



Australian Government

**Department of Agriculture,
Fisheries and Forestry**

National Environmental DNA (eDNA) Testing Program MMXXIII

*capacity, capability & competency for eDNA
testing in biosecurity & environmental
management*

Prof. Geoff Grossel



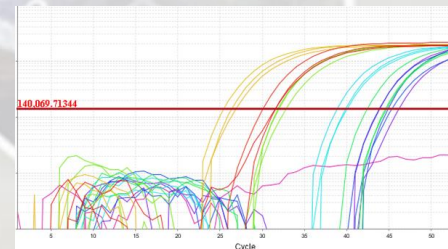
*Actively promoting Strong Public/Private Partnerships & a Shared Biosecurity Culture
The National eDNA Testing Program is managed by the DAFF Biosecurity Science Centre*



What is eDNA & eRNA?

*eDNA/eRNA is the DNA/RNA that is left behind in the environment
e.g. in water, soil, faeces, air*

How can eDNA Testing Manage Biosecurity Risks & Facilitate Trade?




eDNA's most suitable applications

1. *Environment & Biosecurity Risk Management*
2. *Longitudinal Screening*
3. *Emergency Response & Ongoing Management*
4. *Surveillance, Monitoring, Early Warning*
5. *Research, Development & Extension*
6. *Pest-free certification*

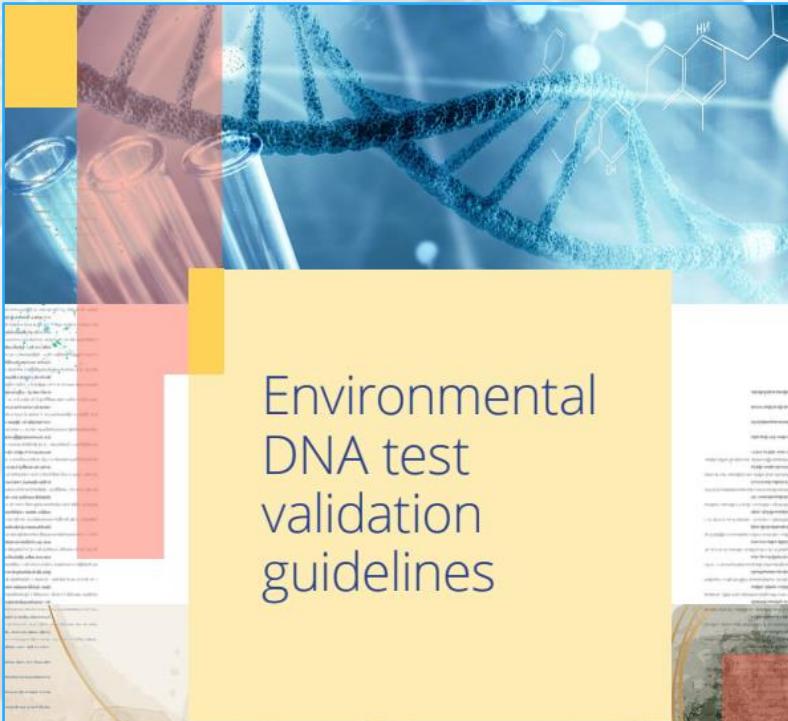
eDNA SOLUTIONS = Safe Trade for Containers

National eDNA Assay & Protocol Guidelines



Environmental
DNA protocol
development
guide for
biomonitoring

This block features a collage of environmental images including a tree by water, a field of corn, and a river. A light green rectangular box is overlaid on the collage, containing the text 'Environmental DNA protocol development guide for biomonitoring'.



Environmental
DNA test
validation
guidelines

This block features a collage of scientific images including a DNA double helix, test tubes, and a chemical structure. A light yellow rectangular box is overlaid on the collage, containing the text 'Environmental DNA test validation guidelines'.

COORDINATION
COMPETENCY
CAPABILITY
CAPACITY

This block features a light blue oval shape containing the text 'COORDINATION', 'COMPETENCY', 'CAPABILITY', and 'CAPACITY' stacked vertically.

Public/Private Partnerships - a Shared Biosecurity Culture



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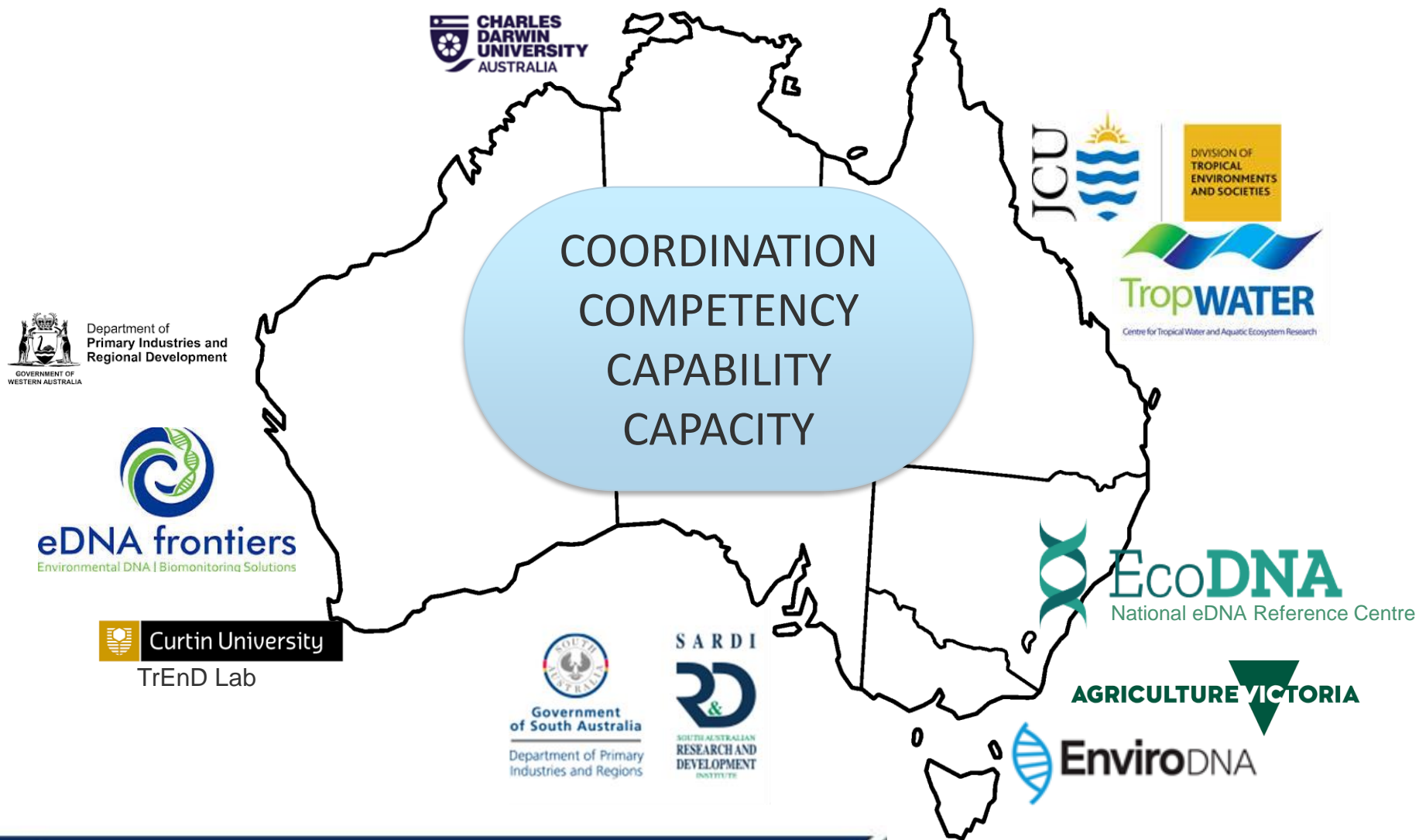
National eDNA Reference Centre

COORDINATION
COMPETENCY
CAPABILITY
CAPACITY

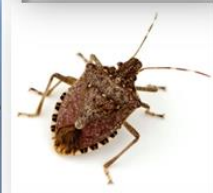
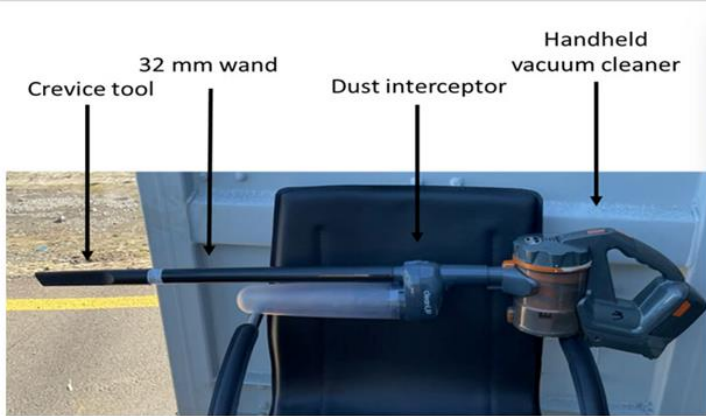
NRC Roles & Responsibilities

- Capability & Preparedness
- Tests & Protocols: Development – Validation – Evaluation – Publication
- Maintaining the National eDNA Test Validation & Protocol Development Guidelines
- Proficiency Testing Rounds & Technology Transfer
- Reporting & Data Analysis
- Biological Reference Material
- Operational Support & Training
- Research & Development

NRC & eDNA Collaboration Centre Network



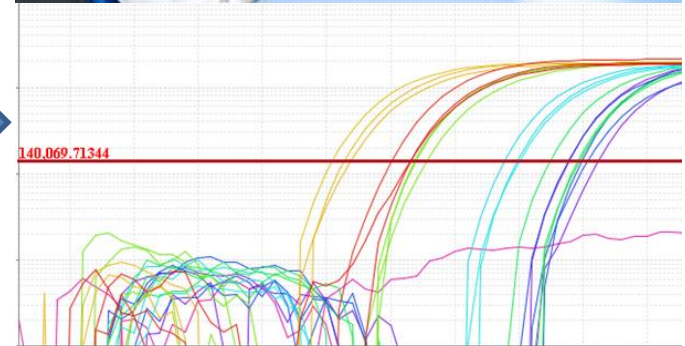
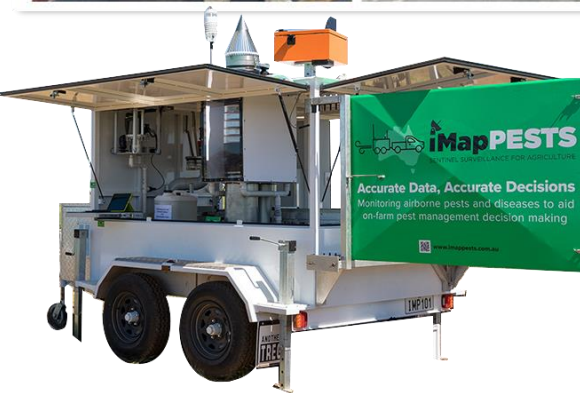
Longitudinal Screening & Early Warning



PoC



LAB



Longitudinal Screening & Early Warning



Khapra beetle



Brown marmorated stink bug

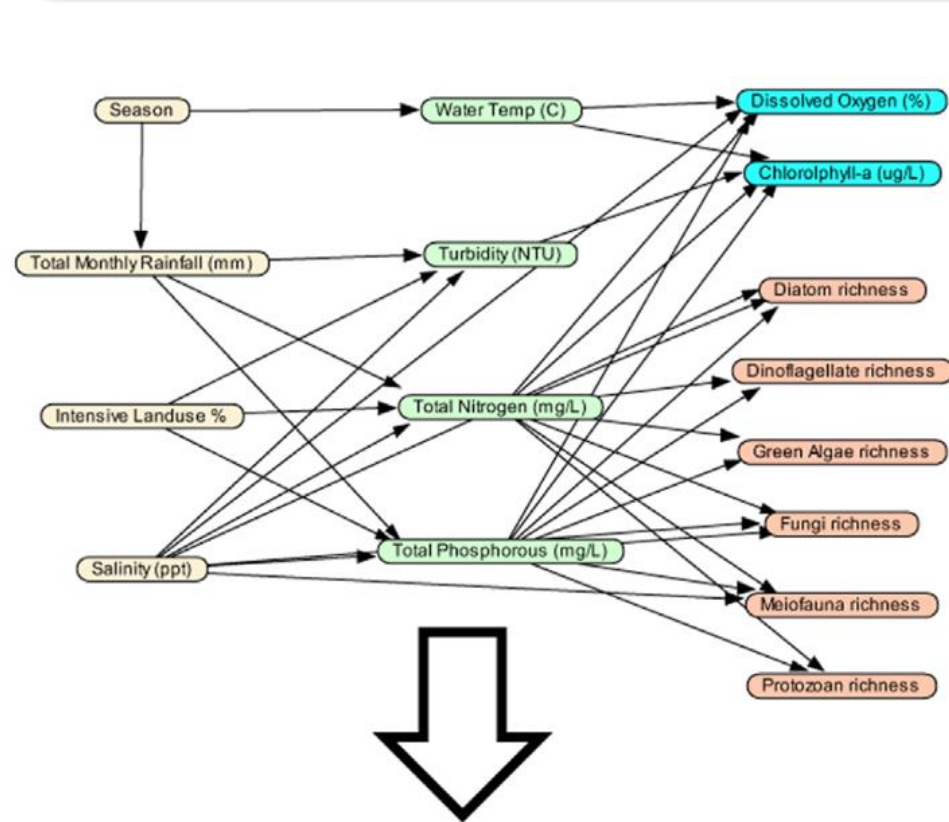


Electric Ant



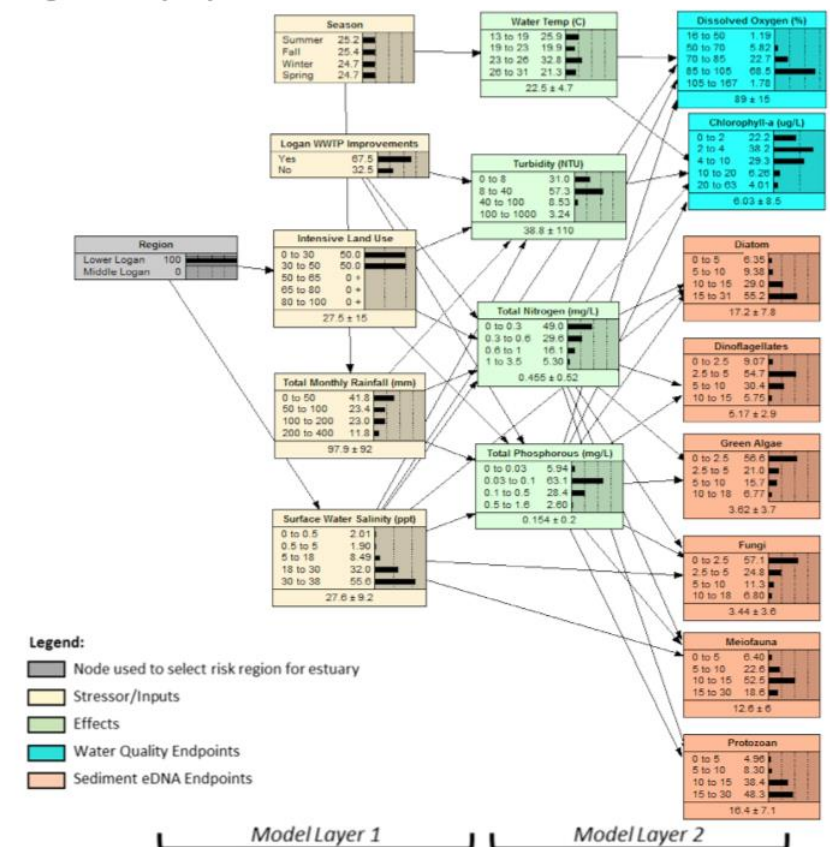
Fully Integrated - Accessible IT Solutions

eDNA DATA = Science-Based Decision-Making

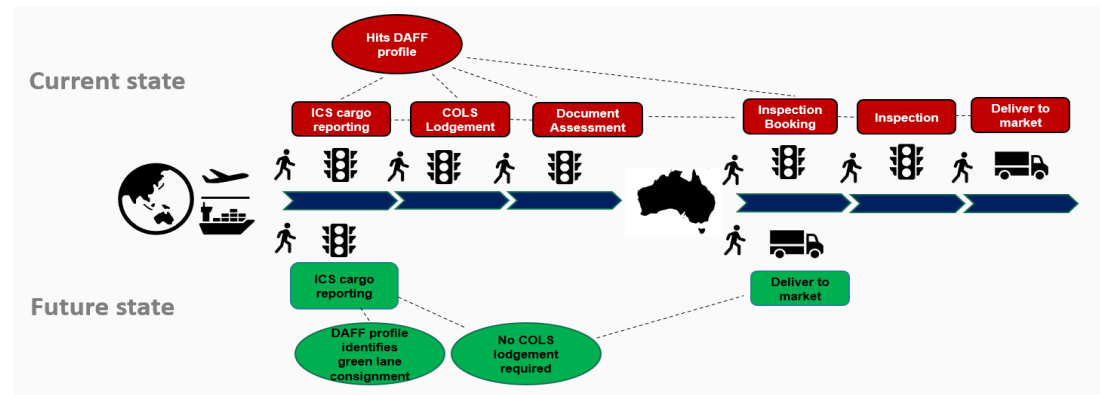
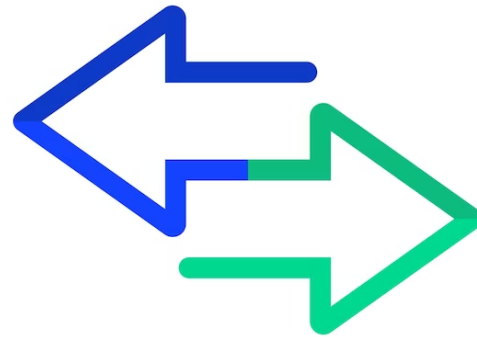


accurately targeting high-risk pathways

Logan Estuary Bayesian Network Model



PEST-FREE certification – for containers & facilities

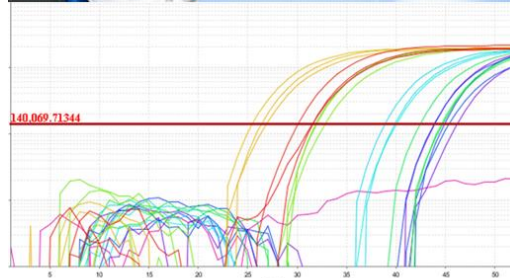


Easy & Cost-Effective - with Industry Partners

1. Take a sample



2. Post to LAB or PoC



3. Pest-Free



Certified PEST-FREE



GREEN LANE
INCENTIVE

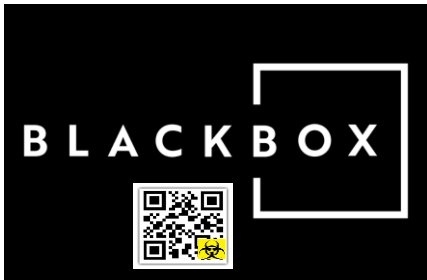


MONITORING: PEST-FREE verification

New eDNA technology

3. Pest-Free

1. Internal Container Sample & Test UNIT



*Place in Container at
start of journey*



2. Scan on arrival



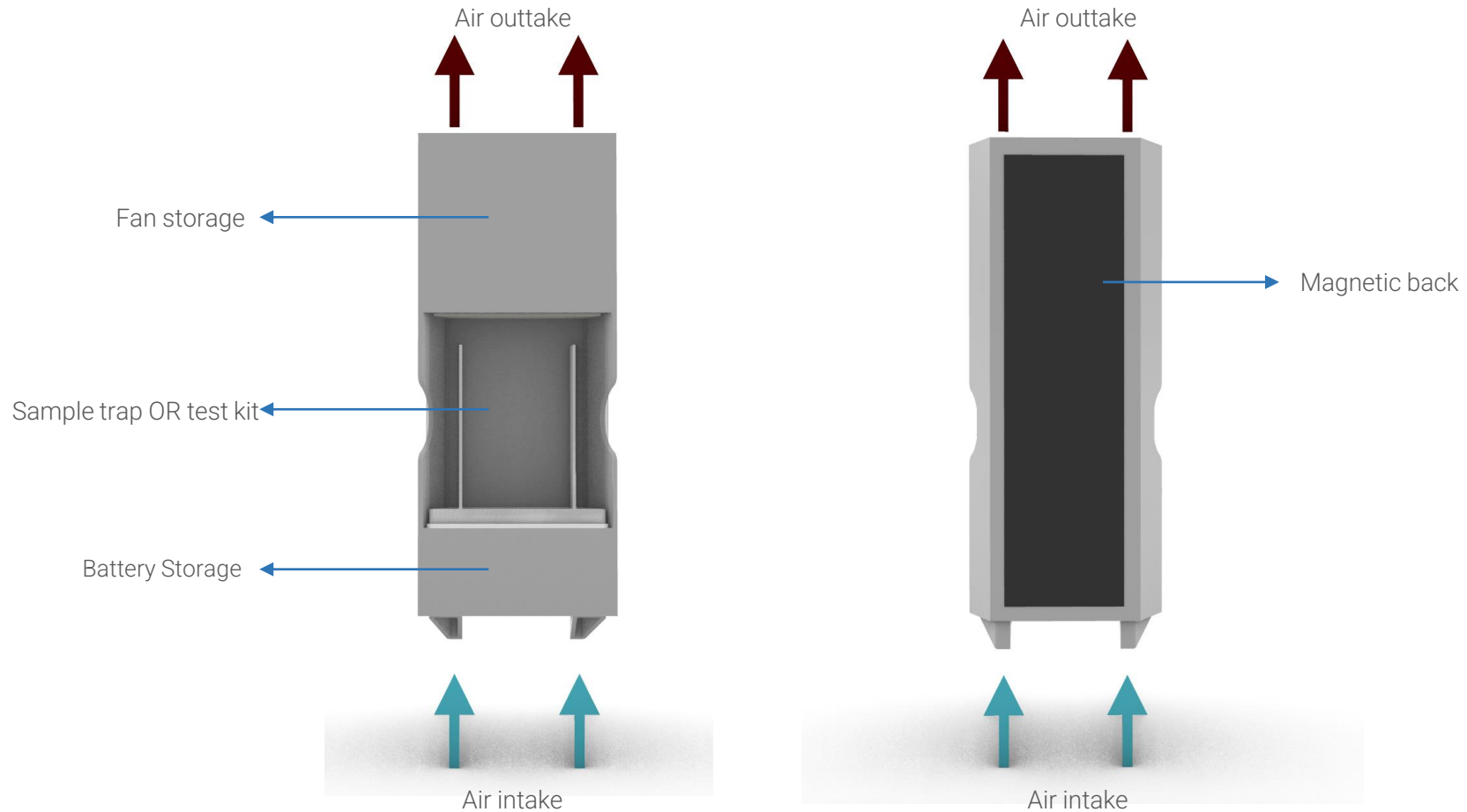
Currently in R&D phase

Device Morphology



Placed at start of voyage

eDNA from AIR samples - How does it work?



Benefits of Operationalising eDNA Testing & Policy

National eDNA Testing Program – Container Pests

Shared Responsibility ✓

Shared Biosecurity Culture ✓

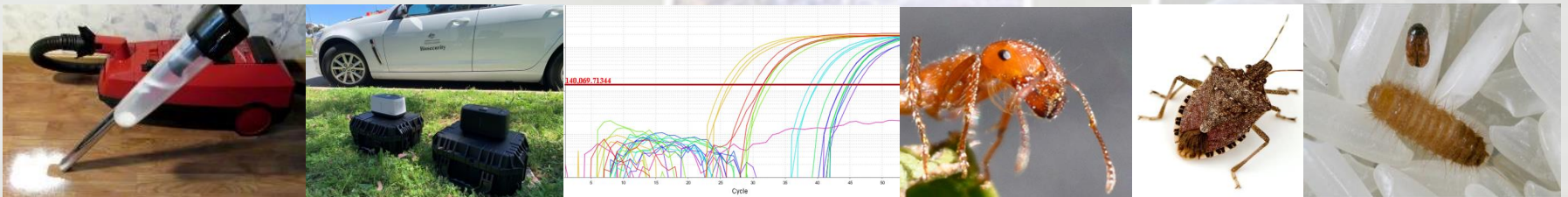
Strong Public/Private Partnership ✓

Manage Biosecurity Risks Together ✓

INCENTIVISED: *Expedite Trade* ✓

Cost-effective ✓

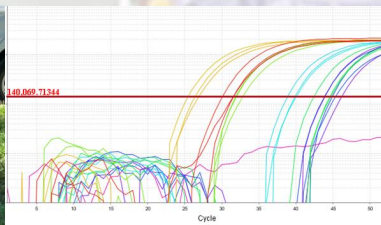
Win-Win ✓



Pathways to IMPEMENTATION

National eDNA Testing Program – Container Pests

- Risk Analysis* ☒
- Risk Management* ☒
- Risk Return* ☒
- Operational Policy* ☒
- Internal Measure* ☒
- SPS-Compliant* ☒
- Less Trade Restrictive* ☒



Acknowledging our Public/Private Partners



Australian Government
**Department of Agriculture,
Fisheries and Forestry**



**PIC
& SSG**



**CENTRE FOR
INVASIVE SPECIES SOLUTIONS**



more info: uday.divi@aff.gov.au

FAQ's

- *eDNA & eRNA --- what's the difference?*
- *What types of DNA technologies are used?*
- *How reliable are these eDNA/eRNA assays?*
- *What if I get a +ve result?*
- *Can I have my facility tested & certified pest-free?*
- *How often do I need to test? A) certification program b) longitudinal screening program*
- *How much does it cost?*