Beyond tracks and scats: an introduction to eDNA

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EnviroDNA

3rd October 2024

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AWS eDNA webinar course 2024

- 3rd Oct: Introduction to eDNA

- 24th Oct – 5th Dec:

    - 2 online workshops

    - eDNA sampling kit & vertebrate

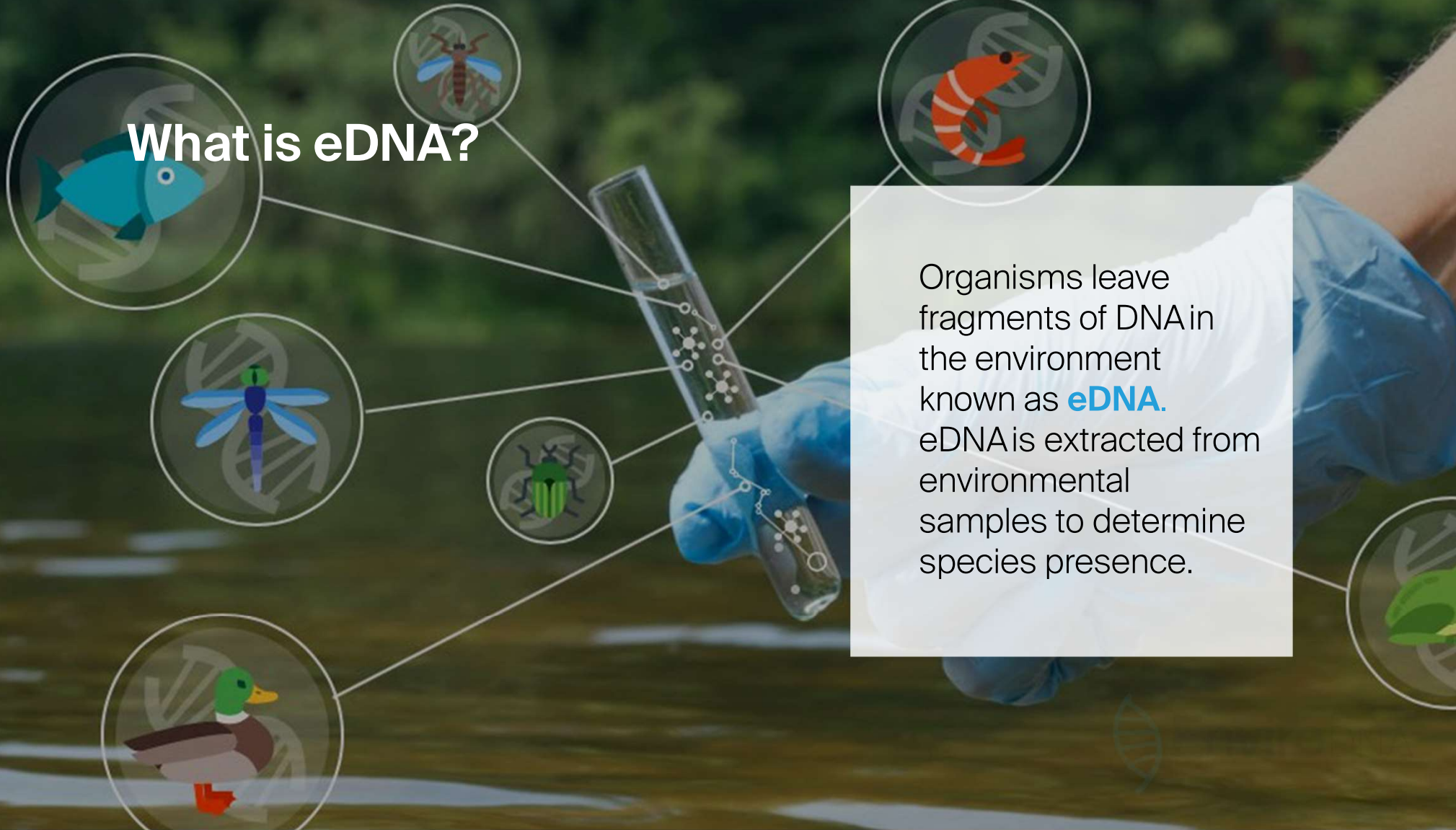   analysis

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About us

Track and understand life on earth
for improved decision making
using environmental DNA.

- Based in Melbourne
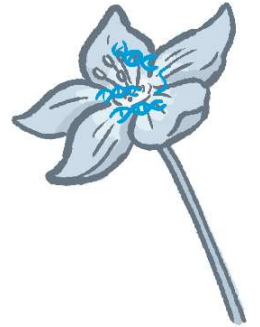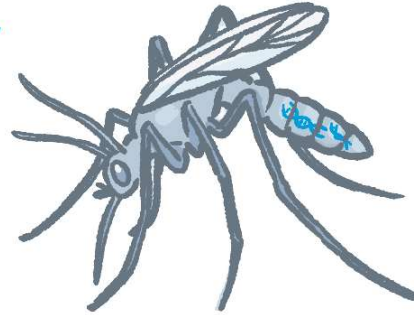- 25 employees
- 250+ clients
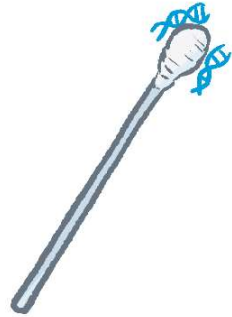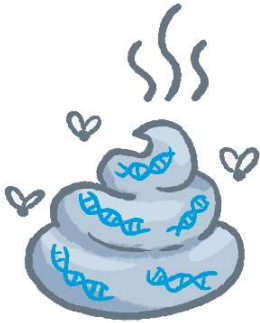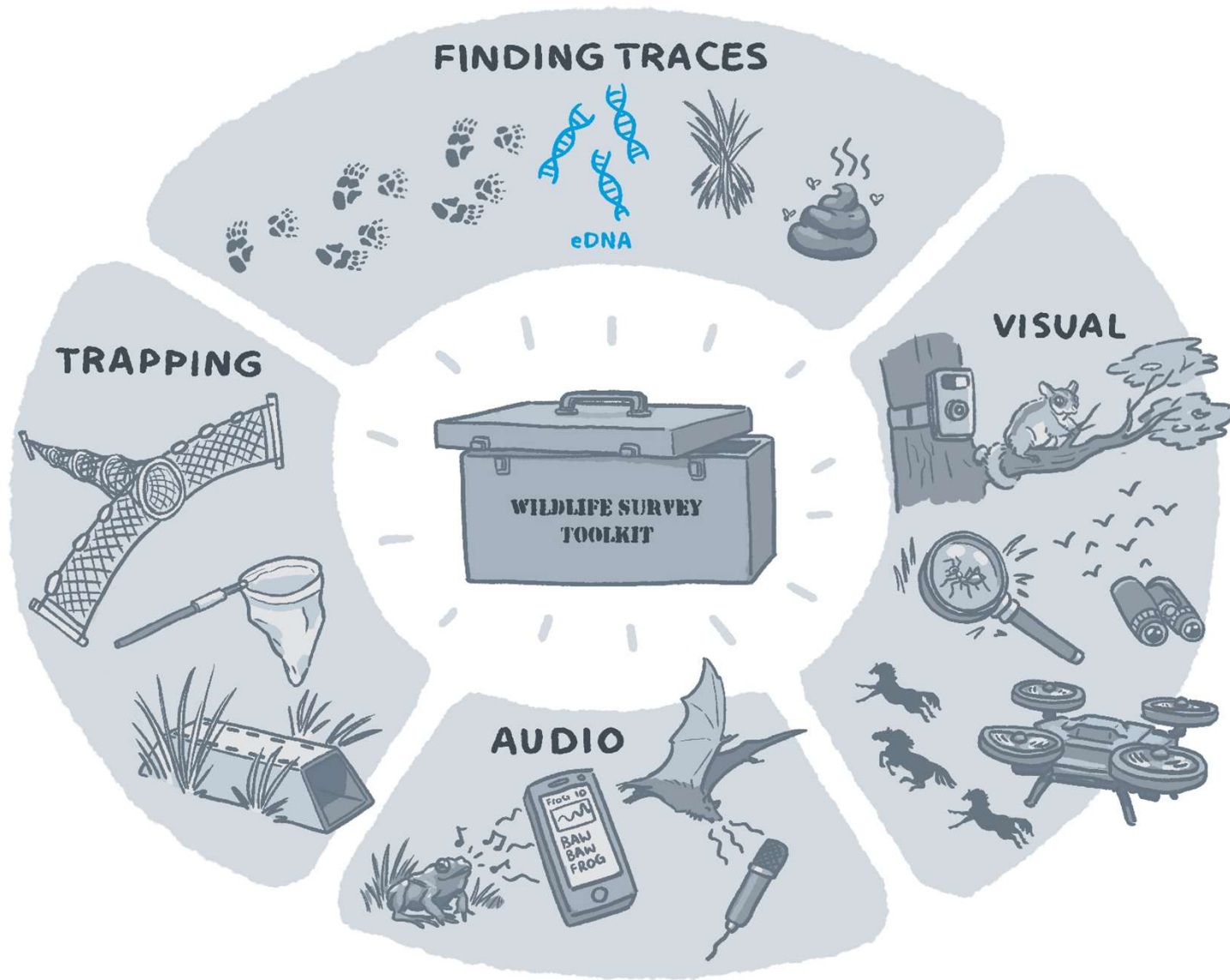- Services - Australia and abroad

What is eDNA?

Organisms leave fragments of DNA in the environment known as **eDNA**. eDNA is extracted from environmental samples to determine species presence.

Sampling approaches

FINDING TRACES

eDNA

TRAPPING

VISUAL

WILDLIFE SURVEY TOOLKIT

AUDIO

FroG ID
BAW
BAW
FROG

Advantages for monitoring

- Simple sampling methods

- Non-invasive

- Highly sensitive

- All life stages

- Detect rare or elusive species

- Early detection of invasive species

- Assess biodiversity efficiently

- Long-term, large scale monitoring

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Water sampling

Products range from citizen-science kits with simple consumables, to dedicated equipment for professional fieldworkers with self-preserving filters.

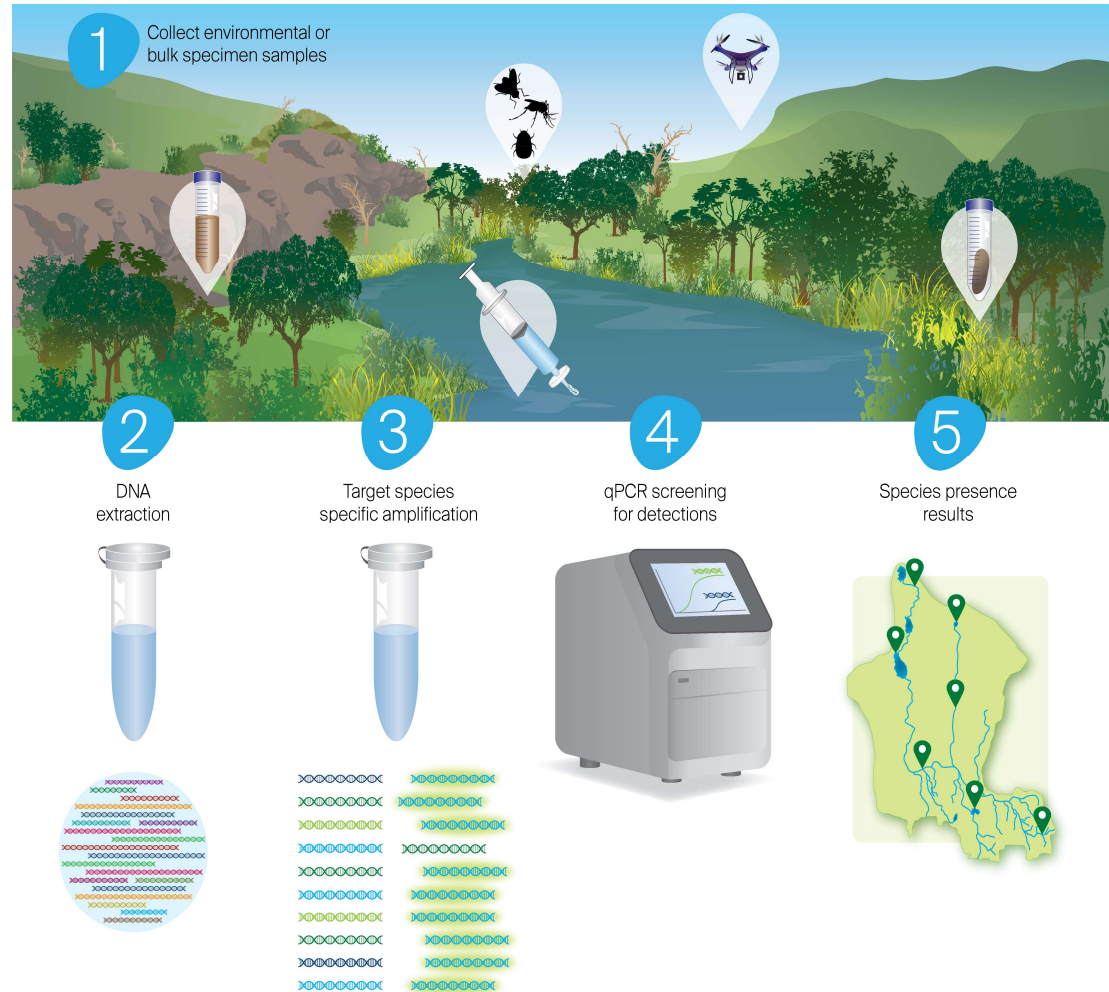Survey design critical to obtain rigorous data specific to your objectives.

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eDNA species detection methods
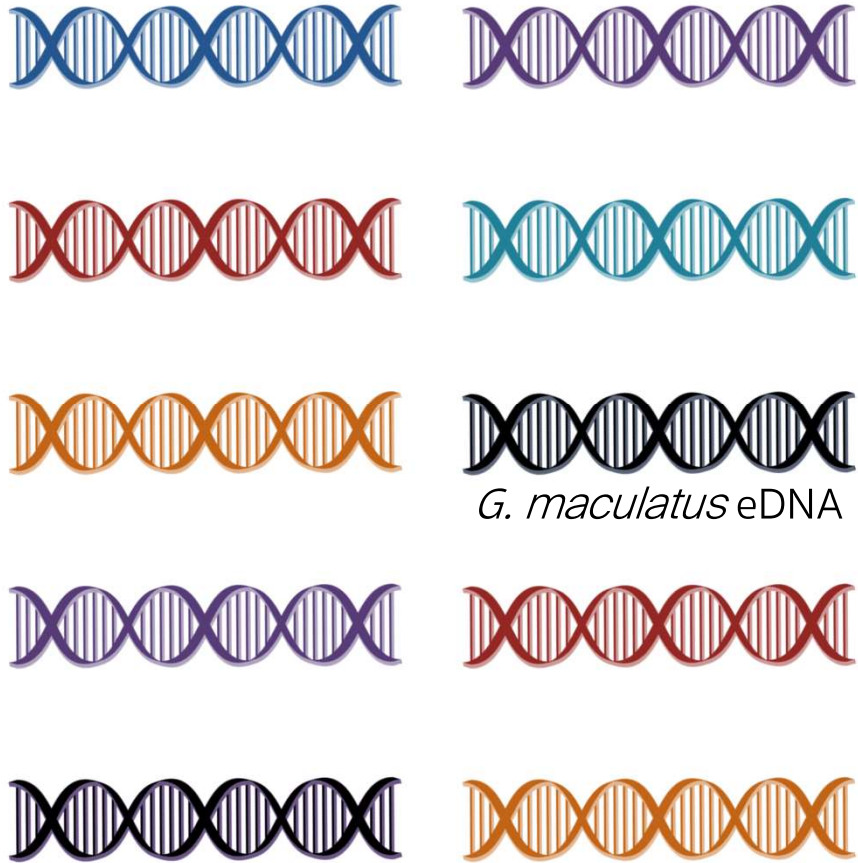

Target-species detection
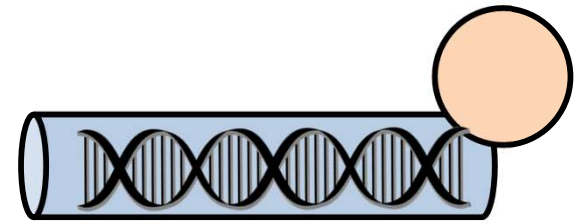
Biodiversity assessments

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Target species assessment (qPCR)

- Determines presence/absence of a single species.

- Native and invasive species
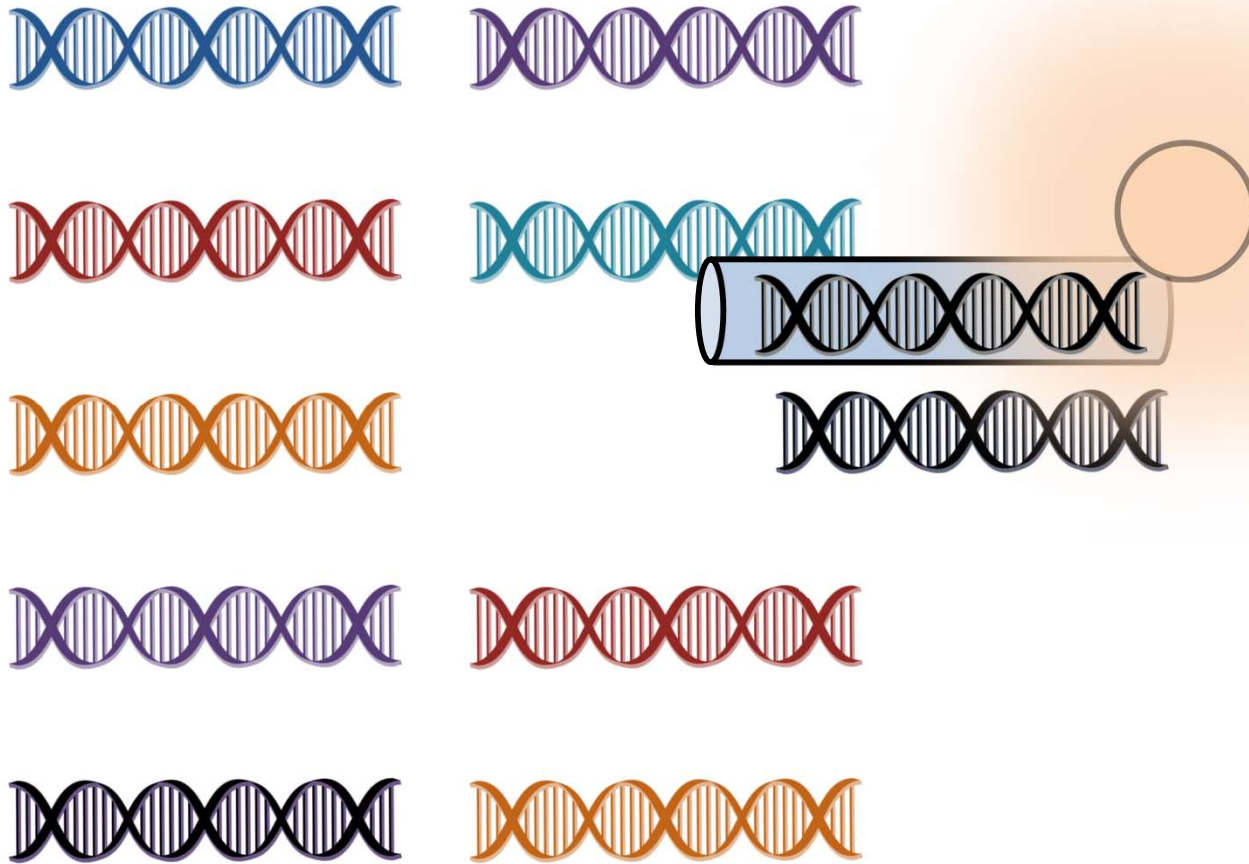
- Highly sensitive, quick turnaround

1 Collect environmental or bulk specimen samples

2 DNA extraction

3 Target species specific amplification

4 qPCR screening for detections

5 Species presence results

Extracted DNA from sample

G. maculatus eDNA

G. maculatus probe

Extracted DNA from sample
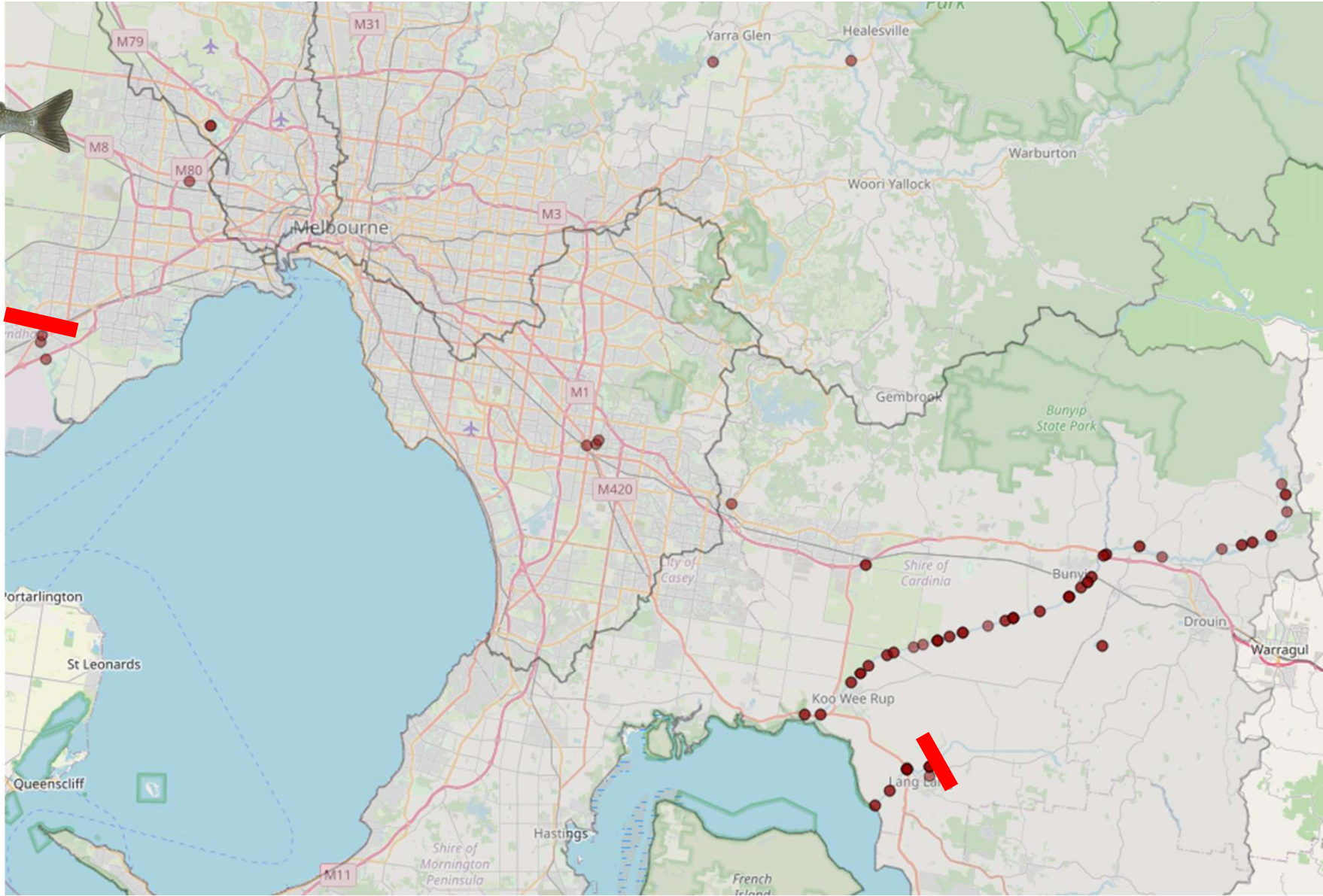
Target species (qPCR)

>70 qPCR assays for native/invasive species

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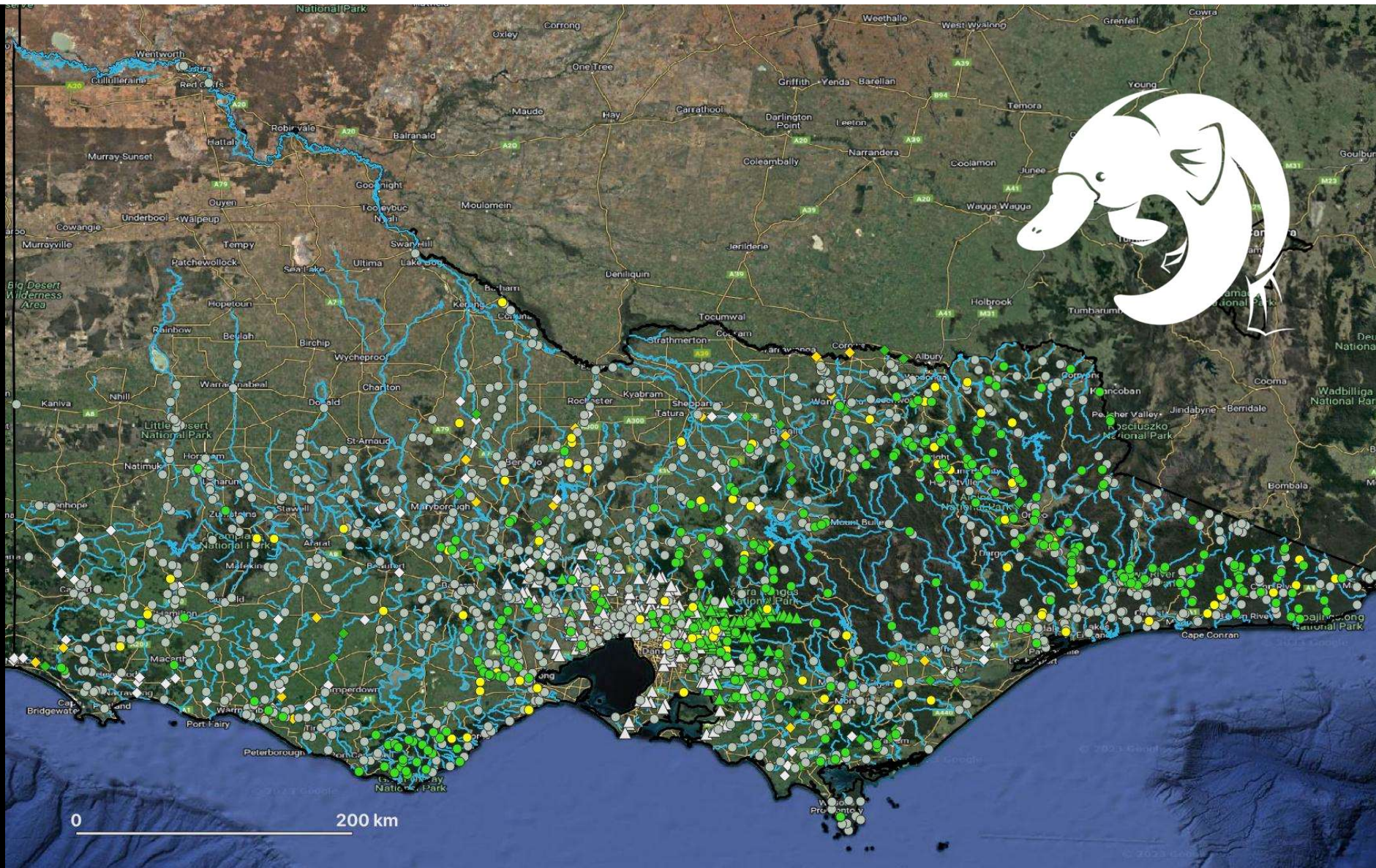
- Early detection tool at invasion front
- Assessing eradication efforts
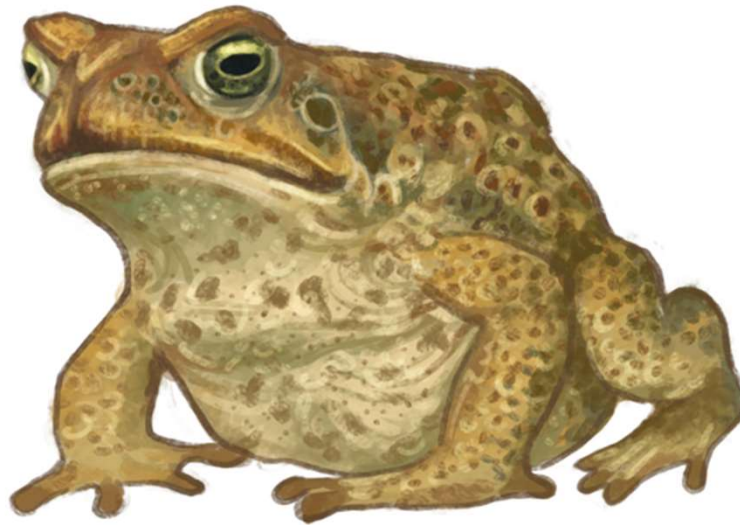
Tingley et al (2018)
Biolological Invasions

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- Incursions of exotic sp. at airports
- Virus vectors

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eDNA species detection methods

Target-species
detection

Biodiversity
assessments

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Biodiversity assessment (metabarcoding)

Determines presence of multiple species from a taxonomic group (e.g. fish, vertebrates, decapods etc).

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Vertebrate biodiversity assessment

Site sampled
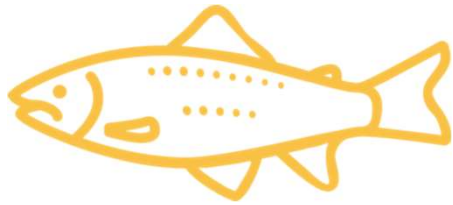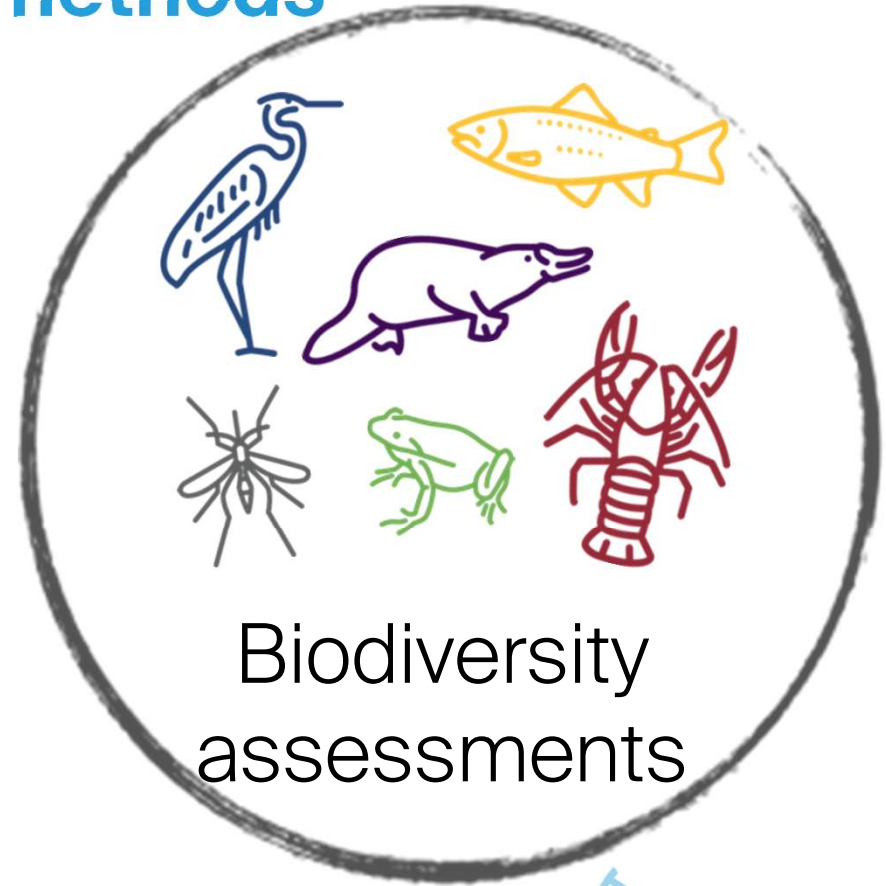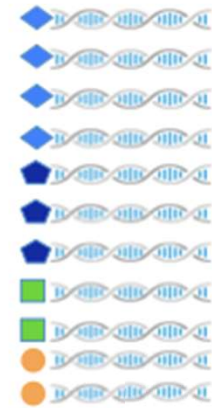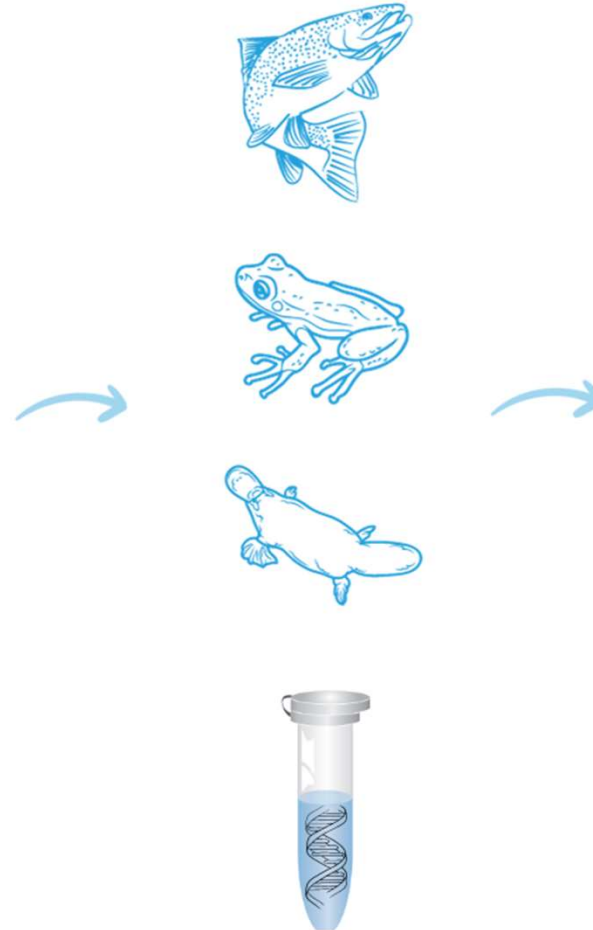
Species detected

Species detected
Short-finned/long-finned eel
Common galaxias
Tupong
Brown trout
Lesueur's frog
Common froglet
Swans & geese
Likley pacific black duck or chestnut teal Chicken
Sulphur-crested cockatoo
Cow
Dog
*Swamp wallaby
Platypus
Bush rat
*Sambar deer
West Gippsland burowing crayfish

Species detected

| Species detected |
|---|
| Short-finned/long-finned eel |
| Perch sp. |
| Galaxias sp. |
| Common galaxias |
| Flathead gudgeon |
| Australian grayling |
| Australian smelt |
| Tupong |
| *Freshwater catfish |
| Tree frog sp. |
| Lesueur's frog |
| Common froglet |
| Striped marsh frog |
| Unidentified bird sp. |
| Duck/swan/goose sp. |
| Dabbling duck sp. |
| Australian wood duck |
| Common moorhen |
| White-browed scrubwren |
| Unidentified mammal sp. |
| Cow |
| Fox |
| Antechinus sp. |
| Platypus |
| Bush rat |
| Deer sp. |
| *Sambar deer |
| Australian glass shrimp |
| East Gippsland burrowing crayfish |

Diet analysis
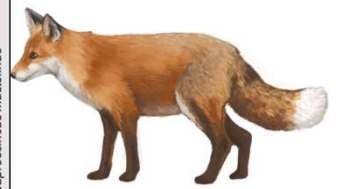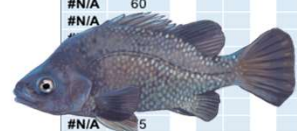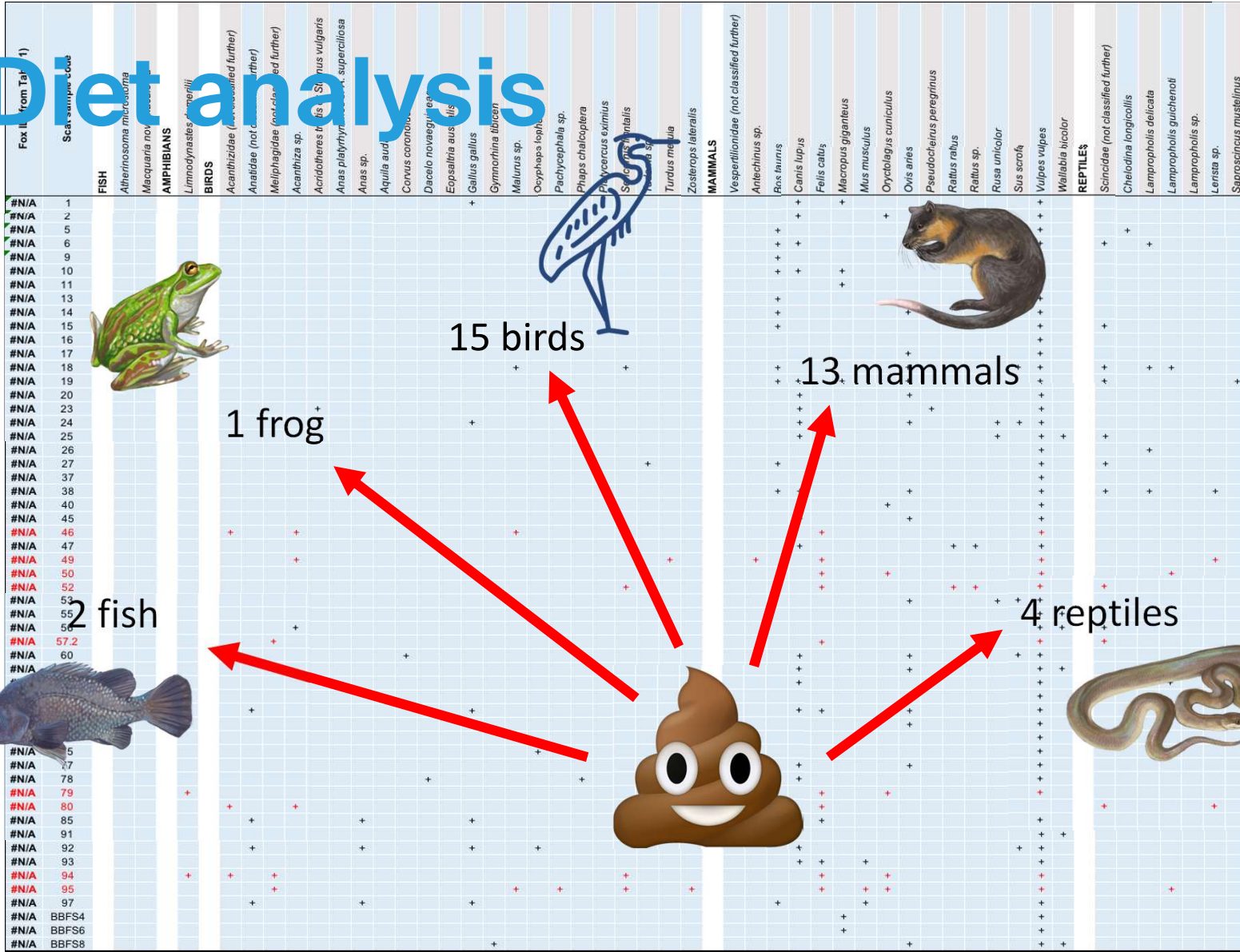
15 birds

13 mammals

1 frog

2 fish

4 reptiles

SourceDNA

eDNA to identify and
track the source of
contamination in
aquatic ecosystems
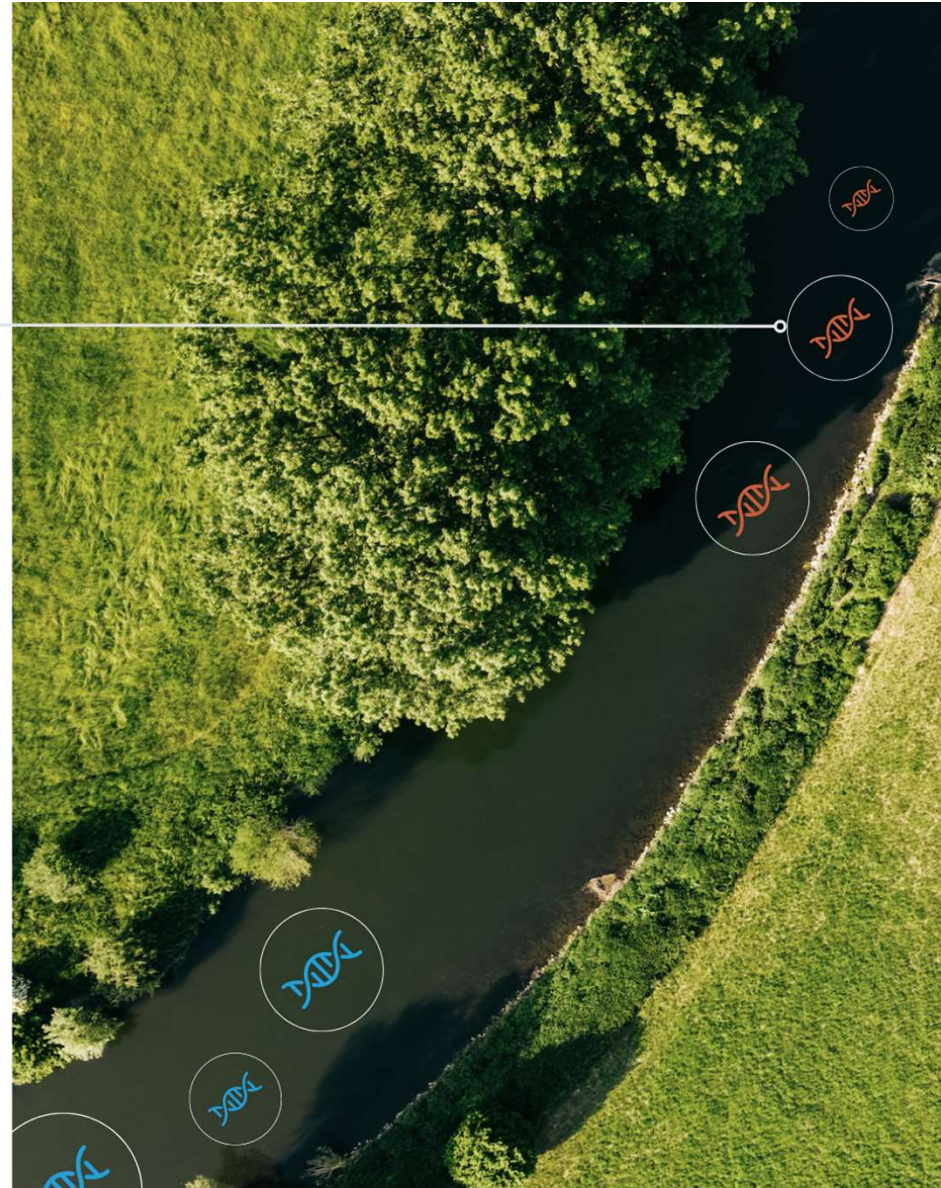
New method for source contamination tracking

- This application detects both indicator bacteria and potential source species (e.g. livestock, human) DNA to identify the possible cause of contamination.

- SourceDNA can be used for an early indicator of microbes of concern by identifying high impact zones to inform management/investment priorities.

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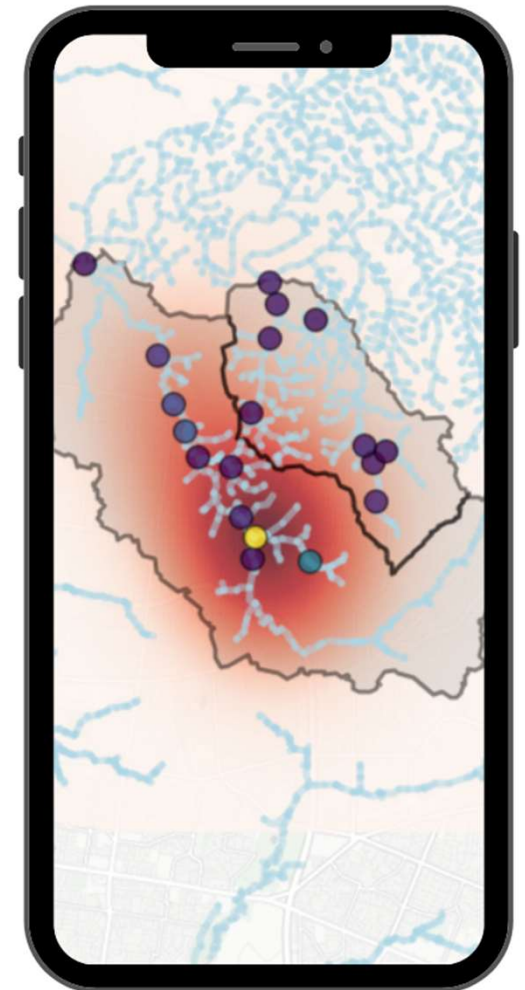
Application of eDNA

- Baseline data collection

- Impact assessments

- Ongoing monitoring and reporting

- Response to management actions or monitoring recovery of sites

- Nature accounting

- Soil/water health (bacteria/fungi) assessments

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What does a project with us look like?

Project design → Sampling → eDNA analysis → Data science/ bioinformatics → Output (report/data online mapping)

You can contact EnviroDNA regarding any eDNA projects or possibilities for detection, monitoring or diet analysis studies. We work with you to decide your objectives and design and implement eDNA projects to support your goals.
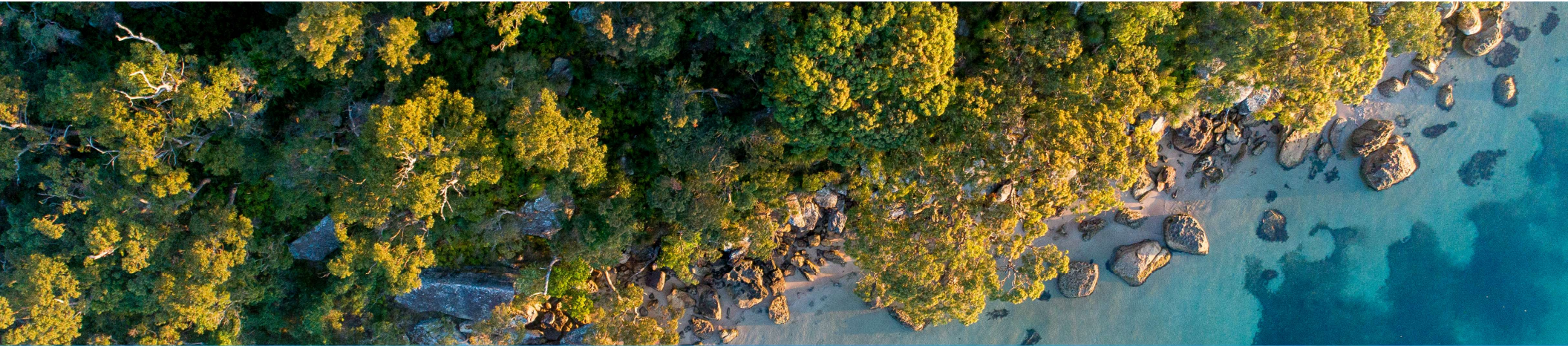
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AWS eDNA webinar course 2024 – learn more!

- 24th Oct – 5th Dec
  - Aust only: eDNA kit provided & sampling (5th Nov)
  - Workshop 1: designing effective eDNA surveys
  - *Lab analysis*
  - Workshop 2: understanding and interpreting eDNA data

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Questions?

www.envirodna.com

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