



Dawson River eDNA Citizen Science Project 2021 / 2022



Acknowledgment of Country

'We would like to acknowledge the First Nations people as the Traditional Owners of the land on which this project has taken place'.

Wulli Wulli and Yiman/Iman Country

We pay deep respects to all Elders past and present and future.'



Background

- Platypus are a cryptic species
- Large distribution in Queensland
- Using the revolutionary method of environmental DNA (eDNA)
- 2 years of important baseline information on platypus distribution in the Dawson River
- eDNA is an effective, simple method of confirming platypus presence
- This method of detection is cost effective, accurate with no environmental disturbance

The platypus (*Ornithorhynchus anatinus*) is an iconic Australia mammal.

- 'Near Threatened' on the International Union for Conservation of Nature, Red List, due to human encroachment on platypus habitat.
- Localised declines have been recorded
 - modifying of waterways (dams, weirs)
 - water pollution
 - habitat destruction from urban development and agriculture
 - climate change.
- Under the current climate and threats, platypus abundance and occupancy are predicted to decline over 50 years, causing local extinctions across approximately 40% of its range (Bino et al. 2020).
- Their elusive behaviour makes measuring their populations difficult and can compromise estimations of population size and trends.

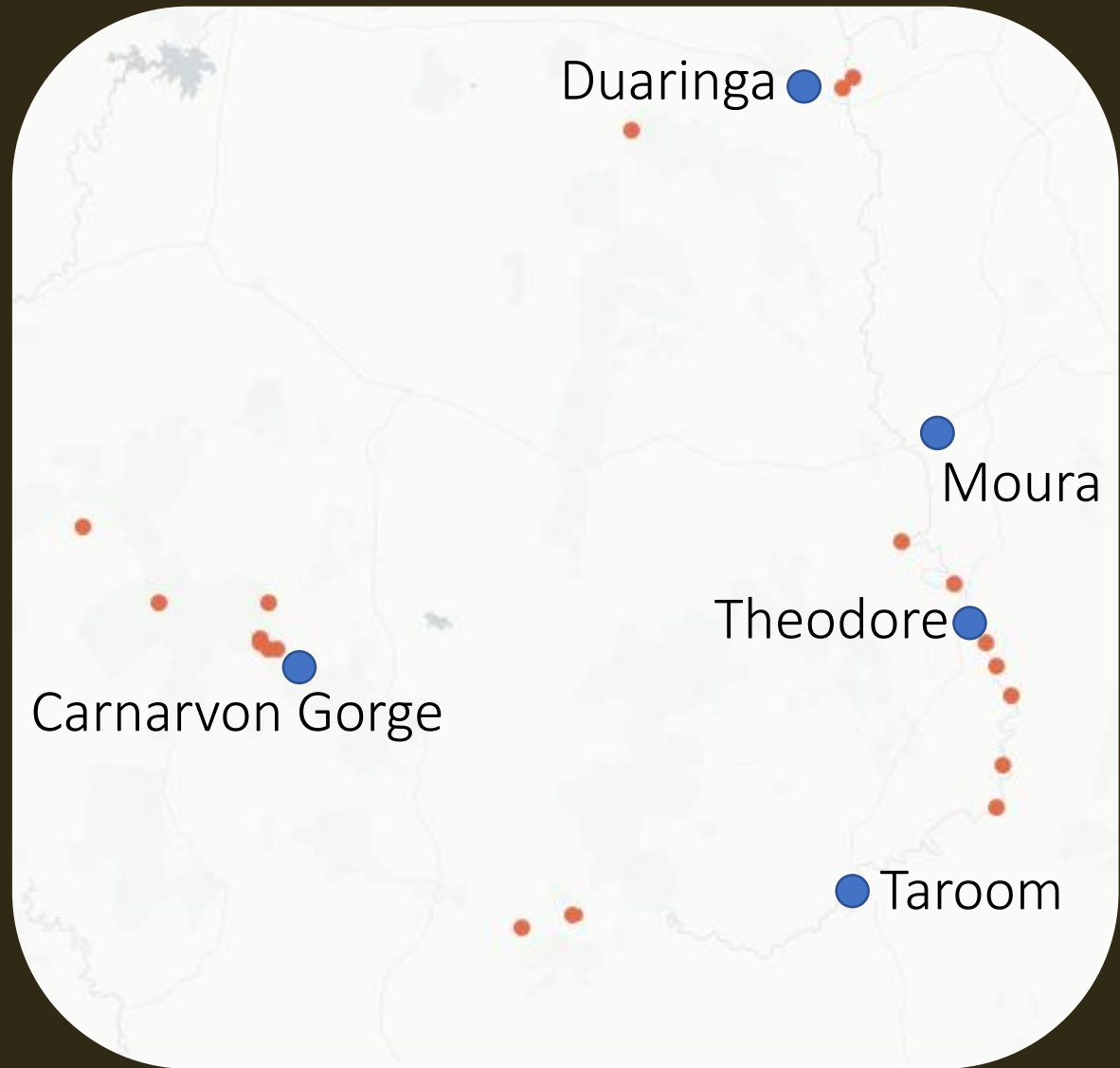
Why platypus?



In Central Queensland,

There has been minimal sighting records within the central western region, apart from the regular sightings at Carnarvon Creek.

Without baseline data we don't know how or if platypuses are surviving, especially with the compounding threats.



Records from early 90's to 2020
(ALA 2021)

In 2019, pilot study

- An environmental DNA (eDNA) pilot study was completed in 2019 and detected platypus in two out of four sites along the Dawson River, west of Taroom.
- The expansion of this project has contribute valuable data on platypus population trends in this region and contribute the state of Queensland database.
- The specific research issues addressed:
 1. *Are platypus populations persisting in the region?*
 2. *Identify localised threats to platypus populations within the region.*
 3. *Is the habitat able to sustain platypus for the future?*



The Dawson River

Is an important connection to the western most known platypus population at Carnarvon Gorge.

What is environmental DNA - eDNA

- “Genetic material obtained directly from environmental samples (soil, sediment, water, etc.) without any obvious signs of biological source material”
(Thomsen and Willerslev 2015).
- Gouldian Finches
(CDU 2019)
- Marine vertebrate biodiversity studies
(Closek et al .2019)
- Monitor species presence or absence
 - Cryptic
 - Invasive
 - Threatened or endangered





eDNA

- Non-invasive
- Species-specific primers
 - Target a small section gene
 - Platypus - mitochondrial gene cytochrome B
 - 57bp fragment
- PCR assays amplify the target DNA
- Sequenced DNA into database/library – Genebank
 - Multispecies analysis – DNA metabarcoding
- Sensitivity > 95% to detect platypus presence
(Lugg et al. 2018).

Cannot tell us.....

Number of individuals

Relatedness

Precise location of animals

Environmental influences

Temperature

UV

Flow

Dawson River Project 2021

2 community events to meet the locals and recruit citizen scientists

- Taroom
- Theodore



Observational survey 2021



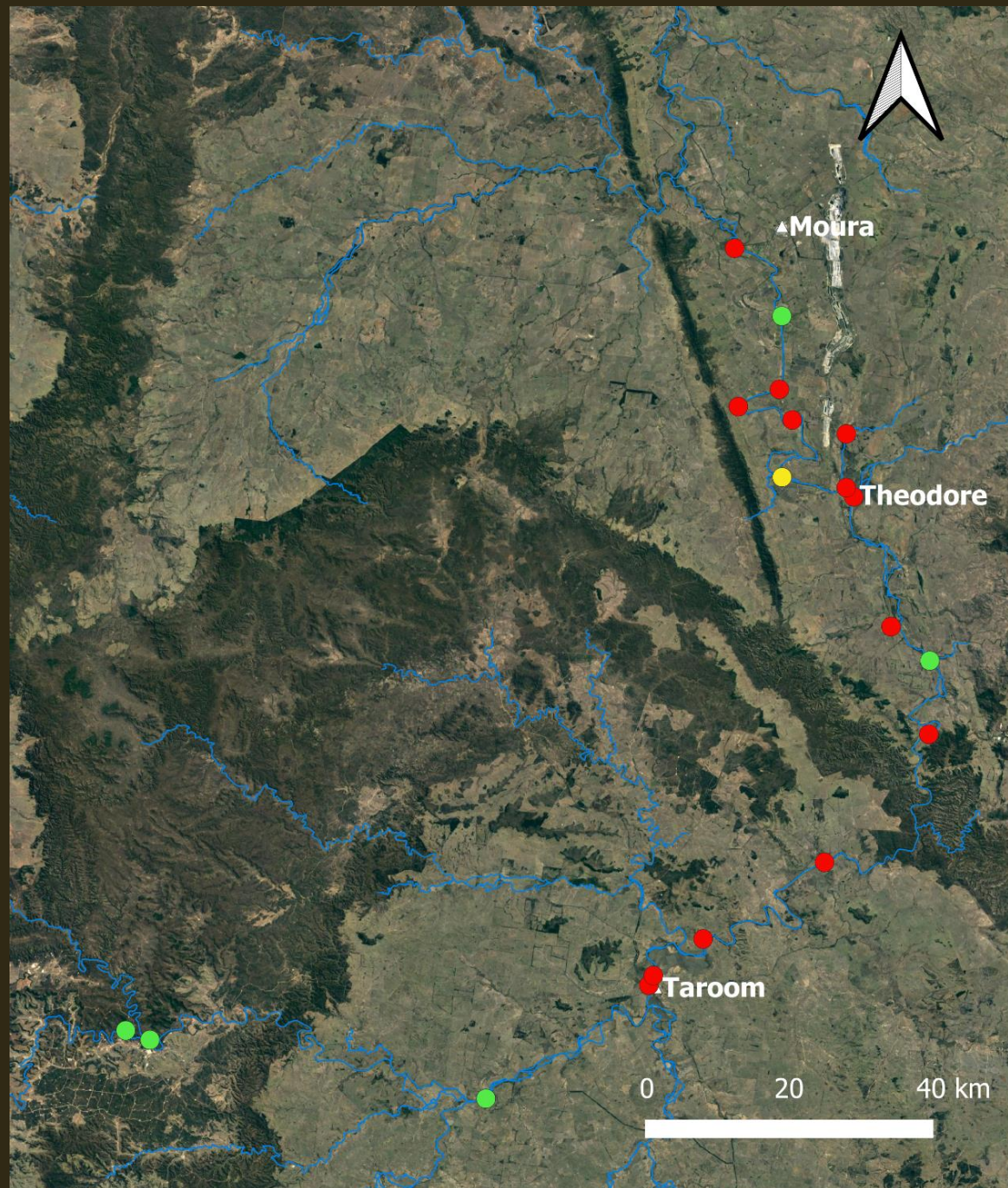
Maudsley family from Mitchell saw a platypus in Castle Creek

2021

- Sampled 19 sites
- Over 300 km's of river Moura through to Baroondah and Santos property

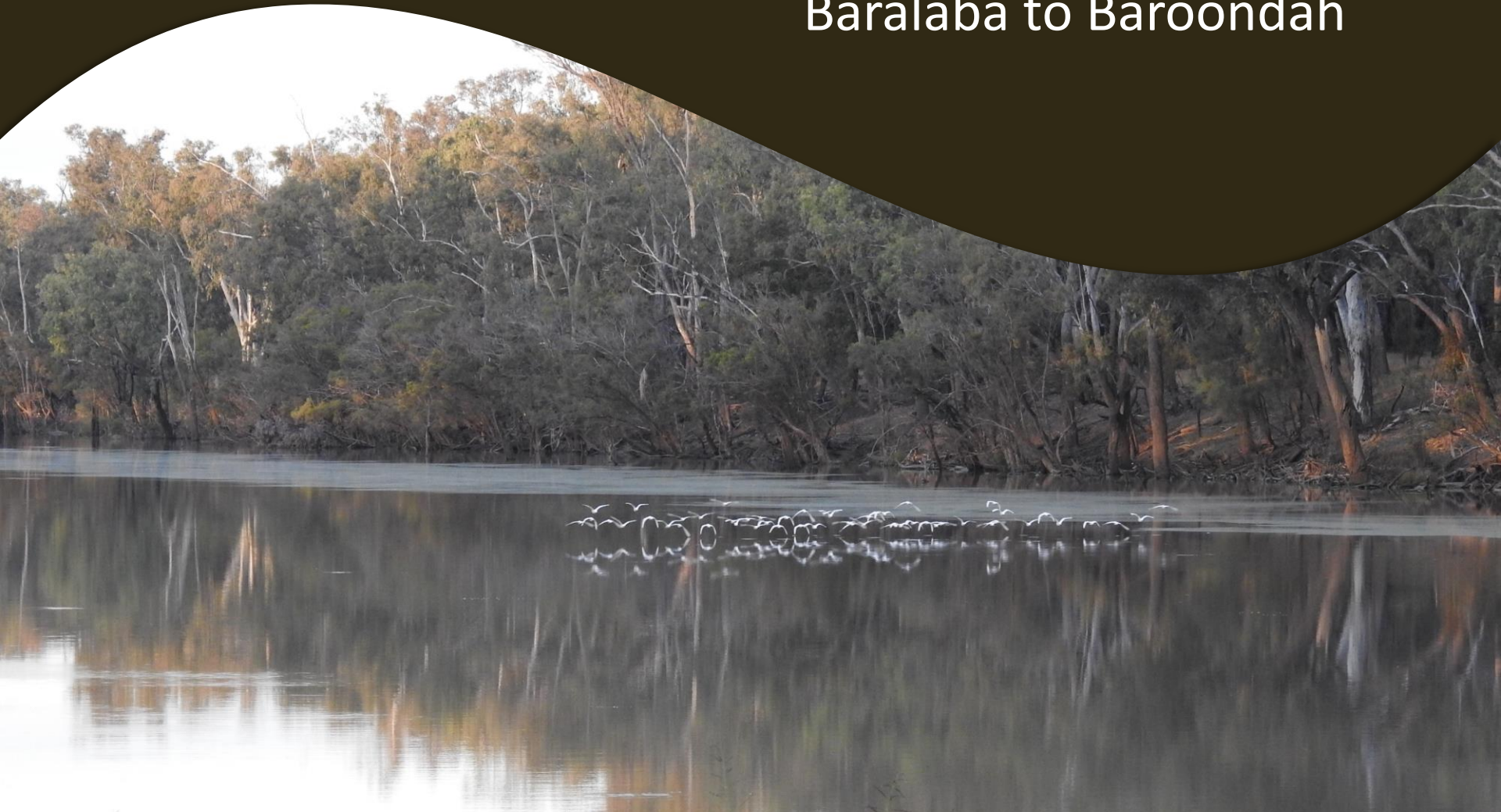


2021 results

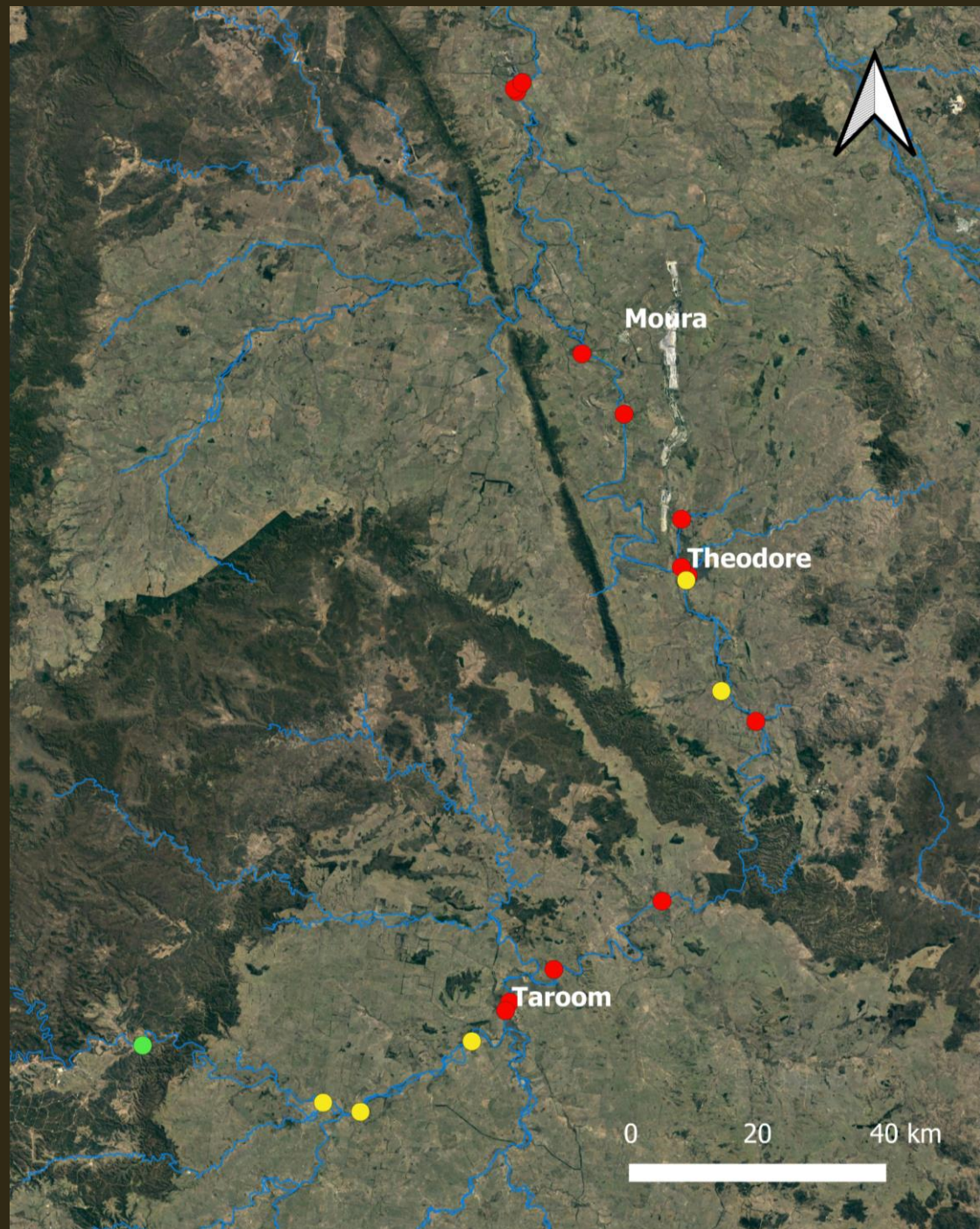


2022

- Sampled 20 sites
- ~ 350 km of river from Baralaba to Baroondah



2022 results



Limitations

- First year
 - Filter too small 0.22 micron
 - Not enough water through the filters
 - Upgraded to 5 micron in 2022
- Water volume and turbidity
 - Large areas of water
- Floods late 2021 and into 2022
 - Volume and velocity of water diluting the platypus eDNA
- Access between sites



The specific research issues addressed:

1. Are platypus populations persisting in the region?

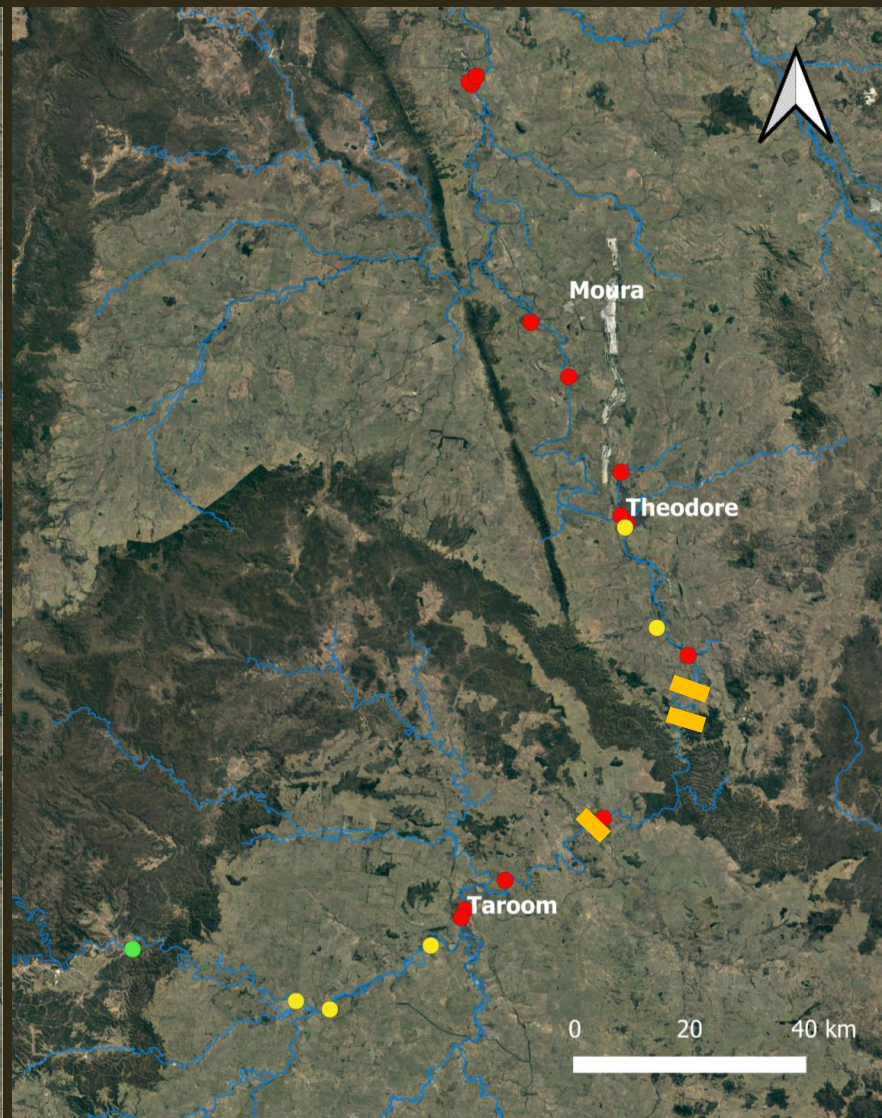
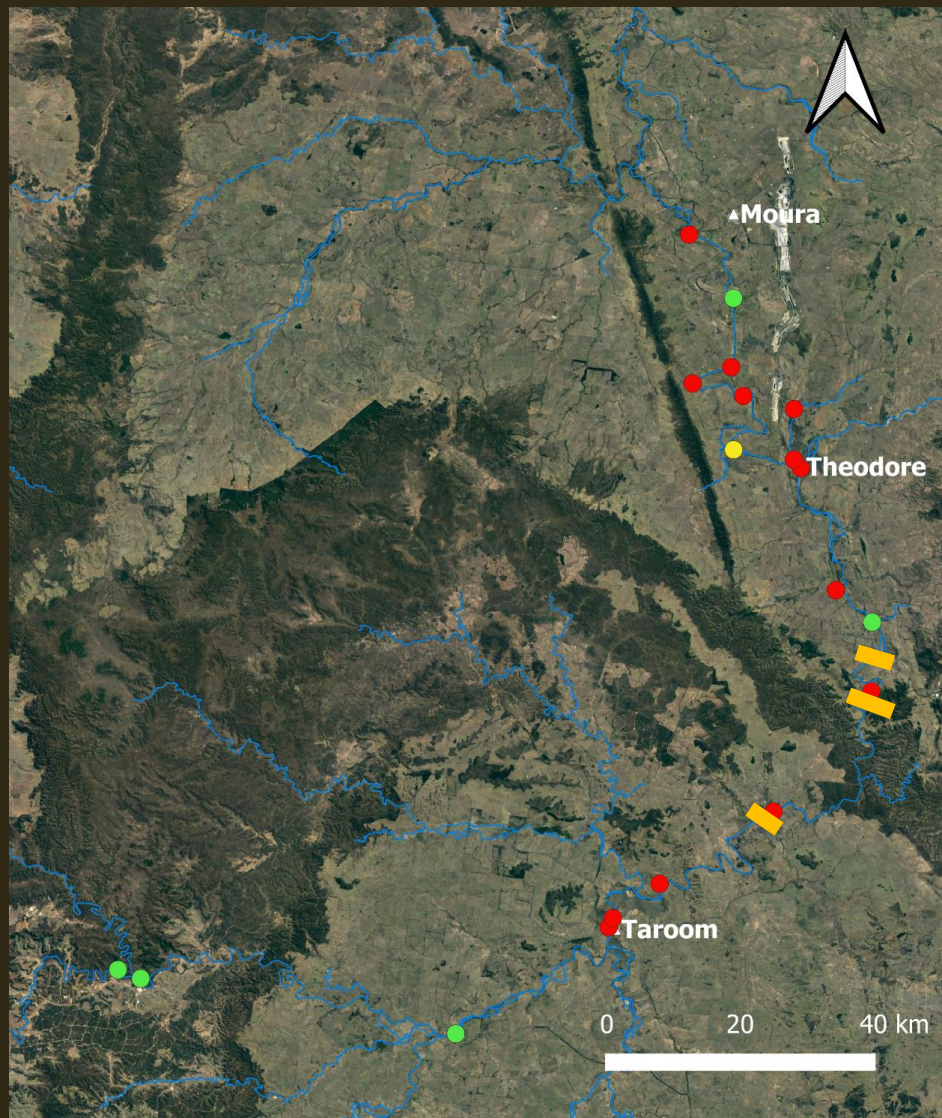
- Yes, with results extending from Theodore and west of Taroom over 3 years.
- How many or how well, will need more investigations.





2. Identify localised threats to platypus populations within the region

- 7 weirs (yellow squares) causing possible barriers to platypus populations from Baralaba to Taroom
- Turbidity – impacting their food source
- Bank erosion – reducing stable burrow sites



Wide Water



Baroondah Crossing



Theodore Weir



3. Is the habitat able to sustain platypus for the future

- Permanent water
- Refuge pools – important in drought
- Areas of intact riparian vegetation
- Banks – high and stable for burrows



Tarana Crossing



Nuns Crossing



Lonesome Creek



What next

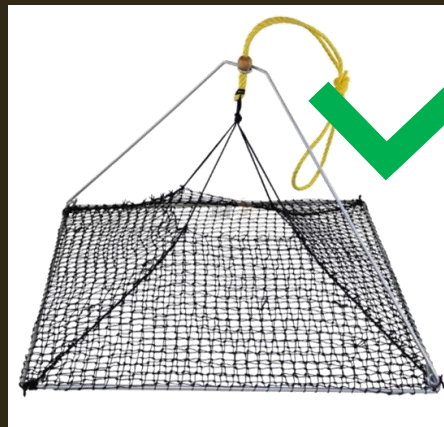
- Continued monitoring
 - Observational – encourage locals to report sightings
 - eDNA – increase number sites, locations and expand
- Resources assessment
 - Habitat and food
- Genetic research
 - What is the genetic integrity of the population?
- Movement research
 - Innovations to create connectivity up and down weirs



Further information or questions

- Contact Tam, platypus@wildlife.org.au
- Wildlife Queensland website – Upper Dawson Project

Reminder – Illegal use of OHN's



Thank you!

- Citizen Scientists
 - Cherland family
 - Maudsley family
 - Brunton family
 - Margery Joyce
 - Leanne Brownlie
 - Rose Connolly
 - Peta Adams
- Wildlife Queensland Upper Dawson Branch
 - Ann Hobson
 - Helen Keys
 - Loraine Hellyer
- Charlotte Langhorne
- Queensland Government Citizen Science Grant 2020



References

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