



Optimisation of sampling procedures for citizen science-led eDNA projects

AUS/NZ eDNA conference
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REEF CATCHMENTS SCIENCE PARTNERSHIP



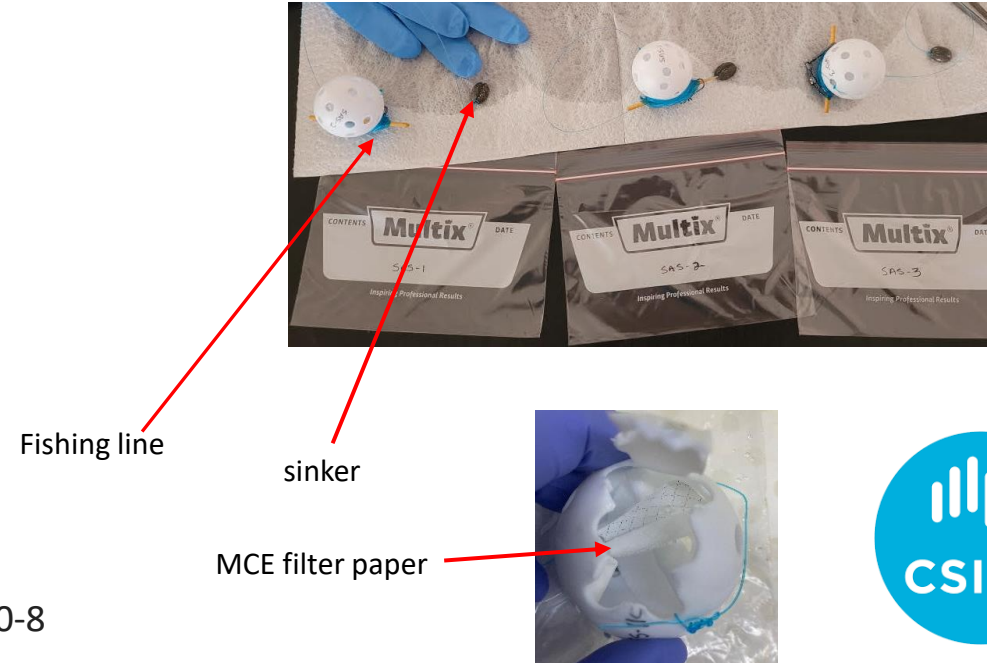
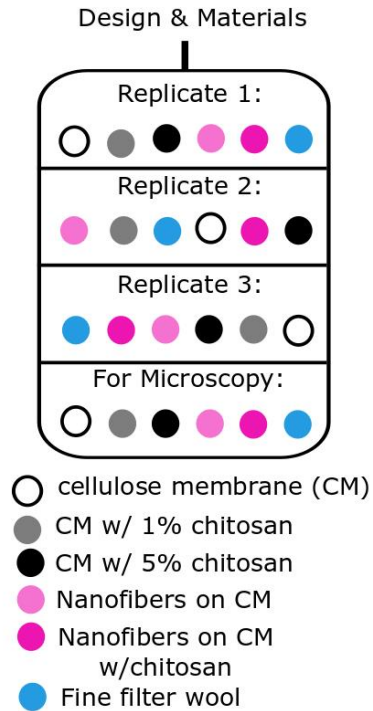
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eDNA Passive sampler method – for dynamic tropical river systems

- No water filtration required
- Submerge the filter for any period of time greater than 10 minutes
- Species composition



Bessey, C. et al. Passive eDNA collection enhances aquatic biodiversity analysis. *Commun Biol* 4, 236 (2021). <https://doi.org/10.1038/s42003-021-01760-8>



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Sampling & extraction protocol investigation: To test the efficacy of eDNA sample approaches for detecting fish taxa



1. Passive filter sampling
Qiagen Blood and tissue standard extraction



2. Water preserved with Longmire's sampling
PPLPP extraction method (Edmunds and Burrows, 2020)

Edmunds RC, Burrows D. Got Glycogen?: Development and Multispecies Validation of the Novel Preserve, Precipitate, Lyse, Precipitate, Purify (PPLPP) Workflow for Environmental DNA Extraction from Longmire's Preserved Water Samples. *J Biomol Tech.* 2020 Dec;31(4):125-150. doi: 10.7171/jbt.20-3104-003. PMID: 33100918; PMCID: PMC7566611.



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Sampling Sites

Rivers from three different regional GBR catchment areas:

Sampling / experimental design

3x rivers

1. South Johnstone River
2. Barratta Creek
3. O'Connell River

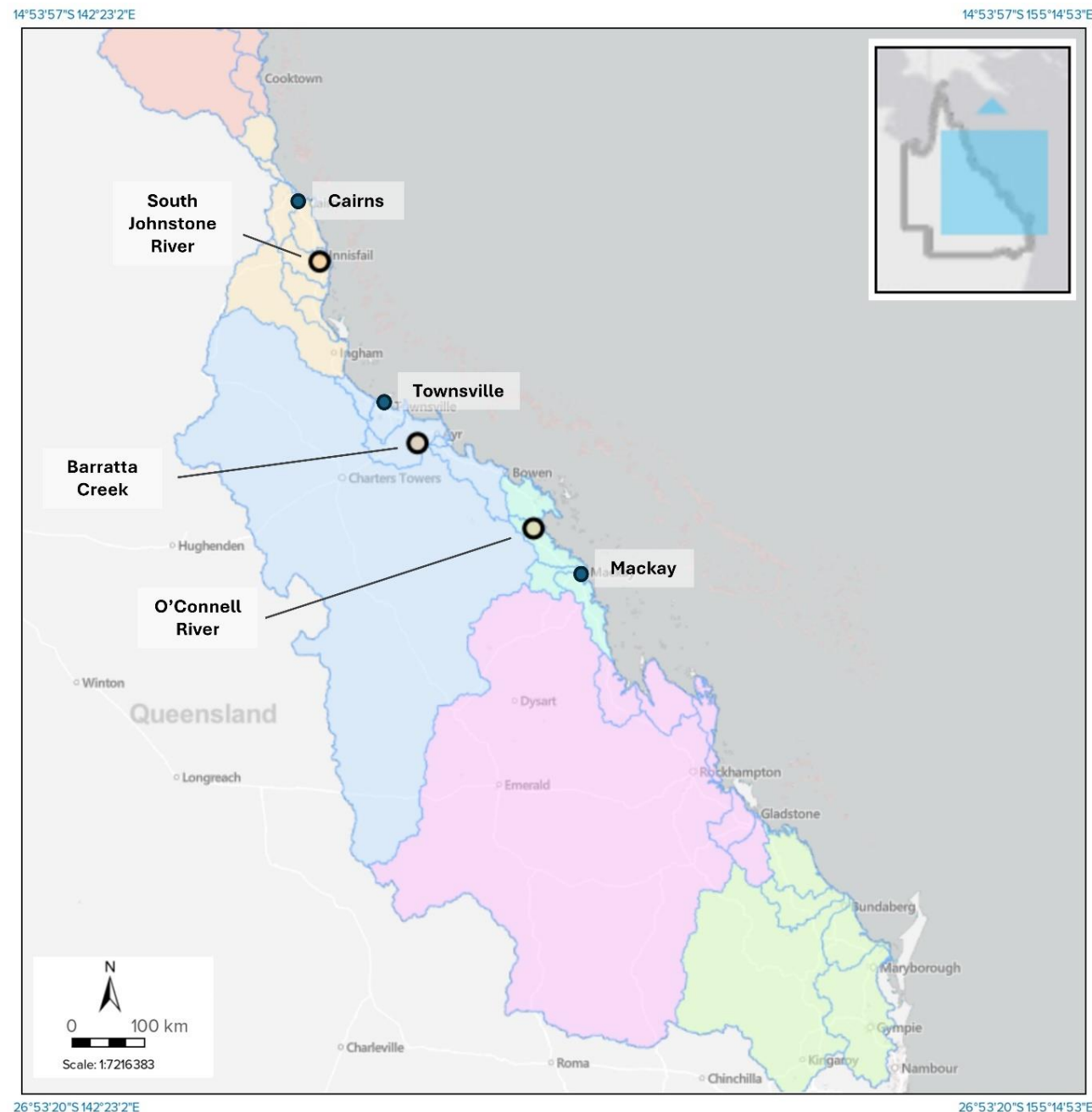
2 x sampling treatments

- Passive filters & qiagen blood & tissue extraction
- Water – Longmire's preservation & PPLPP extraction

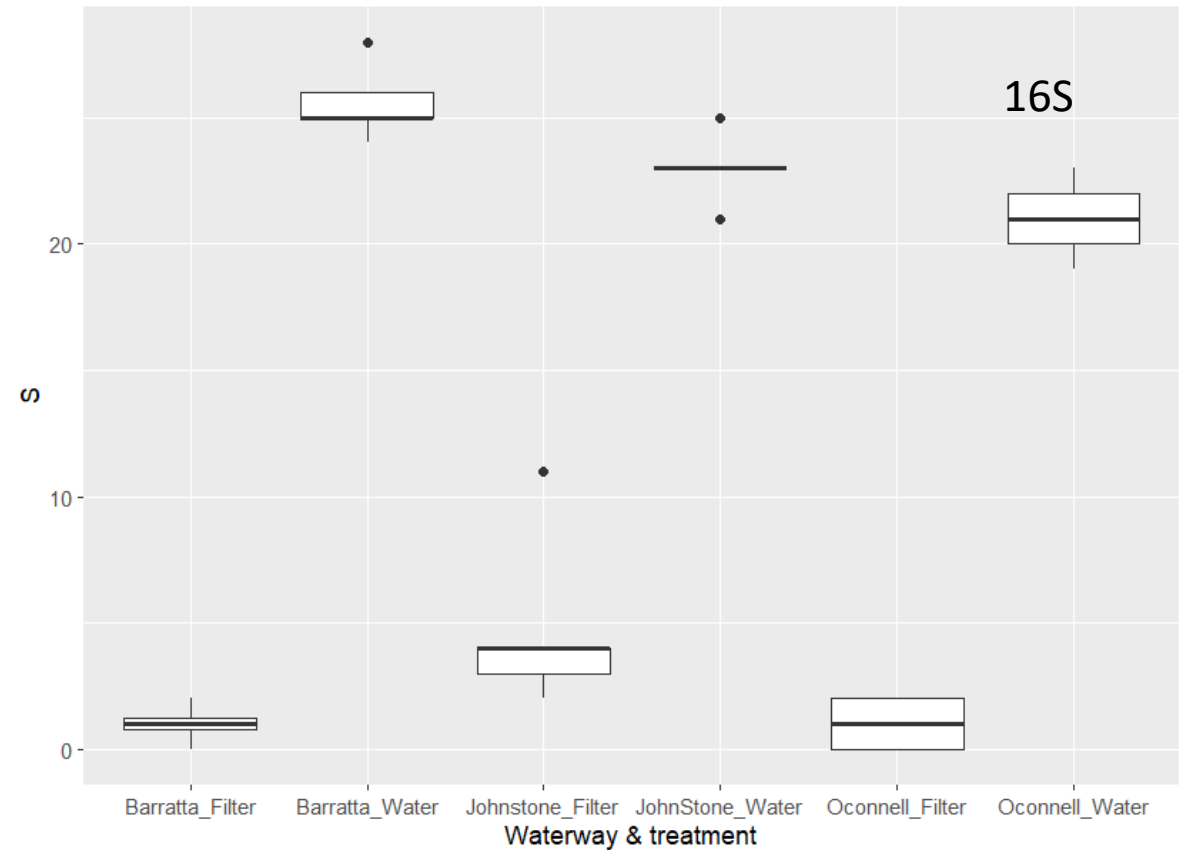
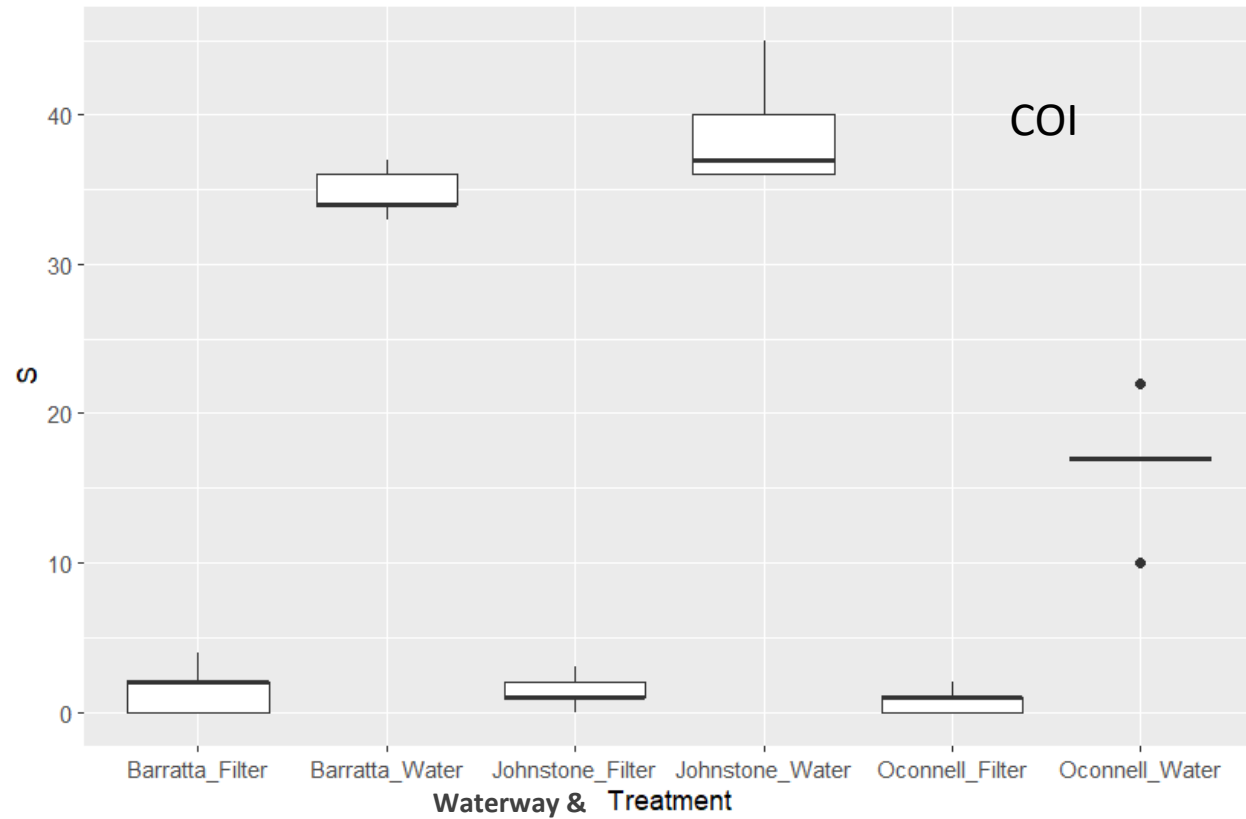
5 biological replicate samples per treatment

Controls

- Field controls
- Lab controls
- PCR controls

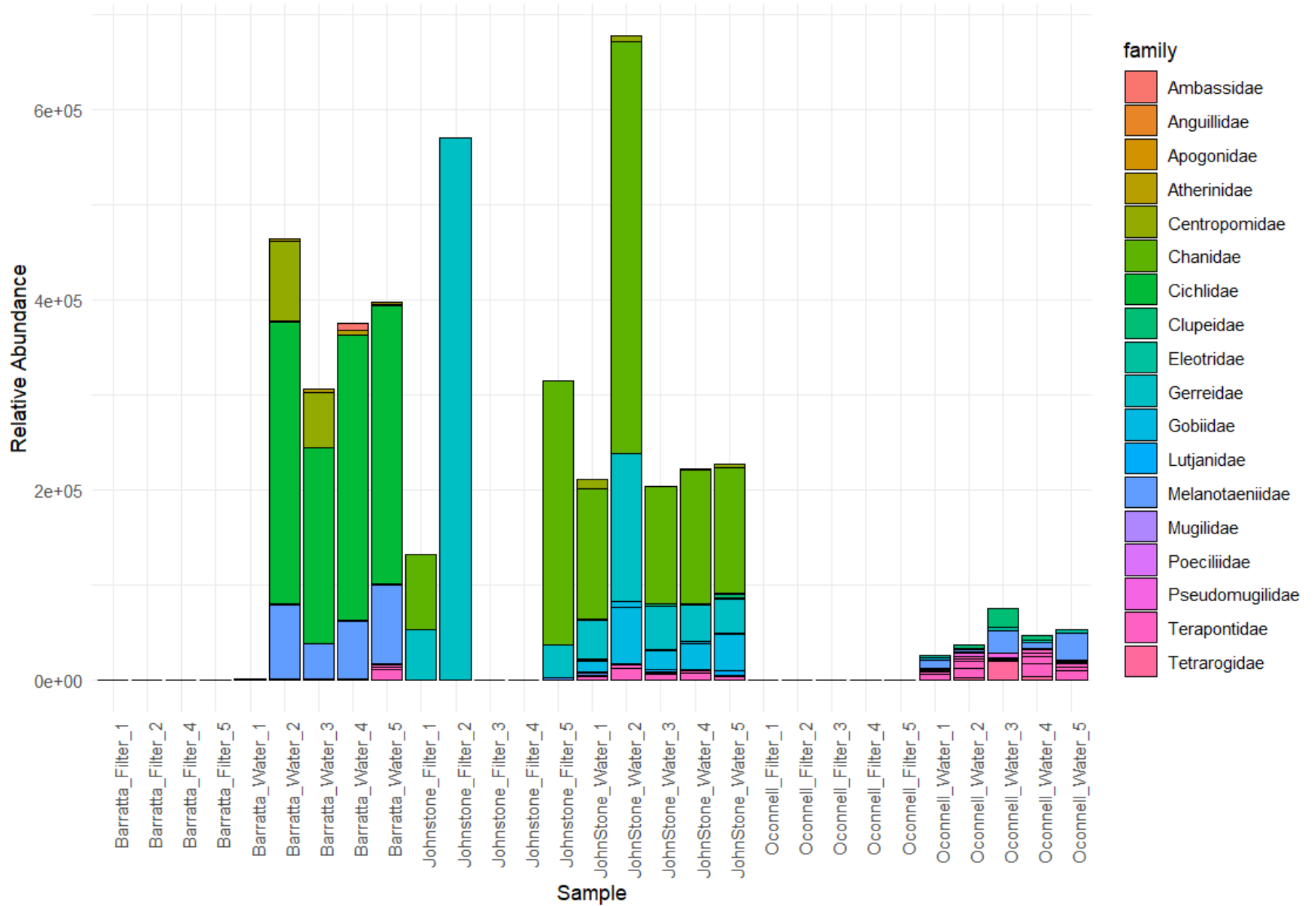


Fish Operational Taxonomic Unit (OTU) richness

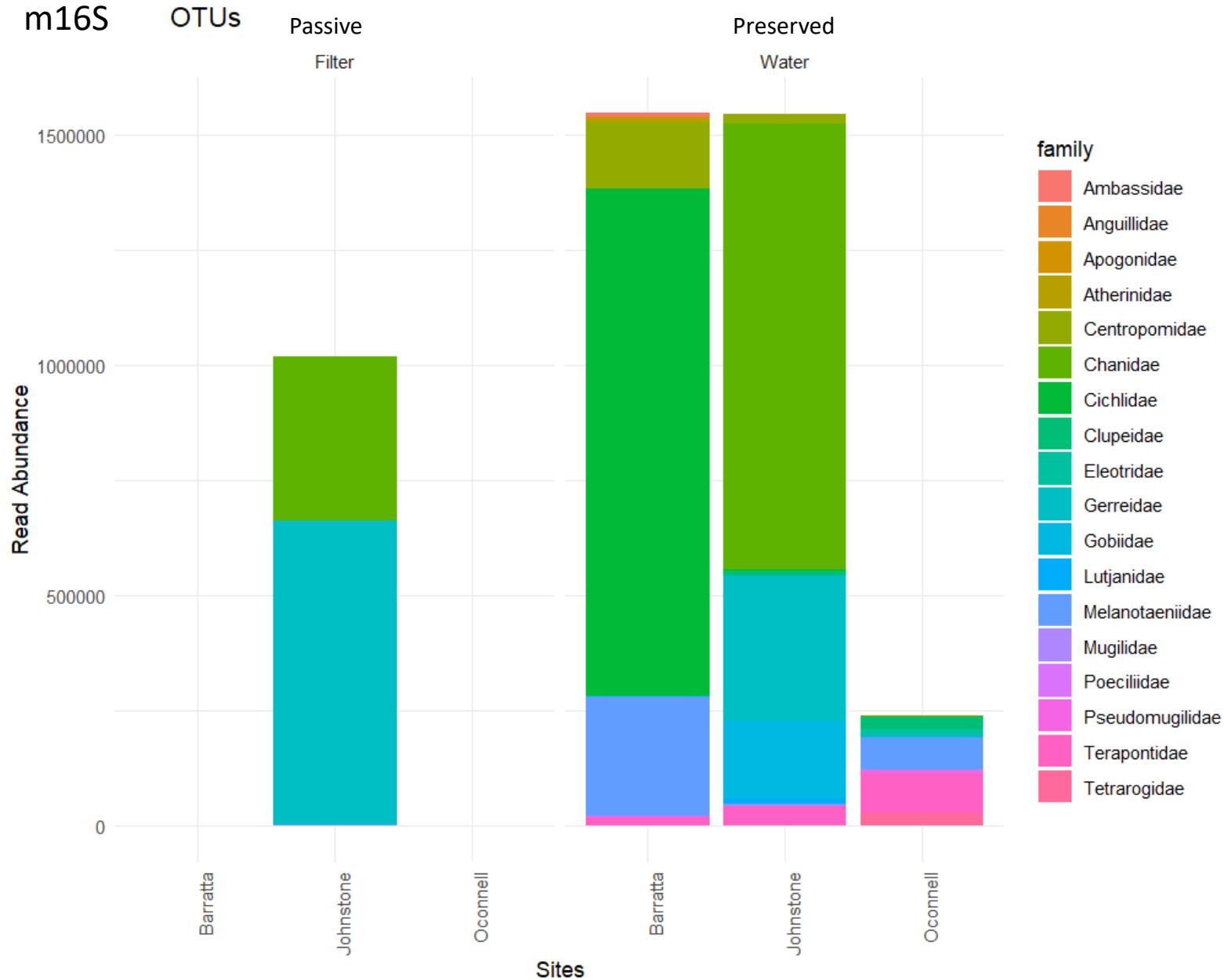


Fish families identified with eDNA

m16S



Read abundance for fish taxa by site and sample type

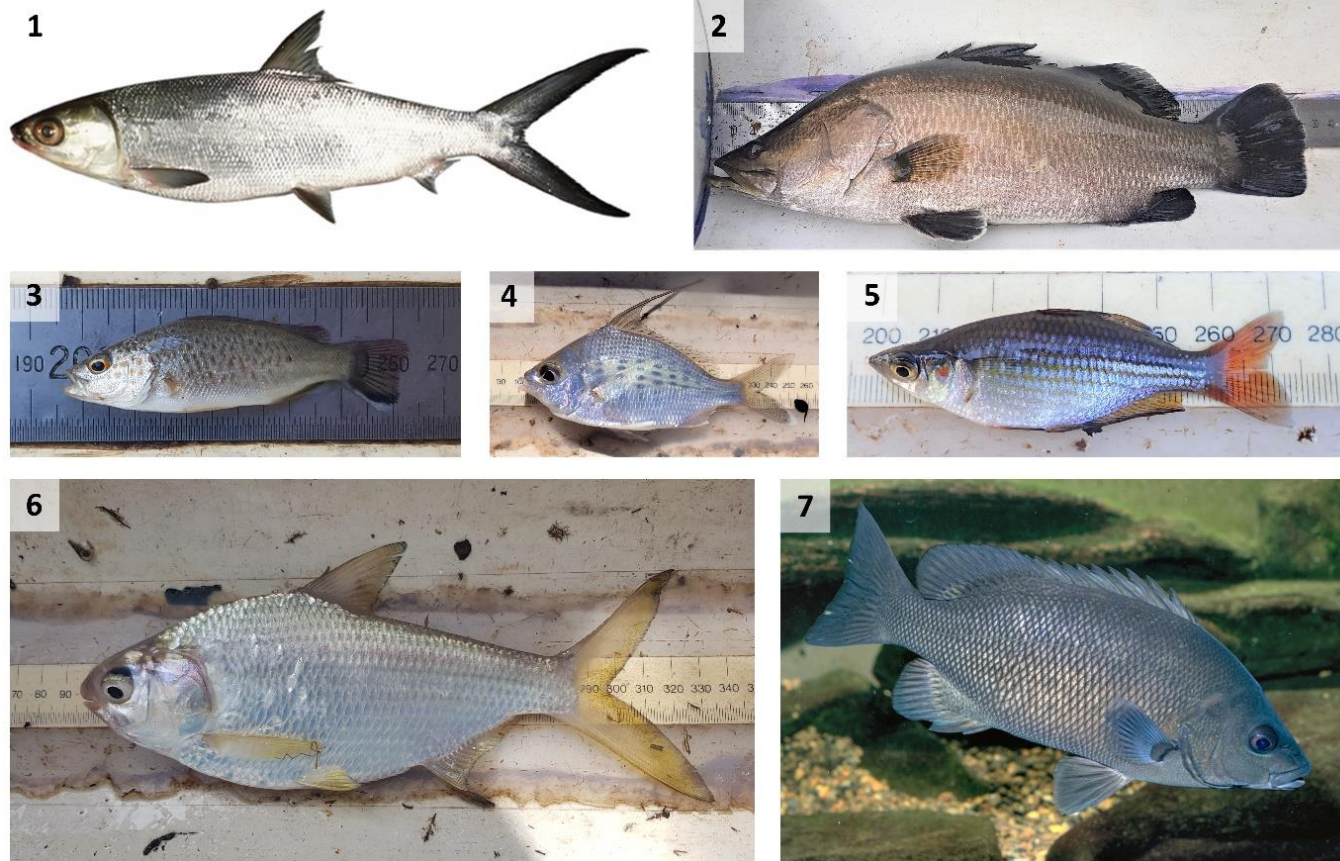


Community engagement - Fish species of interest from GBR, QLD waterways

- Eastern rainbowfish (*Melanotaenia splendida*)
- Barramundi (*Lates calcarifer*)
- Giant Mottled Eel (*Anguilla marmorata*)
- Long-finned Eel (*Anguilla reinhardtii*)
- Snakeheaded gudgeon (*Giuris margaritacea*)
- **Sooty grunter (*Hephaestus fuliginosus*)**
- **Tully grunter (*Hephaestus tulliensis*)**
- Bony bream (*Nematalosa erebi*)
- Mangrove jack (*Lutjanus argentimaculatus*)
- Pikey bream (*Acanthopagrus pacificus*)
- Silver biddy (*Gerres filamentosus*)
- Eel tailed catfish (*Tandanus tropicanus*)
- Fork-tailed catfish (*Neoarius graeffei*)
- Jungle perch (*Kuhlia rupestris*)
- Hardy head (*Craterocephalus spp.*)
- Indo-Pacific tarpon (*Megalops cyprinoides*)
- Milkfish (*Chanos chanos*)
- Hawaiian ladyfish (*Elops hawaiiensis*)



Common fish species detected using eDNA in north QLD waterways from this study



1, milkfish, *Chanos chanos*; 2, barramundi, *Lates calcarifer*;
3, spangled perch, *Leiopotherapon unicolor*; 4, threadfin silverbiddy, *Gerres filamentosus*;
5, eastern rainbowfish, *Melanotaenia splendida*; 6, bony bream, *Nematalosa erebi*; 7, sooty grunter, *Hephaestus fuliginosus*.

Citizen science volunteer eDNA project in GBR catchment waterways



Volunteers who sampled eDNA sites



Dr Cecilia Villacorta Rath



Dr Geoff Collins



Dr Sharon Hook



Great Barrier Reef Foundation

