

# Freshwater species of the Isle of Man: an eDNA Survey\*

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Taxa Genomics

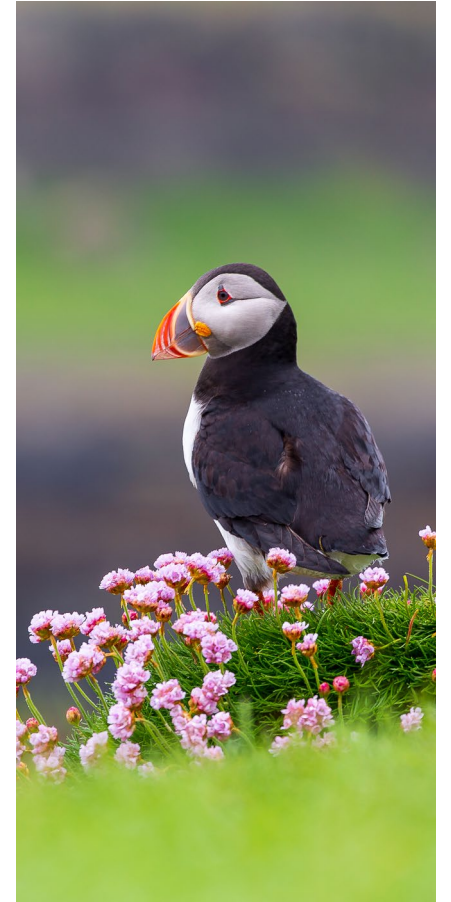
# What are biomonitoring and biosurveillance?

- **Biomonitoring**

- The regular measurement of biodiversity or specific taxa in an environment to understand ecological health, species richness, or long-term trends
- Detects changes in community composition, presence/absence of species, and overall ecosystem status

- **Biosurveillance**

- The targeted, early detection and tracking of specific species or pathogens to enable rapid management action.
- Acts as an early warning system for threats to biodiversity, food security, or public health



# Traditional surveys

- Fish surveys often involve electrofishing, seine netting, or trapping
  - invasive
  - labour-intensive
  - seasonal
- Macroinvertebrate surveys
  - Kick sampling
  - Physical identification and sorting of species
  - Relies on microscopy and visual taxonomic expertise



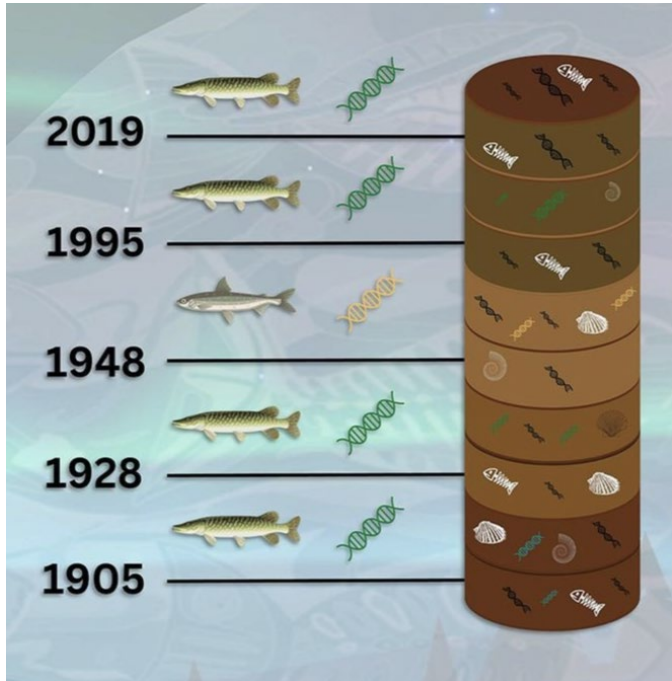


# Environmental DNA (eDNA)

- eDNA is the DNA left behind in an environment by organisms
  - epithelial cells
  - mucous
  - gametes
  - faeces
- eDNA can be broken down by UV light, microbes and DNases over time
- Temporal resolution
  - typically, days-weeks
  - Isle of Man rivers likely hours



# eDNA soil/sediment/surface sampling



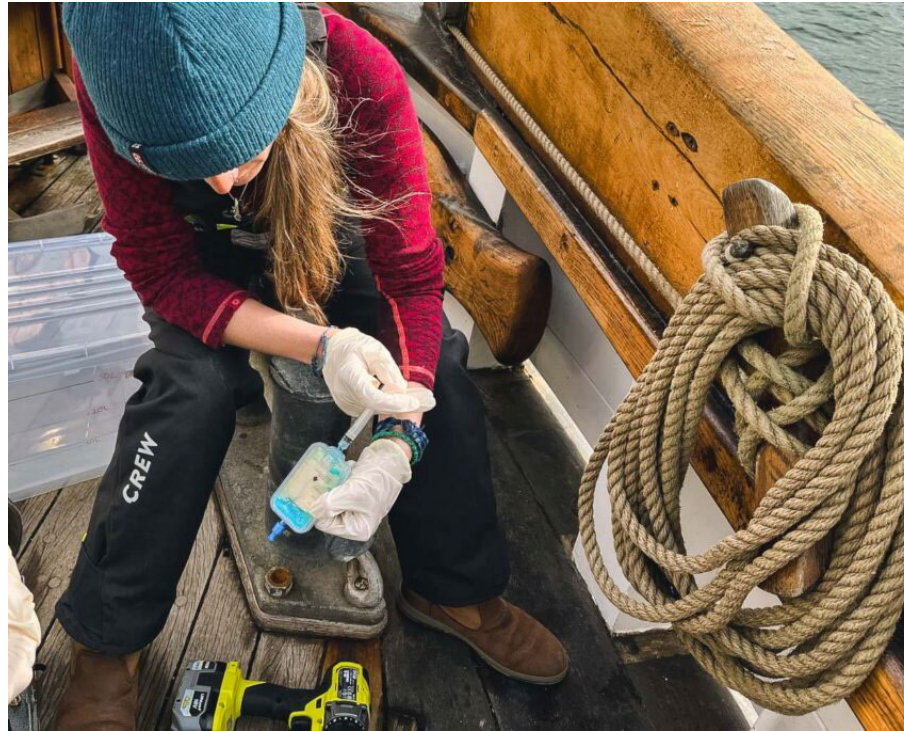


# eDNA air sampling





# eDNA water sampling

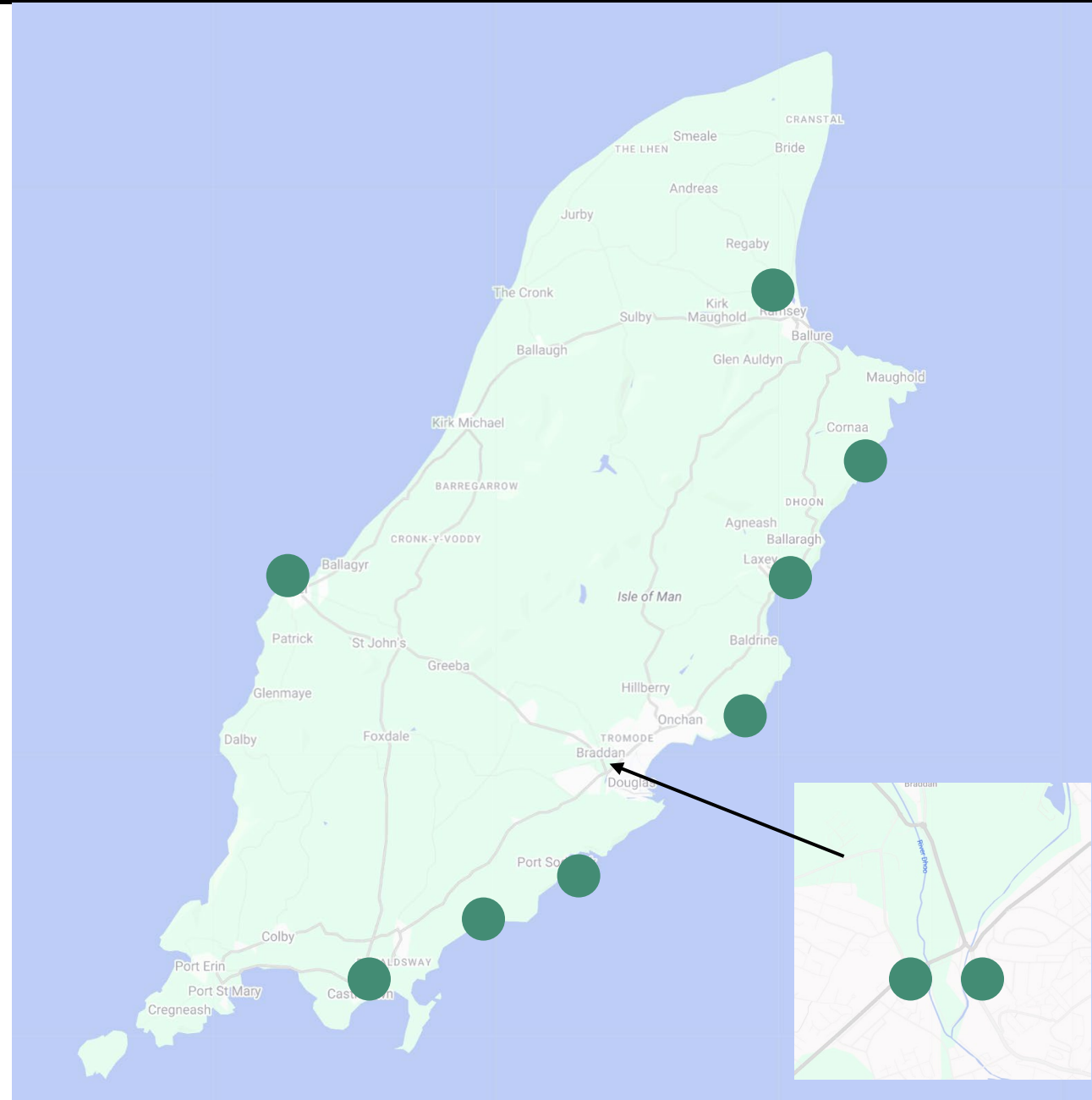


# Freshwater samples

## Rivers:

- Sulby
- Cornaa
- Laxey
- Groudle
- Dhoo
- Glass
- Port Soderick
- Port Grenaugh
- Silverburn
- Neb

DISCLAIMER! These samples were taken for internal R&D purposes not a designed and executed survey of Manx rivers.





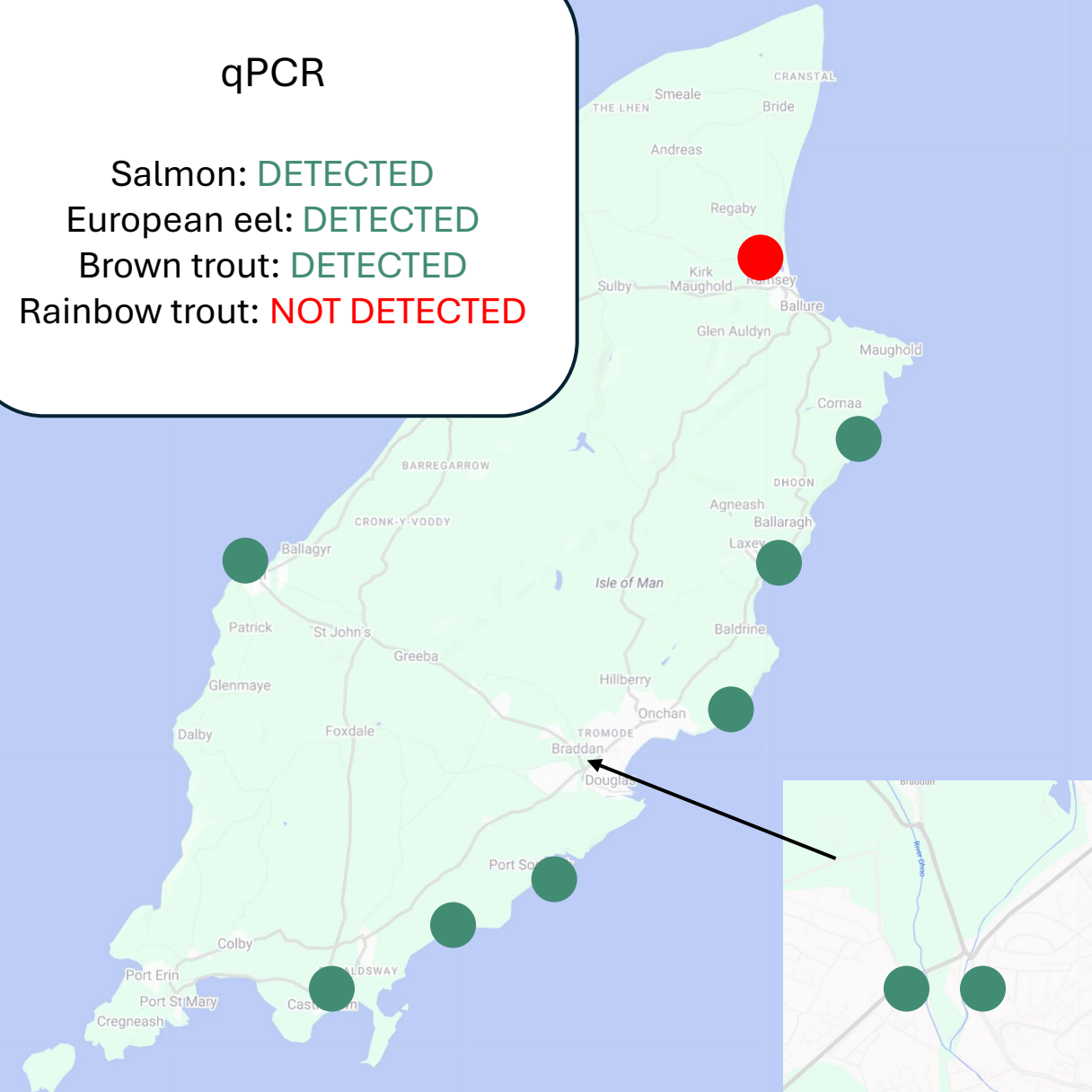
# Sulby River

Metabarcoding detected:

- *Homo sapiens* (Human)
- *Salmo salar* (Atlantic salmon)
- *Anguilla Anguilla* (European eel)
- *Pomatoschistus microps* (Goby)
- *Salmo trutta* (Brown trout)
- *Felis catus* (cat)

qPCR

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



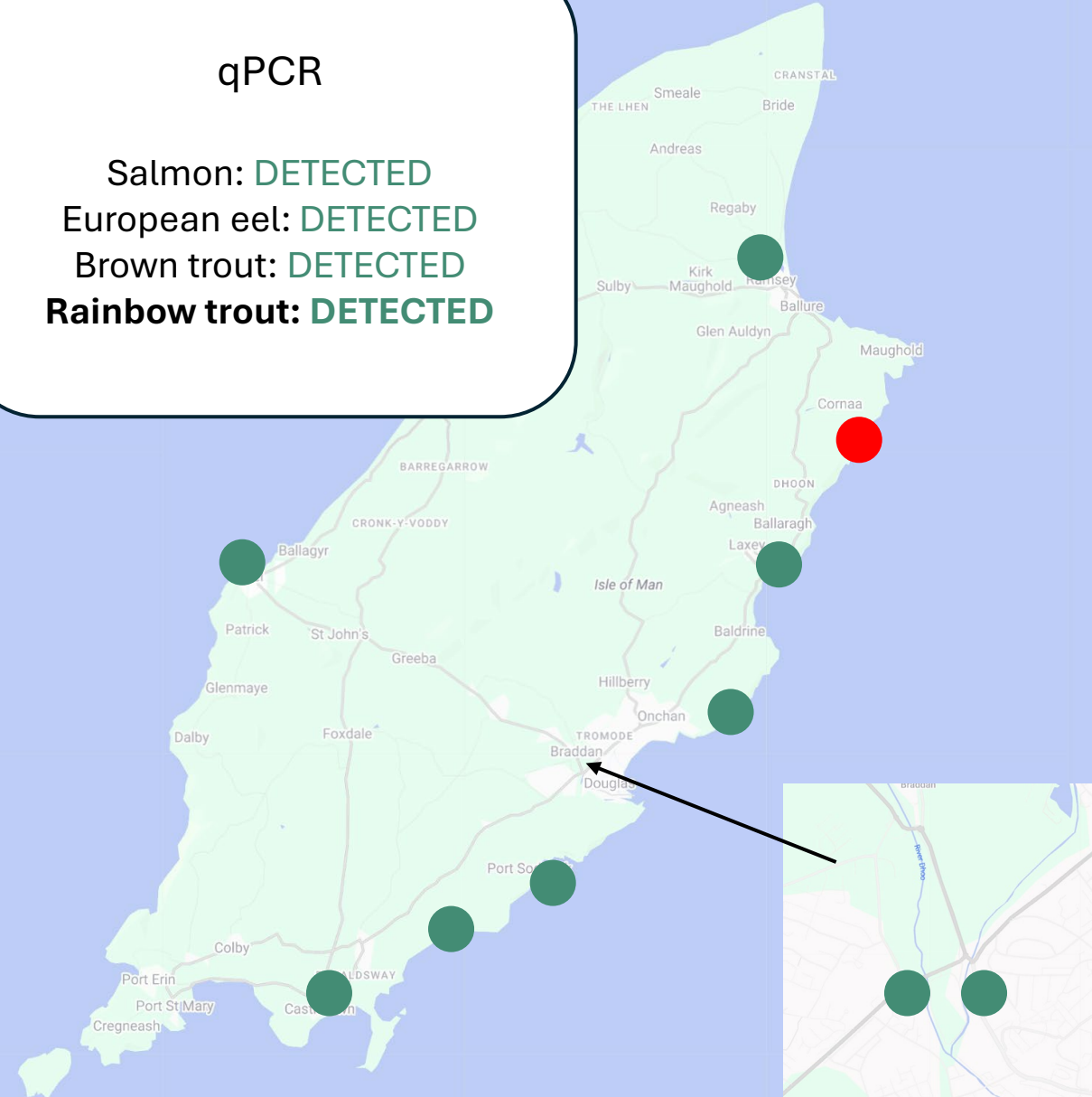
# Cornaa River

## Metabarcoding detected:

- *Onchorhynchus mykiss* (Rainbow trout)
- *Mareca sp.* (ducks)
- *Spatula clypeata* (northern shoveler)
- *Salmo salar* (Atlantic salmon)
- *Anguilla Anguilla* (European eel)
- *Pomatoschistus microps* (Goby)
- *Salmo trutta* (Brown trout)
- *Homo sapiens* (Human)

qPCR

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





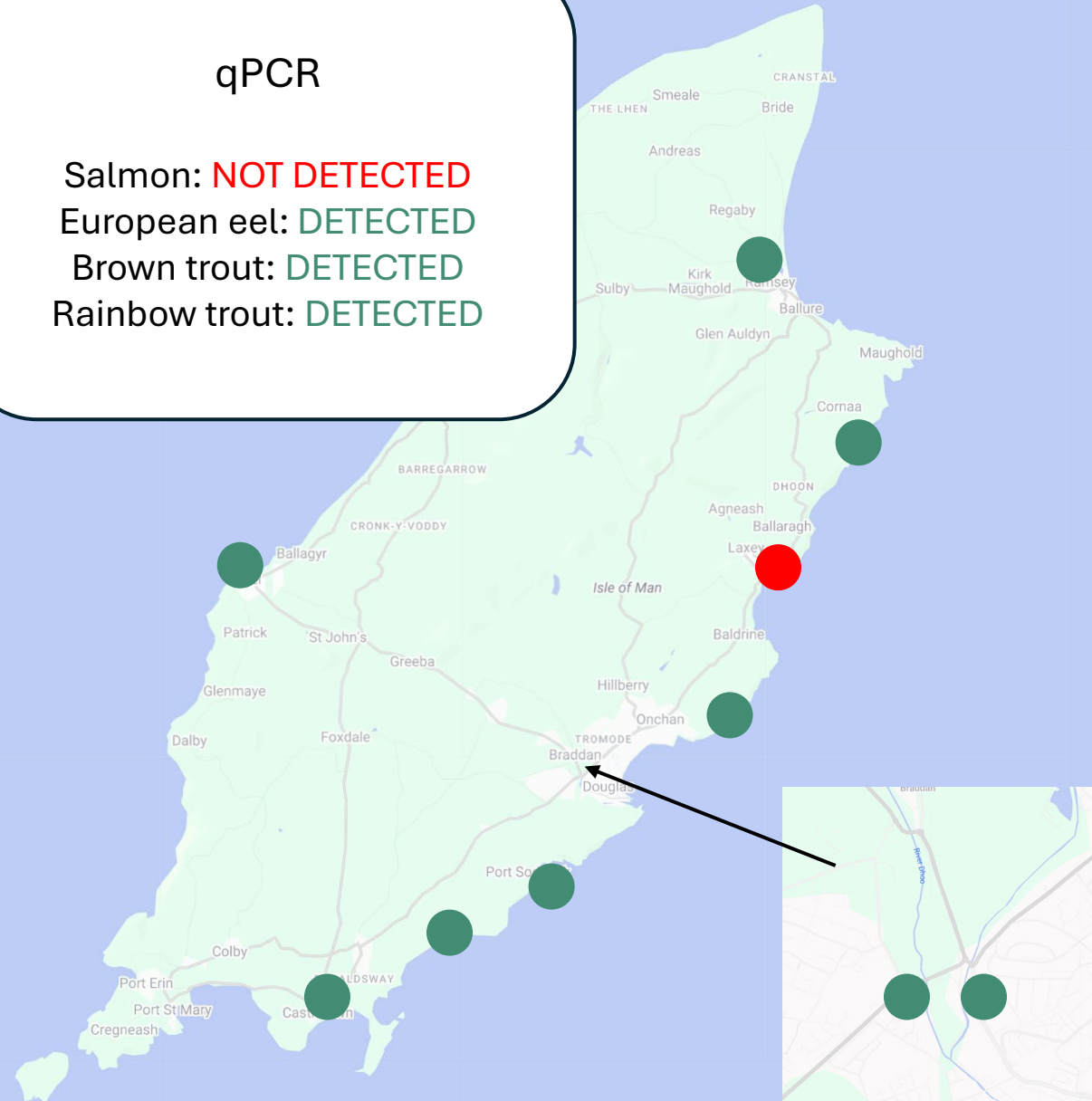
# Laxey River

Metabarcoding detected:

- *Homo sapiens* (Human)
- *Salmo trutta* (Brown trout)
- *Salmo salar* (Rainbow trout)
- *Oncorhynchus mykiss* (Rainbow trout)
- *Pomatoschistus microps* (Goby)

qPCR

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



# Groudle River

## Metabarcoding detected:

- *Homo sapiens* (Human)
- *Anguilla Anguilla* (European eel)
- *Salmo trutta* (Brown trout)
- *Onchorynchus mykiss* (Rainbow trout)
- *Felis catus* (Cat)
- *Sorex minutus* (Shrew)
- *Bos taurus* (Cow)
- *Canis lupus familiaris* (Dog)

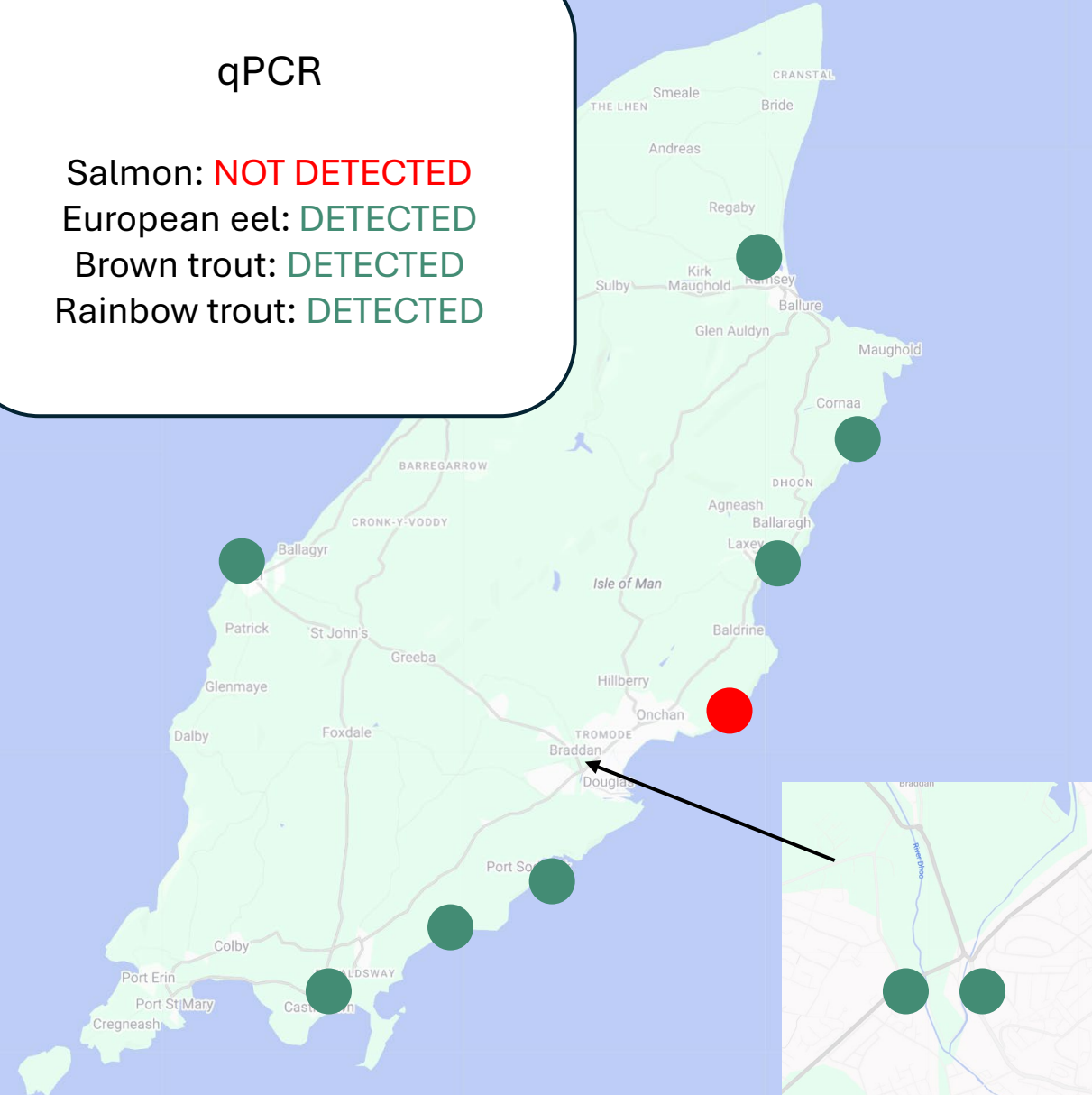
qPCR

Salmon: NOT DETECTED

European eel: DETECTED

Brown trout: DETECTED

Rainbow trout: DETECTED



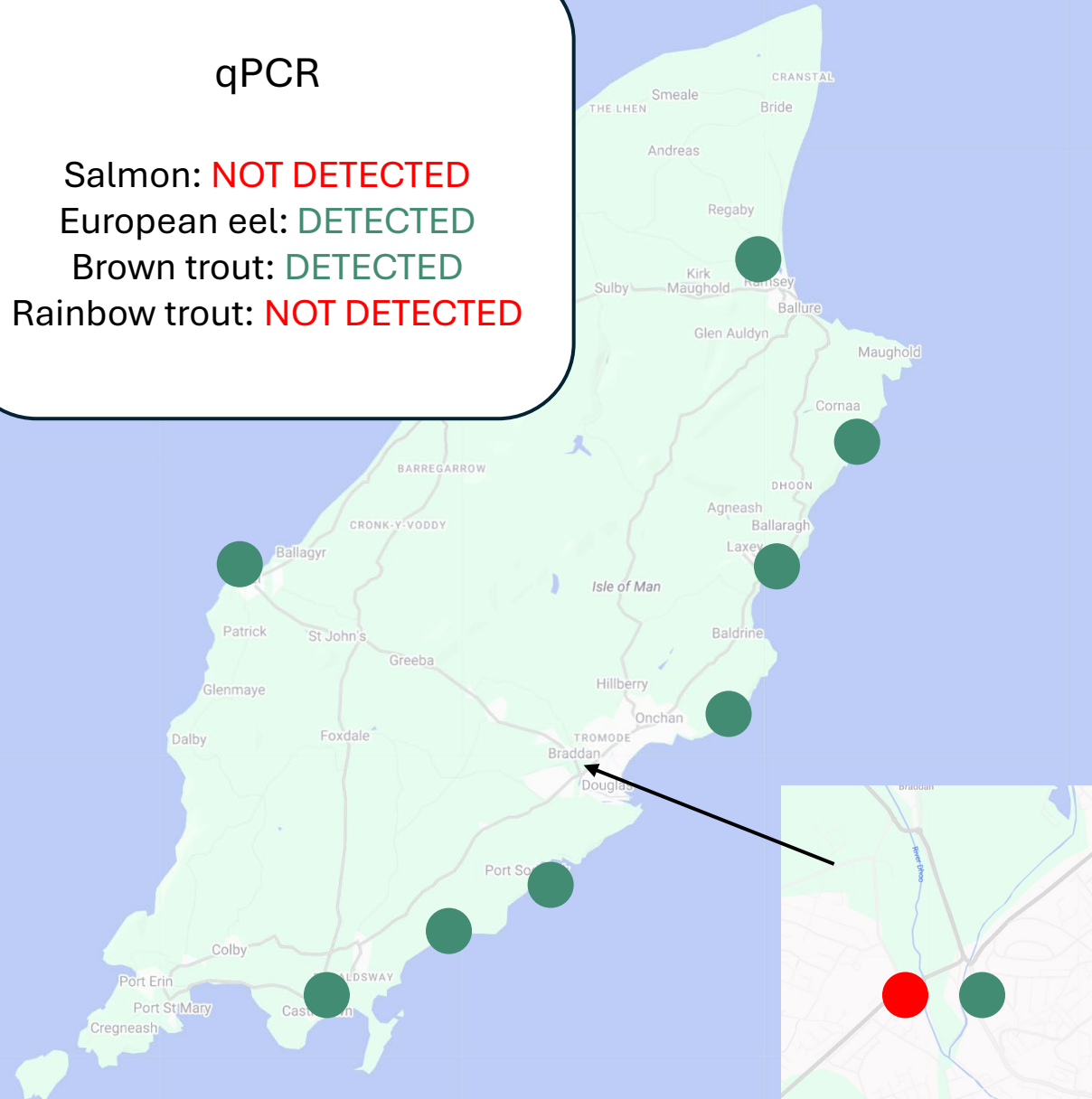


# River Dhoo

No metabarcoding data

qPCR

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

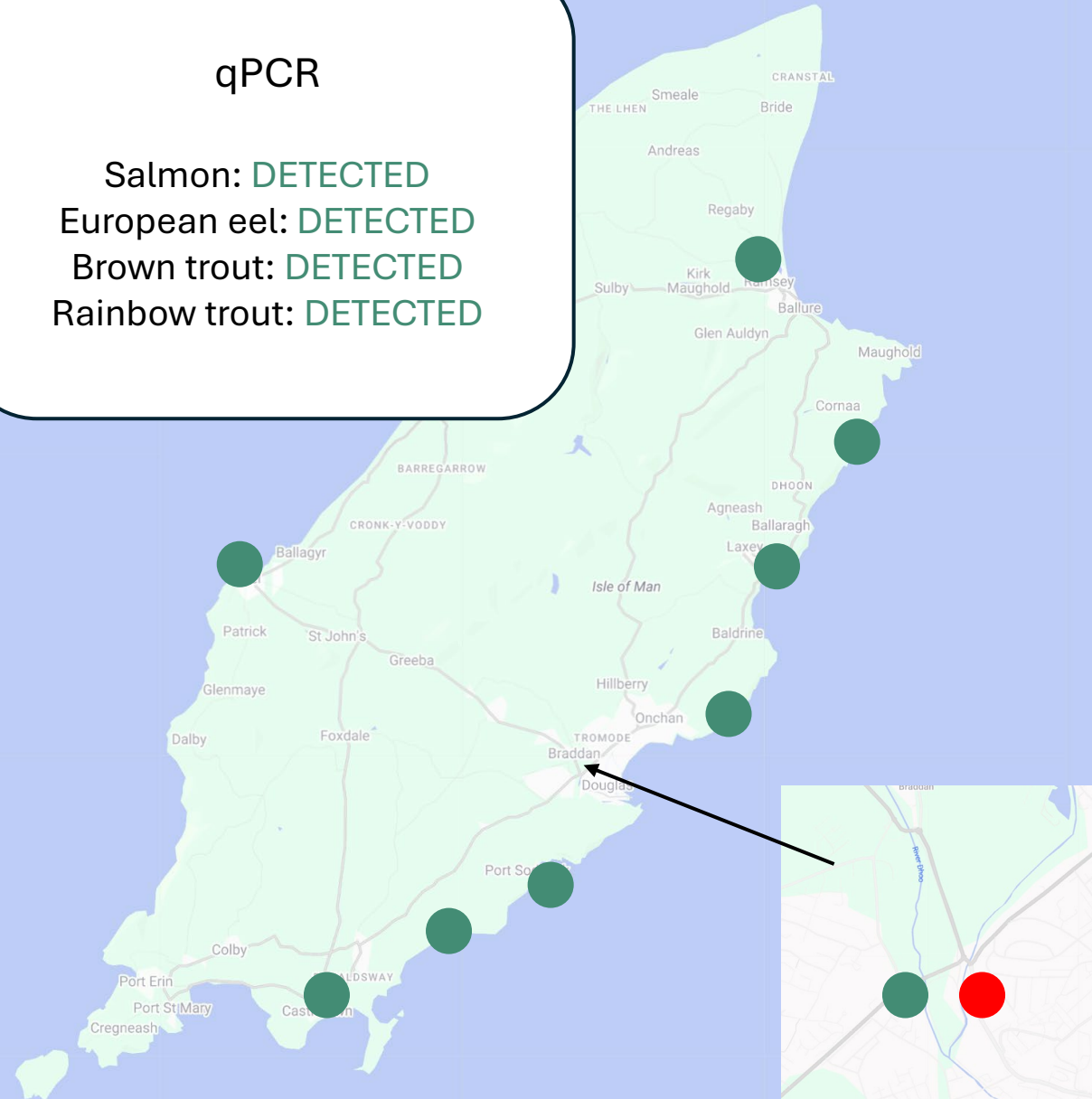


# River Glass

## No metabarcoding data

qPCR

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



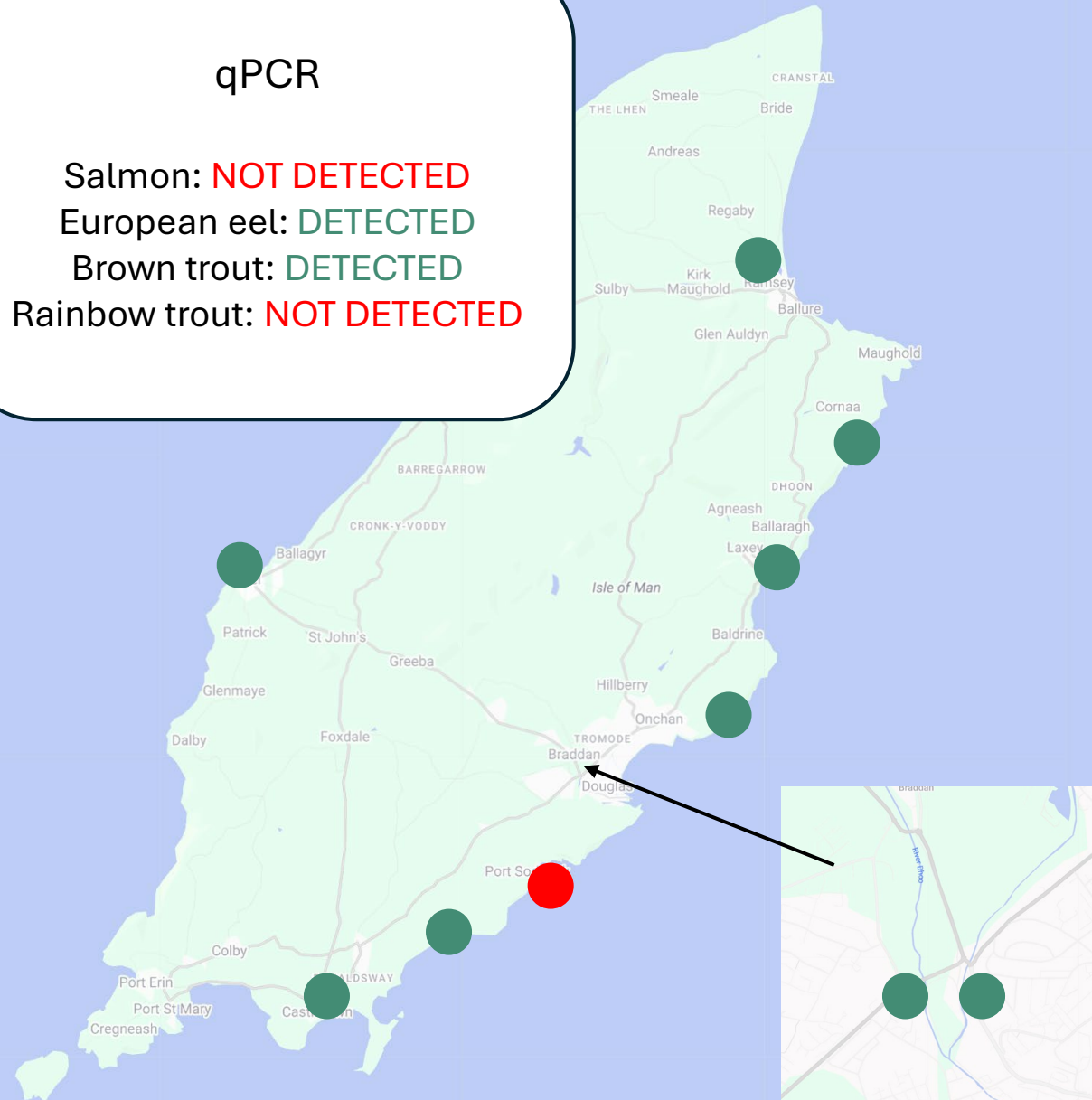


# Port Soderick

No metabarcoding data

qPCR

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

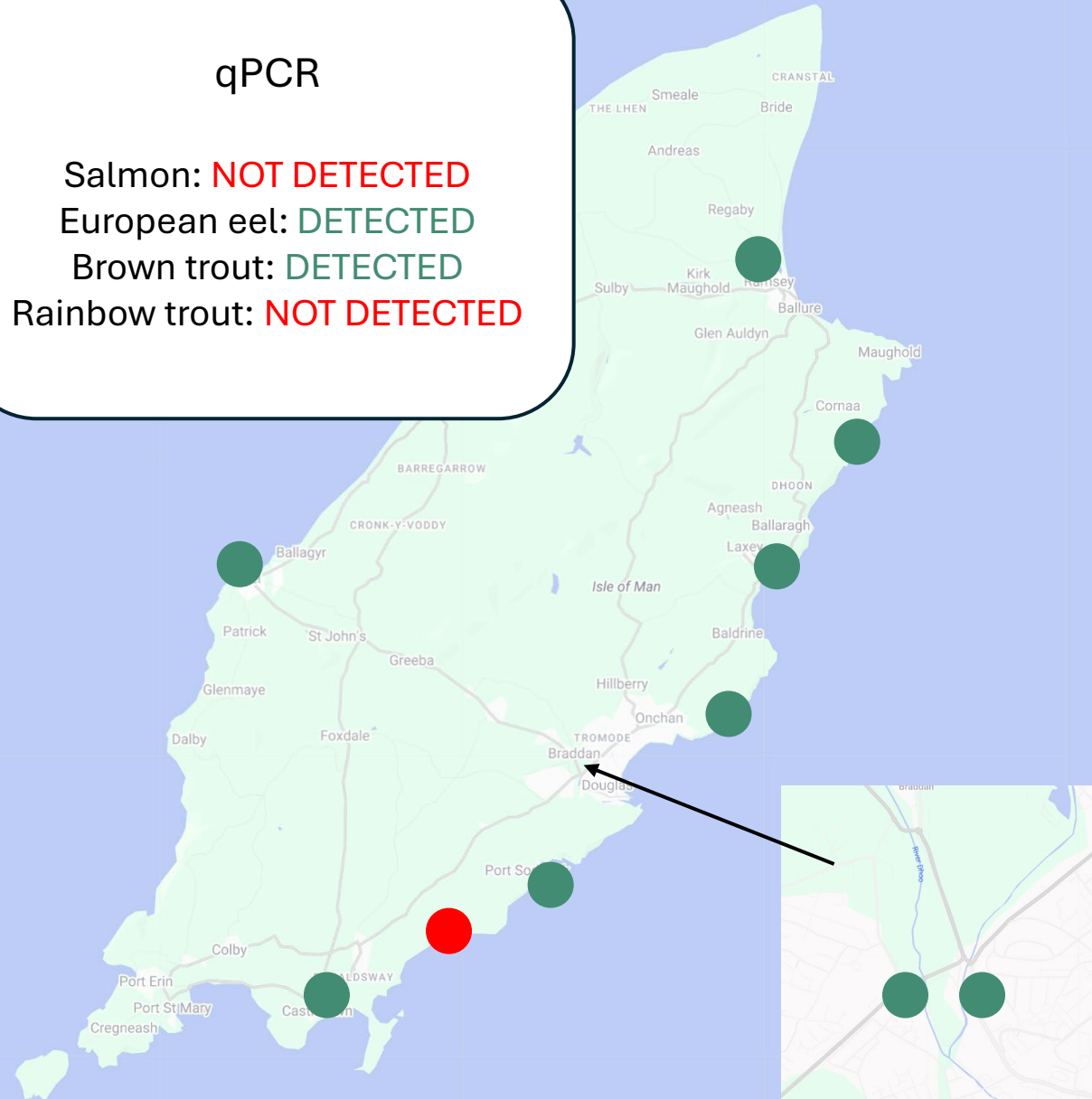


# Port Grenaugh

No metabarcoding data

qPCR

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

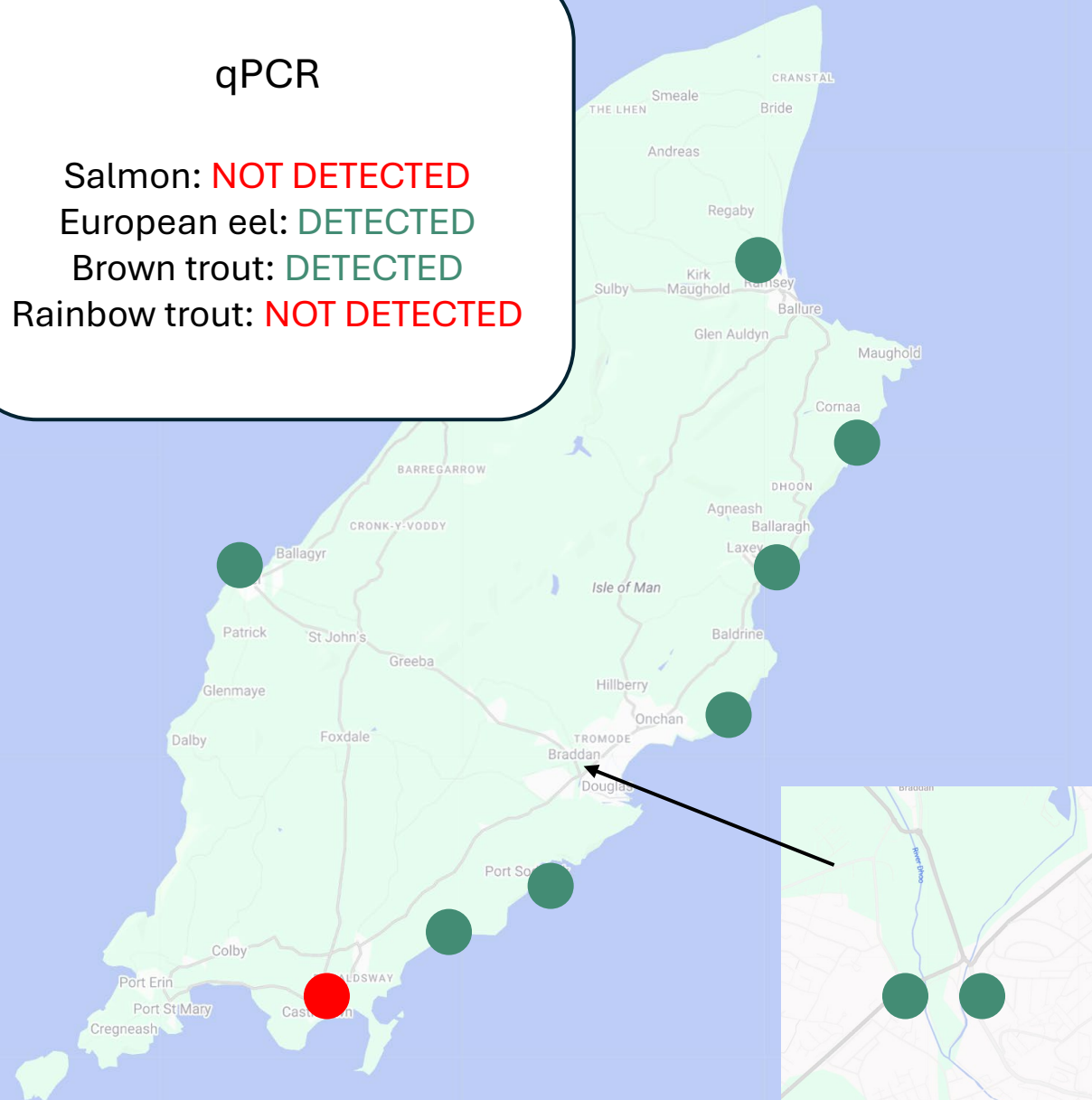


# Silverburn river

No metabarcoding data

qPCR

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





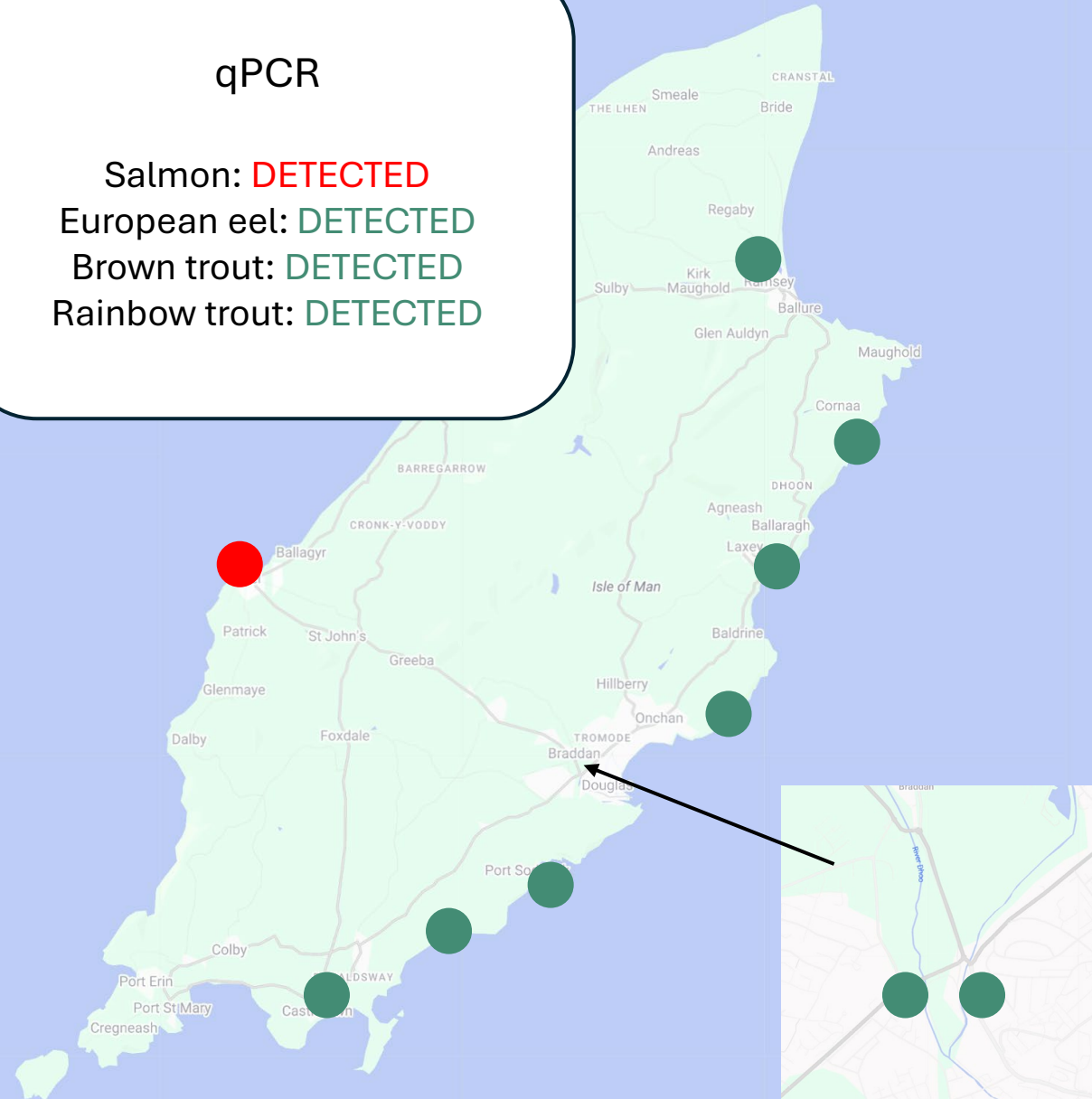
# River Neb\*\*

## Metabarcoding detected:

- *Salmo trutta* (Brown trout)
- *Anguilla anguilla* (European eel)
- *Salmo salar* (Atlantic salmon)
- *Pomatoschistus microps* (goby)
- *Clupea harengus* (herring)
- *Sprattus sprattus* (brisling)
- *Scomber scombrus* (mackerel)
- *Thymallus thymallus* (grayling)
- *Uria aalge* (guillemot)
- *Larus argentatus* (herring gull)

qPCR

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



# Findings

- The red-listed endangered European eel appears to be extremely abundant in rivers on the Isle of Man
  - This finding warrants further investigation
- Brown trout is also abundant in Isle of Man rivers
- Rainbow trout and Atlantic salmon were also detected
- No detections of the invasive Pink salmon were detected.
  - **HOWEVER!**
    - We did not test for this specifically for this species with qPCR, the most sensitive method.
    - The metabarcoding experiments were not designed to carry out “deep sequencing” to detect rare species.

# Thank you!



**@Taxa Genomics**

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Any questions?