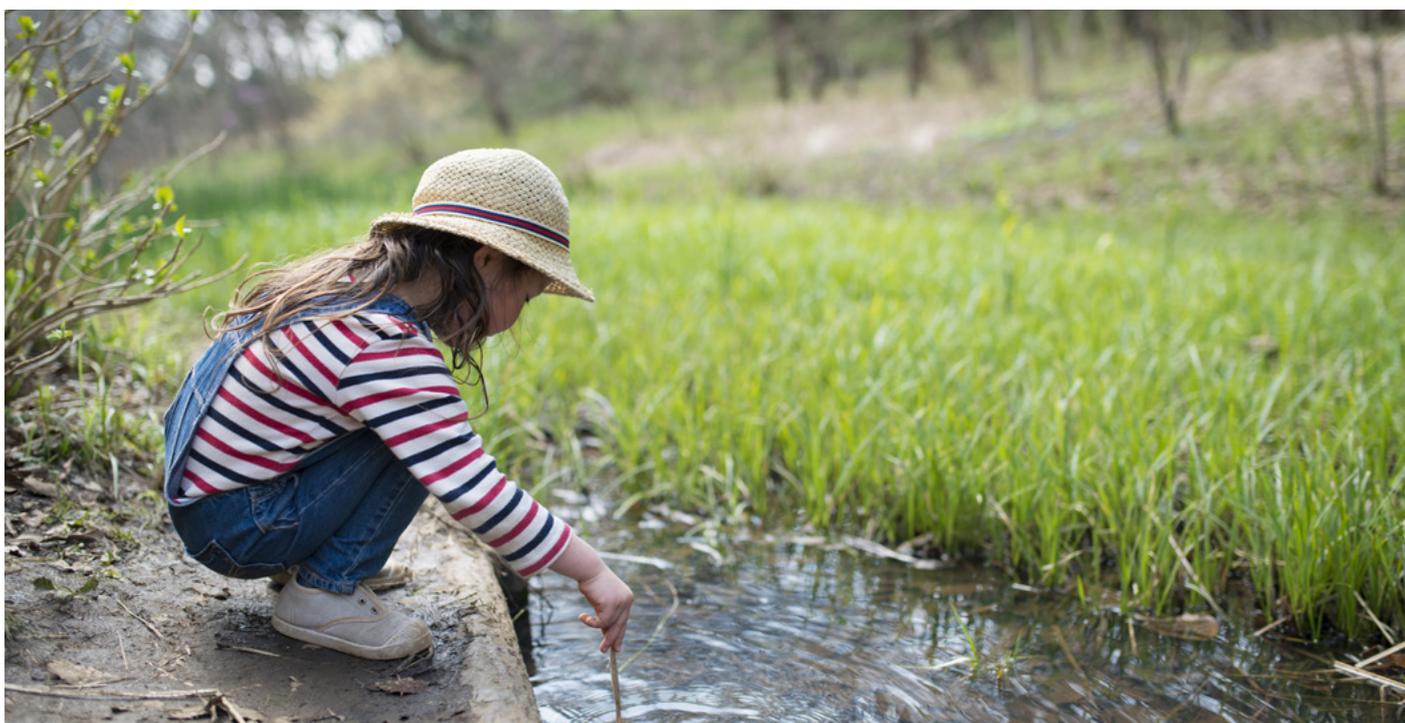


Farm Dam eDNA Biodiversity Report July 2019



Project summary

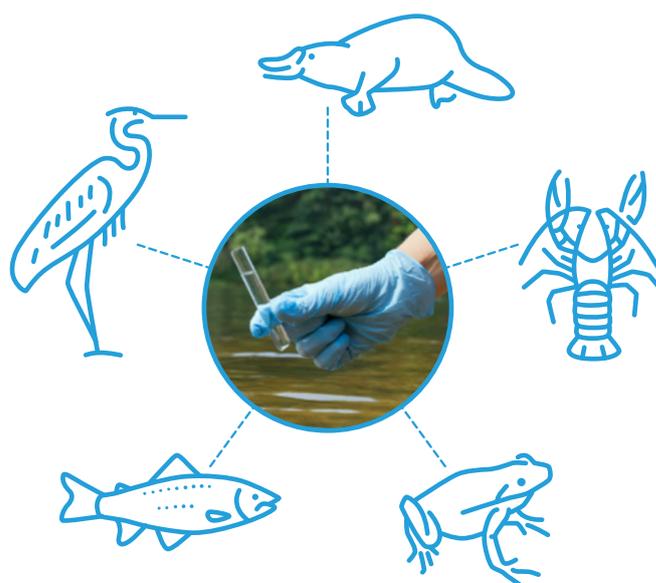
A citizen science project investigating farm dam biodiversity in West Gippsland, Victoria: Landholders and other Landcare locals went in search of wildlife DNA, using innovative technology called environmental DNA (eDNA). Wildlife has been mapped across 18 farm dams, highlighting the value these water bodies play in supporting biodiversity within an agricultural landscape.

What is eDNA?

All creatures shed DNA into their surrounding environment via skin cells, hair, scales, mucous and more – this is environmental DNA.

Contents

- 1 Overview of results
- 2 Insights
- 3 Interpreting results and resources
- 4 Individual farm dam results



All creatures shed DNA into their surrounding environment via skin cells, hair, scales and more – this is environmental DNA.

Farm dam wildlife biodiversity study
using eDNA and citizen science

Overview of results

Summary of statistics



18

farm
dams

16

condition
assessments

30

citizen
scientists

2

sampling
occasions

110

eDNA
samples



41

native
wildlife

13

invasive
wildlife

4

livestock
animals

2

domestic
animals

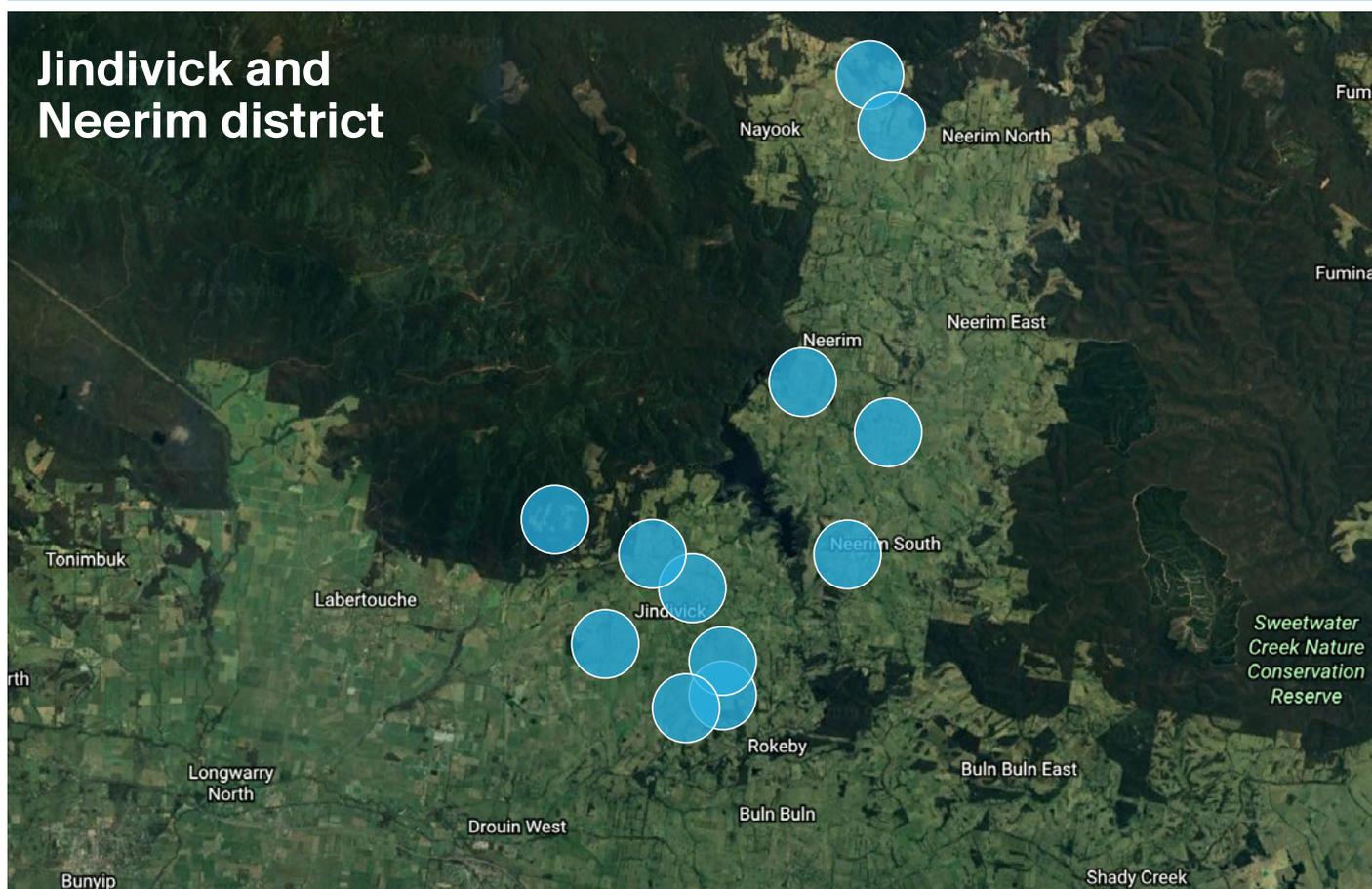
38

macro
invertebrate
families

Average number of wildlife detected per dam in this project:

8 native species / 2.5 invasive species / 18 macroinvertebrate families (5 dams surveyed only)

Jindivick and Neerim district



This project received grant funding from the Australian Government through the National Landcare Program



Wildlife detections – eDNA

Birds

27 species

Species name	Common name
Acanthiza pusilla	Brown thornbill
Ardea novaehollandiae	White faced heron
Ardea species	Heron or egret species
Chenonetta jubata	Australian wood duck
Colluricincla harmonica	Grey shrikethrush
Corvus coronoides	Australian raven
Cygnus atratus	Black swan*
Fulica atra	Common coot
Gallinula chloropus	Common moorhen
Gymnorhina tibicen	Australian magpie
Malurus cyaneus	Multiple sp Superb fairy wren
Malurus species	Fairy wrens
Manorina melanocephala	Noisy miner
Microcarbo melanoleucos	Little pied cormorant
Oxyura australis	Blue billed duck – Endangered
Phaps chalcoptera	Common bronzewing
Platycercus eximius	Eastern rosella
Porphyrio porphyrio	Purple swamphen
Ptilonorhynchus violaceus	Satin bowerbird
Tachybaptus novaehollandiae	Australian grebe
Tadorna species	Shelduck
Todiramphus sanctus	Sacred kingfisher
Acridotheres tristis	Common mynah – Invasive
Anas platyrhynchos	Mallard – Invasive**
Sturnus vulgaris	Common starling – Invasive
Turdus merula	Common blackbird – Invasive
Turdus philomelos	Song thrush – Invasive

*Black swan could also be goose.

**Mallard could also be the native Pacific black duck.

Mammals

13 species

Species name	Common name
Mormopterus planiceps	Southeastern free tailed bat
Hydromys chrysogaster	Rakali (water rat)
Ornithorhynchus anatinus	Platypus
Rattus fuscipes	Bush rat
Petaurus breviceps	Sugar glider
Pseudocheirus peregrinus	Common ringtail possum
Trichosurus vulpecula	Brush-tail possum
Vombatus ursinus	Common wombat
Mus musculus	House mouse – Invasive
Oryctolagus cuniculus	Rabbit – Invasive
Rattus rattus	Black rat – Invasive
Rusa unicolor	Sambar Deer – Invasive
Vulpes vulpes	Fox – Invasive

Decapods

2 species

Species name	Common name
Euastacus species	Spiny crayfish
Paratya australiensis	Australian glass shrimp

Fish

7 species

Species name	Common name
Anguilla australis	Short finned eel
Macquaria ambigua	Golden perch
Nannoperca species	Pygmy perch species
Percalates novemaculeata	Australian bass
Gambusia holbrooki	Eastern mosquitofish – Invasive
Perca fluviatilis	Redfin perch – Invasive
Salmo trutta	Brown trout – Invasive

Frogs

4 species

Species name	Common name
Crinia signifera	Eastern common froglet
Limnodynastes peronii	Striped marsh frog
Limnodynastes tasmaniensis	Spotted marsh frog
Litoria species	Southern brown tree frog and/or another Litoria frog species

Reptile

1 species

Species name	Common name
Chelodina longicollis	Eastern long necked turtle

Domestic & Livestock

6 species

Species name	Common name
Bos taurus	Cow
Gallus gallus	Chicken
Ovis aries	Sheep
Sus scrofa	Pig
Canis lupus	Dog
Felis catus	Cat

Wildlife detections – insect sampling & DNA

Macro invertebrates

38 families

Acarina	Ceinidae)	Hydrometridae	Oligochaeta
Aeshnidae	Chironominae	Leptoplebiidae	Orthoclaadiinae
Ancylidae	Coenagrionidae	Lestidae	Physidae
Atyidae	Corduliidae	Libellulidae	Planorbiidae
Baetidae	Corixidae	Lymnaeidae	Pleidae
Belostomatidae	Dixidae	Mesoveliidae	Scirtidae
Calamoceratidae	Dugesiiidae	Naucoridae	Sphaeriidae
Calocidae	Dytiscidae	Notonectidae	Tanypodinae
Ceratopogonidae	Glossiphoniidae	Notonemouridae	Veliidae
Chiltoniidae (formally	Haliplidae	Odonotoceridae	

Insights



most commonly detected native wildlife
Australian wood duck
Striped marsh frog
Short finned eel



most commonly detected invasive wildlife
Mallard (also includes eDNA detections of the closely related Pacific black duck)
House mouse
Common mynah

Farm dams: an important refuge for wildlife

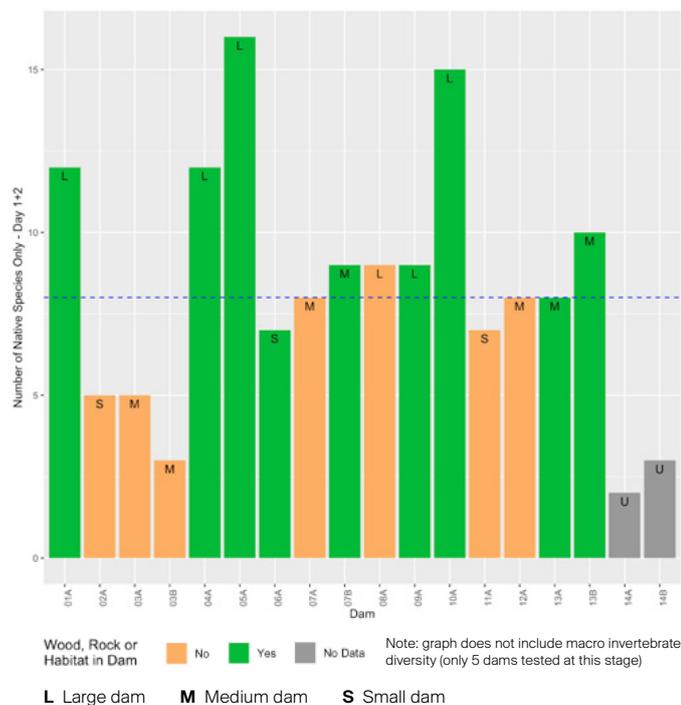
Agriculture and wildlife conservation can co-exist. The number and diversity of species detected helps to demonstrate that farm dams can provide an important resource for wildlife as extra habitat, refuges, or "stepping stones". With scarce water and habitat fragmentation in agricultural landscapes, dams are an opportunity for more ecological farming practices.

Variables influencing wildlife diversity

The variable that appeared to have the largest influence on the number of native species (and overall number of species, not including macro-invertebrates) detected in a dam was dam size. Not surprisingly, more species were detected at larger dams, most likely due to the larger volume of water and land area that was available to support species habitats.

Interestingly, a correlation was also detected between the number of species and the amount of vegetation in or around the dam. Although not statistically significant in this study (limited sample size of farm dams), findings support the concept that the presence of vegetation around a dam and/or the presence of logs or rocks in a dam assist in supporting biodiversity. However, other factors such as the quality or types of vegetation (species and diversity of plants, for instance) would also play a role.

Comparison of number of native species detected across farm dams: wood, rock or other key habitat available in a dam



Threatened wildlife detected

Blue billed duck – detected over both seasons in two dams, indicating that these dams are providing important resources for this species, which is listed as 'endangered' under Flora and Fauna Guarantee Act Victoria, and 'near threatened' under the International Union of Conservation of Nature.

Potentially the Yarra pygmy perch – this species is closely related to the Southern pygmy perch. It looks more likely that we have detected the latter, particularly given the Yarra pygmy perch known distribution doesn't extend to the surveyed region. However, there is still the potential the threatened Yarra pygmy perch was detected in some instances, particularly if the animal has been stocked. More analysis would need to occur to confirm.

Platypus – detected in one dam over both survey seasons, and another dam in late summer. While this incredibly unique species is not technically considered threatened in Australia (e.g. under the Environment Protection and Biodiversity Conservation Act or the Fauna and Flora Guarantee Act), the International Union of Conservation of Nature lists platypus as 'near threatened'. It is also expected that Australian environmental authorities will be reviewing platypus conservation status given increasing evidence of fragmented habitat and decreasing populations.

Macroinvertebrates

Some further investigation is taking place on applying eDNA to detect macroinvertebrates. In the meantime, five farm dams in this project have been surveyed for macroinvertebrates using live insect survey techniques and DNA metabarcoding. Dams and other similar waterbodies typically have lower diversity than streams and rivers for macroinvertebrates. The results from dams surveyed in this project were middle of the range. The giant water bugs (Belostomatidae), the creeping water bugs (Naucoridae) and the water measurer (Hydrometridae) are interesting to note as these are species not necessarily commonly found in streams and rivers.

Non aquatic/ or semi aquatic species with eDNA water sampling

There were many terrestrial bird and mammal species detected that are not considered aquatic or semi aquatic in their ecology and behaviour – see examples listed below. While they are not necessarily living in farm dams, they could be passing by, using a dam for drinking, bathing or using the habitat surrounding it. While eDNA water sampling may not be the most reliable tool for monitoring all birds and terrestrial species, the results help to demonstrate the sensitivity of the technique. Not surprisingly, a number of livestock species were also detected.

- Satin bowerbird
- Common ringtail possum
- Rabbit
- Deer
- South eastern freetail bat
- Australian Bush Rat

Interpreting your farm dam eDNA results

Why did we detect livestock DNA in my dam if there is no access for them?

DNA can travel into the dam via run off or other forms of contamination from surrounding areas, so it could be from your livestock or your neighbour's, even though they are not accessing your dam.

I don't have pigs, so why have they have been detected in my dam?

If your neighbours don't have pigs, it is possible that your dam has been visited by a feral pig. Another explanation could be run off from pig manure fertilizer.

There are particular animals that I know are around – why haven't they been detected in the results?

They may not have visited your dam in the days leading up to the eDNA sampling event (or only visited briefly) and therefore no DNA or not enough of their DNA was in the dam for detection. They may be an animal that doesn't heavily rely on your dam.

The animal may be present in and around your dam at particular times of the year e.g. migratory birds, which means their DNA may not have been present at the time of sampling.

Crustaceans/decapods: we were expecting more detection results for these types of species (e.g. yabbies). These species can shed a good amount of DNA particularly during breeding seasons and when they are growing. However, detecting the presence of a small number of non-breeding adults may be challenging with eDNA.

I have less frog detections in autumn – why?

Many frog species breed in and around spring, at which time there is more activity in waterways as well as tadpoles. Outside of breeding season we expect to detect less DNA in waterbodies, which may help to explain these results.

I thought I had particular fish species, but it didn't show up in results.

If it is a native species and is in very low abundance (particularly likely if there are invasive species present), there is a possibility that its DNA reads were not strong enough to show in results.

If it was an invasive species (e.g. a trout), it is highly possible that there is not an established population, or it may no longer be present in your dam. If there is enough food, invasive fish species tend to establish and have high abundance compared to other native fish, and thus we would expect to detect them with eDNA if they are present.

Compared to other dams, and the overall study, there were not as much wildlife detected in my dam.

You may have comparatively low diversity of wildlife in and around your dam due to location of the dam (e.g. proximity to bush or waterways where there is extensive habitat for wildlife), available habitat in and around your dam (e.g. vegetation, debris), the condition of your dam and edges, and/or you may have a comparatively small dam.

Why are there some animals that cannot be distinguished from each other?

Some animals share very similar DNA sequences, and the particular eDNA test used in this project has not been able to distinguish between some. For example, the mallard, an invasive species of bird, is genetically very similar to the Pacific black duck, a native species. They are actually known to hybridise in the wild. Further analysis would need to be conducted to confirm, however in this instance it is likely that both bird species are present in the area.

Where to from here?

A biodiversity benchmark has been created for the farm dam owners in this project. With conscious management effort, owners have the opportunity to maintain or improve the biodiversity value of their farm dams.

Beyond community engagement, and garnering inspiration and insight into farm dam biodiversity, this project has proven to be a great pilot project to pave the way for future farm dam biodiversity studies e.g. another citizen science based project following a similar model, or a more comprehensive dam biodiversity study involving greater sample size. Dam size had a large influence on biodiversity indicators in this pilot study (not including macro-invertebrates). In future studies, we ideally need a greater sample size of dams if we want to better understand the influence of other factors (e.g. water source, proximity to bushland, vegetation/type of vegetation etc). Ideally future studies can help further uncover how such factors can provide value to both productivity and biodiversity outcomes.

Useful resources

www.murraywildlife.com.au/farm-dams/

- Improving biodiversity of Farm Dams – PRINCIPLES (brochure)
- Improving biodiversity of Farm Dams – CASE STUDIES (brochure)

youtu.be/clxfkq_NjTY

- Farm Dam Blitz - making wildlife welcome (You Tube video)

www.wpcin.org.au/wp-content/uploads/2015/06/farm_dam.pdf

- Enhancing your farm dam (brochure)

www.wpcin.org.au/wp-content/uploads/2015/06/wet_area.pdf

- Convert problem wet areas into valuable habitat (brochure)

Learn more about environmental DNA (eDNA) and this project at www.envirodna.com.au



Thankyou

Many people have come together to make this project happen. We'd like to acknowledge and thank:

Farm dam owners for putting their farm dams into the study and welcoming people onto their properties.

Citizen scientists for bringing their enthusiasm and putting up their hands to take eDNA water samples.

Peter Ronalds (Jindivick Landcare) and Philip Darton (Neerim District Landcare) for bringing everyone together on multiple occasions, bringing their wisdom and ideas and playing a key role in rolling out this project.

Hamish Brooks and Beau Miles for helping capture project moments with photos and film footage.

GHD, particularly Zac Billingham for spending a long day tracking down macro invertebrates.

Habitat Creations for sharing their knowledge and advice on creating wetland habitats.

Gavin Brock of Melbourne Water for lending the turbidity testing tubes.

The National Landcare Program, which funded this project and Jindivick Landcare and Neerim District Landcare who have come together with us at EnviroDNA to make it happen.

Contact us

Our service is available Australia wide from our home in Melbourne. We would love to hear from you and discuss how we can help with your next project.

Web: envirodna.com

Phone: +61 3 9028 8753

Email: info@envirodna.com

Dam: 1A, Jindivick

Turbidity: 15 Conductivity: 0.5ms

Dam notes

Large, gully, spring fed/run off, no livestock access, aquatic & riparian vegetation

Initial observational assessment undertaken November 2019



12
native species

1
invasive species

1
livestock / domestic

Wildlife detected

Late spring 2018

Fish

Australian bass
Golden perch

Frogs

Southern brown tree frog
Eastern common froglet

Birds

Australian wood duck
Black swan*
Common coot
Common moorhen
Purple swamphen
Australian raven
Mallard (invasive)**

Livestock/Domestic

Cow

Autumn 2019

Fish

Australian bass
Golden perch
Short finned eel

Birds

Australian wood duck
Black swan*
Common coot
Common moorhen
Purple swamphen
Australian grebe
Mallard (invasive)**

Livestock/Domestic

Cow

Other observations

Wildlife observed previously by owner - Geese, ducks, herons, swamp hens, frogs, cormorants, fish, silver perch, yellow perch, murray cod, bass, trout, eels, yabbies, shrimp.

*Black swan could be also be domestic goose

**Mallard could also be the native Pacific black duck

Average number of wildlife detected per dam in this eDNA farm dam biodiversity project:

8 native species / 2.5 invasive species / 18 macroinvertebrate families (5 dams surveyed only)

Turbidity affects how far light can penetrate into the water. Less light restricts photosynthesis of green plants meaning less food and oxygen is available for aquatic animals. Turbidity tube range: 400 - 10/9, with 10 or 9 considered very clear.

Conductivity is used to measure salinity. While salts are vital for aquatic life, salinity above the normal range for a species will negatively impact it (be that wildlife, livestock, crops). Conductivity measurement: 1 millisiemens/centimeter [mS/cm], with 0 > 0.3 low, 0.3 - 0.8 medium, 0.8 - 2.5 high, 2.5 - 5.8 very high, >5.8 extremely high.

Dam: 2A, Jindivick

Turbidity: 30 Conductivity: 0.48ms

Dam notes

Small, dry creek/gully, run off, livestock access, aquatic vegetation

Initial observational assessment undertaken November 2019



5

native species

2

invasive species

1

livestock / domestic

Wildlife detected

Late spring 2018

Birds

Mallard (invasive)*
Australian wood duck
Australian raven

Fish

Short finned eel

Livestock/Domestic

Cow

Autumn 2019

Birds

Fairy wren
Superb fairy wren
Song thrush (invasive)

Fish

Short finned eel

Livestock/Domestic

Chicken

Other observations

Wildlife observed by owner – ducks, frogs, snakes

*Mallard could also be the native Pacific black duck

Average number of wildlife detected per dam in this eDNA farm dam biodiversity project:
8 native species / 2.5 invasive species / 18 macroinvertebrate families (5 dams surveyed only)

Turbidity affects how far light can penetrate into the water. Less light restricts photosynthesis of green plants meaning less food and oxygen is available for aquatic animals. Turbidity tube range: 400 - 10/9, with 10 or 9 considered very clear.

Conductivity is used to measure salinity. While salts are vital for aquatic life, salinity above the normal range for a species will negatively impact it (be that wildlife, livestock, crops). Conductivity measurement: 1 millisiemens/centimeter [mS/cm], with 0 > 0.3 low, 0.3 - 0.8 medium, 0.8 - 2.5 high, 2.5 - 5.8 very high, >5.8 extremely high.

Dam: 3A, Neerim

Turbidity: 10 Conductivity: 0.1ms

Dam notes

Medium size,
open paddock,
spring fed,
no livestock access,
some revegetation

Initial observational
assessment undertaken
November 2019



5

native
species

1

invasive
species

1

livestock /
domestic

19

macro
invertebrate
families

Wildlife detected

Late spring 2018

Frogs

Southern brown tree frog
Eastern common froglet
Striped marsh frog
Spotted marsh frog

Birds

Australian wood duck
Mallard (invasive)*

Livestock/Domestic

Cow

Autumn 2019

Frogs

Eastern common froglet
Striped marsh frog

Birds

Australian wood duck
Mallard (invasive)*

Livestock/Domestic

Cow

Other observations

Wildlife observed previously -
Ducks, broad tooth mice, wombats,
foxes, frogs

Macro Invertebrate Families

Acarina
Ancyliidae
Baetidae
Belostomatidae
Ceratopogonidae
Chiltoniidae (formally Ceinidae)
Chironominae
Coenagrionidae
Corixidae
Dytiscidae
Glossiphoniidae
Hydraenidae
Mesoveliidae
Naucoridae
Notonectidae
Oligochaeta
Pleidae
Tanypodinae
Veliidae

*Mallard could also be the native Pacific black duck

Average number of wildlife detected per dam in this eDNA farm dam biodiversity project:

8 native species / 2.5 invasive species / 18 macroinvertebrate families (5 dams surveyed only)

Turbidity affects how far light can penetrate into the water. Less light restricts photosynthesis of green plants meaning less food and oxygen is available for aquatic animals. Turbidity tube range: 400 - 10/9, with 10 or 9 considered very clear.

Conductivity is used to measure salinity. While salts are vital for aquatic life, salinity above the normal range for a species will negatively impact it (be that wildlife, livestock, crops). Conductivity measurement: 1 millisiemens/centimeter [mS/cm], with 0 > 0.3 low, 0.3 - 0.8 medium, 0.8 - 2.5 high, 2.5 - 5.8 very high, >5.8 extremely high.

Dam: 3B, Neerim South

Turbidity: 40 Conductivity: 0.2ms

Dam notes

Medium, gully location, on waterway, no livestock access, aquatic vegetation, surrounding trees, red azola present

Initial observational assessment undertaken November 2019



3

native species

3

invasive species

2

livestock / domestic

Wildlife detected

Late spring 2018

Frogs

Striped marsh frog

Mammals

Deer (invasive)

Australian bush rat

Livestock/Domestic

Cow

Pig (potentially feral pig)

Autumn 2019

Birds

Mallard (invasive)*

Mammals

Bush rat

Black rat (invasive)

Fish

Short finned eel

Other observations

Wildlife previously observed - wombats, snakes, foxes, deer

*Mallard could also be the native Pacific black duck

Average number of wildlife detected per dam in this eDNA farm dam biodiversity project:

8 native species / 2.5 invasive species / 18 macroinvertebrate families (5 dams surveyed only)

Turbidity affects how far light can penetrate into the water. Less light restricts photosynthesis of green plants meaning less food and oxygen is available for aquatic animals. Turbidity tube range: 400 - 10/9, with 10 or 9 considered very clear.

Conductivity is used to measure salinity. While salts are vital for aquatic life, salinity above the normal range for a species will negatively impact it (be that wildlife, livestock, crops). Conductivity measurement: 1 millisiemens/centimeter [mS/cm], with 0 > 0.3 low, 0.3 - 0.8 medium, 0.8 - 2.5 high, 2.5 - 5.8 very high, >5.8 extremely high.

Dam: 4A, Piedmont

Turbidity: 10 Conductivity: 0.9ms

Dam notes

Large, on creek/
waterway fed,
livestock access,
aquatic and riparian
vegetation, recent
revegetation efforts,
fenced, some erosion
from past cattle

Initial observational
assessment undertaken
November 2019



12
native
species

3
invasive
species

5
livestock /
domestic

18
macro
invertebrate
families

Wildlife detected

Late spring 2018

Fish

Short finned eel
Brown trout (invasive)

Frogs

Eastern common froglet
Striped marsh frog

Birds

Australian wood duck
Brown thornbill

Mammals

Common wombat
Platypus
Rakali (native water rat)
Australian bush rat

Livestock/Domestic

Cow
Dog
Chicken
Pig (potentially feral)

Autumn 2019

Fish

Short finned eel
Brown trout (invasive)

Birds

Australian wood duck
Common bronzewing
Australian raven
Fairy wrens
Common mynah (invasive)
Mallard (invasive)*

Mammals

Platypus
Rakali (native water rat)
Australian bush rat

Livestock/Domestic

Cow
Sheep
Chicken

Macro Invertebrate Families

Notonectidae
Corixidae
Atyidae
Libellulidae
Coenagrionidae
Tanypodinae
Chironominae
Chiltoniidae (formally Ceinidae)
Scirtidae
Veliidae
Dytiscidae
Baetidae
Sphaeriidae
Leptolebiidae
Leptoceridae
Calamoceratidae
Calocidae
Odonotoceridae

Other observations

Wildlife observed previously –
ducks, platypus

*Mallard could also be the native Pacific black duck

Average number of wildlife detected per dam in this eDNA farm dam biodiversity project:

8 native species / 2.5 invasive species / 18 macroinvertebrate families (5 dams surveyed only)

Turbidity affects how far light can penetrate into the water. Less light restricts photosynthesis of green plants meaning less food and oxygen is available for aquatic animals. Turbidity tube range: 400 - 10/9, with 10 or 9 considered very clear.

Conductivity is used to measure salinity. While salts are vital for aquatic life, salinity above the normal range for a species will negatively impact it (be that wildlife, livestock, crops). Conductivity measurement: 1 millisiemens/centimeter [mS/cm], with 0 > 0.3 low, 0.3 - 0.8 medium, 0.8 - 2.5 high, 2.5 - 5.8 very high, >5.8 extremely high.

Dam: 5A, Jindivick

Turbidity: 14 Conductivity: 0.3ms

Dam notes

Large, gully location, spring fed/runoff, livestock access, aquatic vegetation, other habitat, revegetation, pugging in places

Initial observational assessment undertaken November 2019



16
native species

1
invasive species

2
livestock / domestic

Wildlife detected

Late spring 2018

Birds

Mallard (invasive)*
Australian wood duck
Black swan
Blue billed duck **ENDANGERED**
Shelduck
Common coot
Common moorhen
Purple swamphen
Australian raven
Fairy wrens

Frogs

Eastern common froglet
Striped marsh frog

Reptiles

Eastern long necked turtle

Fish

Short finned eel

Decapods

Australian glass shrimp

Livestock/Domestic

Cow

Autumn 2019

Birds

Mallard (invasive)*
Australian wood duck
Blue billed duck **ENDANGERED**
Shelduck
Common coot
Purple swamphen
Australian grebe

Mammals

Southeastern free tailed bat

Fish

Short finned eel

Livestock/Domestic

Chicken
Cow

Other observations

Wildlife observed previously -
Black swans, ducks, trout?

*Mallard could also be the native Pacific black duck

Average number of wildlife detected per dam in this eDNA farm dam biodiversity project:
8 native species / 2.5 invasive species / 18 macroinvertebrate families (5 dams surveyed only)

Turbidity affects how far light can penetrate into the water. Less light restricts photosynthesis of green plants meaning less food and oxygen is available for aquatic animals. Turbidity tube range: 400 - 10/9, with 10 or 9 considered very clear.

Conductivity is used to measure salinity. While salts are vital for aquatic life, salinity above the normal range for a species will negatively impact it (be that wildlife, livestock, crops). Conductivity measurement: 1 millisiemens/centimeter [mS/cm], with 0 > 0.3 low, 0.3 - 0.8 medium, 0.8 - 2.5 high, 2.5 - 5.8 very high, >5.8 extremely high.

Dam: 6A, Jindivick

Turbidity: 49 (top of gauge) Conductivity: 0.11ms

Dam notes

Small, gully location, spring fed, no livestock access, aquatic vegetation, revegetation, fenced

Initial observational assessment undertaken November 2019



7

native species

4

invasive species

4

livestock / domestic

Wildlife detected

Late spring 2018

Birds

Mallard (invasive)*
Australian raven

Frogs

Southern brown tree frog
Eastern common froglet
Striped marsh frog

Fish

Short finned eel

Mammals

Sugar glider

Livestock/Domestic

Chicken
Cow
Sheep
Pig (potentially feral)

Autumn 2019

Birds

Mallard (invasive)*
Common blackbird (invasive)
Song thrush (invasive)

Fish

Short finned eel

Mammals

Australian Bush rat
House mouse (invasive)

Livestock/Domestic

Cow

Other observations

Wildlife observed by owner – frogs, water rats, birds, ducks, wombat, snakes.

*Mallard could also be the native Pacific black duck

Average number of wildlife detected per dam in this eDNA farm dam biodiversity project:
8 native species / 2.5 invasive species / 18 macroinvertebrate families (5 dams surveyed only)

Turbidity affects how far light can penetrate into the water. Less light restricts photosynthesis of green plants meaning less food and oxygen is available for aquatic animals. Turbidity tube range: 400 - 10/9, with 10 or 9 considered very clear.

Conductivity is used to measure salinity. While salts are vital for aquatic life, salinity above the normal range for a species will negatively impact it (be that wildlife, livestock, crops). Conductivity measurement: 1 millisiemens/centimeter [mS/cm], with 0 > 0.3 low, 0.3 - 0.8 medium, 0.8 - 2.5 high, 2.5 - 5.8 very high, >5.8 extremely high.

Dam: 7A, Neerim South

Turbidity: 10 Conductivity: 0.1ms

Dam notes

Upper dam, medium, on creek/spring fed, no livestock access, aquatic vegetation and riparian vegetation, fenced

Initial observational assessment undertaken November 2019



8

native species

4

invasive species

1

livestock / domestic

22

macro invertebrate families

Wildlife detected

Late spring 2018

Frogs

Southern brown tree frog
Eastern common froglet
Striped marsh frog

Birds

Mallard (invasive)*
Brown thornbill
Australian raven
Common mynah (invasive)

Mammals

Fox (invasive)
Common wombat

Livestock/Domestic

Cow

Autumn 2019

Frogs

Southern brown tree frog
Eastern common froglet
Striped marsh frog

Birds

Mallard (invasive)*
Fairy wrens
Grey shrikethrush
Song thrush (invasive)

Mammals

Fox (invasive)

Other observations

Wildlife observed previously – frogs, snakes, wombats, foxes

Macro Invertebrate Families

Aeshnidae
Notonectidae
Corixidae
Dytiscidae
Hydrophilidae
Coenagrionidae
Lestidae
Leptoceridae
Veliidae
Ancyliidae
Dixidae
Culicidae
Chironominae
Tanypodinae
Orthoclaadiinae
Sphaeriidae
Notonemouridae
Leptoplebiidae
Planoribiidae
Oligochaeta
Pleidae
Acarina

*Mallard could also be the native Pacific black duck

Average number of wildlife detected per dam in this eDNA farm dam biodiversity project:

8 native species / 2.5 invasive species / 18 macroinvertebrate families (5 dams surveyed only)

Turbidity affects how far light can penetrate into the water. Less light restricts photosynthesis of green plants meaning less food and oxygen is available for aquatic animals. Turbidity tube range: 400 - 10/9, with 10 or 9 considered very clear.

Conductivity is used to measure salinity. While salts are vital for aquatic life, salinity above the normal range for a species will negatively impact it (be that wildlife, livestock, crops). Conductivity measurement: 1 millisiemens/centimeter [mS/cm], with 0 > 0.3 low, 0.3 - 0.8 medium, 0.8 - 2.5 high, 2.5 - 5.8 very high, >5.8 extremely high.

Dam: 7B, Neerim South

Turbidity: 10 Conductivity: 0.0ms

Dam notes

Lower dam, medium, on creek open paddock location, waterway/spring fed, no livestock access, aquatic vegetation and some surrounding, fenced

Initial observational assessment undertaken November 2019



9

native species

4

invasive species

1

livestock / domestic

Wildlife detected

Late spring 2018

Frogs

Southern brown tree frog
Eastern common froglet
Striped marsh frog

Birds

Mallard (invasive)*
Australian wood duck

Decapods

Spiny crayfish

Mammals

Common wombat
Australian bush rat

Livestock/Domestic

Cow

Autumn 2019

Frogs

Southern brown tree frog
Eastern common froglet
Striped marsh frog

Birds

Mallard (invasive)*
Australian wood duck
Fairy wrens
Superb fairy wren
Song thrush (invasive)

Mammals

Australian Bush rat
House mouse (invasive)
Rabbit (invasive)

Decapods

Spiny crayfish

Livestock/Domestic

Cow

Other observations

Wildlife observed previously – frogs, snakes, wombats, foxes

*Mallard could also be the native Pacific black duck

Average number of wildlife detected per dam in this eDNA farm dam biodiversity project:

8 native species / 2.5 invasive species / 18 macroinvertebrate families (5 dams surveyed only)

Turbidity affects how far light can penetrate into the water. Less light restricts photosynthesis of green plants meaning less food and oxygen is available for aquatic animals. Turbidity tube range: 400 - 10/9, with 10 or 9 considered very clear.

Conductivity is used to measure salinity. While salts are vital for aquatic life, salinity above the normal range for a species will negatively impact it (be that wildlife, livestock, crops). Conductivity measurement: 1 millisiemens/centimeter [mS/cm], with 0 > 0.3 low, 0.3 - 0.8 medium, 0.8 - 2.5 high, 2.5 - 5.8 very high, >5.8 extremely high.

Dam: 8A, Neerim South

Conductivity: 0.38ms

Dam notes

Large, open paddock location, spring fed/runoff, no livestock access, limited in stream aquatic vegetation, surrounding veg – trees, grass, reeds, fenced

Initial observational assessment undertaken November 2019



9

native species

3

invasive species

2

livestock / domestic

Wildlife detected

Late spring 2018

Fish

Pygmy perch species (Southern or Yarra)

Frogs

Southern brown tree frog
Eastern common froglet
Striped marsh frog

Birds

Mallard (invasive)*
Australian wood duck
Shelduck
Common coot
Purple swamphen

Livestock/Domestic

Cow
Chicken
Sheep
Pig (potentially feral)
Dog
Cat

Autumn 2019

Fish

Pygmy perch species (Southern or Yarra)

Birds

Mallard (invasive)*
Australian wood duck
Common coot
Common mynah (invasive)
Australian grebe

Mammals

House mouse (invasive)

Livestock/Domestic

Cow
Chicken

Other observations

Wildlife previously observed - Frogs, ducks, black swans, yabbies

*Mallard could also be the native Pacific black duck

Average number of wildlife detected per dam in this eDNA farm dam biodiversity project:

8 native species / 2.5 invasive species / 18 macroinvertebrate families (5 dams surveyed only)

Turbidity affects how far light can penetrate into the water. Less light restricts photosynthesis of green plants meaning less food and oxygen is available for aquatic animals. Turbidity tube range: 400 - 10/9, with 10 or 9 considered very clear.

Conductivity is used to measure salinity. While salts are vital for aquatic life, salinity above the normal range for a species will negatively impact it (be that wildlife, livestock, crops). Conductivity measurement: 1 millisiemens/centimeter [mS/cm], with 0 > 0.3 low, 0.3 - 0.8 medium, 0.8 - 2.5 high, 2.5 - 5.8 very high, >5.8 extremely high.

Dam: 9A, Jindivick

Turbidity: 10 Conductivity: 0.6ms

Dam notes

Large, on creek location, livestock access, aquatic vegetation, forest surrounding, unfenced but good quality

Initial observational assessment undertaken November 2019



9

native species

4

invasive species

3

livestock / domestic

Wildlife detected

Late spring 2018

Fish

Pygmy perch species (southern or yarra)
Short finned eel

Birds

Mallard (invasive)*
Australian wood duck
Sacred kingfisher
Common coot
Common moorhen
Song thrush (invasive)

Mammals

Fox (invasive)
Common wombat
Platypus
House mouse (invasive)

Decapods

Australian glass shrimp

Livestock/Domestic

Cow
Dog

Autumn 2019

Fish

Pygmy perch species (southern or yarra)
Short finned eel

Birds

Mallard (invasive)*
Australian wood duck
Common coot

Mammals

House mouse (invasive)

Decapods

Australian glass shrimp

Livestock/Domestic

Cow
Pig (potentially feral)

Other observations

Wildlife observed by owner – Birds, blue tongue lizard, wallabies, deer, wombats, echidna, platypus, fox, rabbits, crayfish, rainbow trout

*Mallard could also be the native Pacific black duck

Average number of wildlife detected per dam in this eDNA farm dam biodiversity project:

8 native species / 2.5 invasive species / 18 macroinvertebrate families (5 dams surveyed only)

Turbidity affects how far light can penetrate into the water. Less light restricts photosynthesis of green plants meaning less food and oxygen is available for aquatic animals. Turbidity tube range: 400 - 10/9, with 10 or 9 considered very clear.

Conductivity is used to measure salinity. While salts are vital for aquatic life, salinity above the normal range for a species will negatively impact it (be that wildlife, livestock, crops). Conductivity measurement: 1 millisiemens/centimeter [mS/cm], with 0 > 0.3 low, 0.3 - 0.8 medium, 0.8 - 2.5 high, 2.5 - 5.8 very high, >5.8 extremely high.

Dam: 10A, Neerim South

Turbidity: 11 Conductivity: 0.49ms

Dam notes

Very large, gully location, spring fed/run off, livestock access, aquatic vegetation, islands, some trees surrounding

Initial observational assessment undertaken November 2019



15
native
species

6
invasive
species

2
livestock /
domestic

12
macro
invertebrate
families

Wildlife detected

Late spring 2018

Fish

Golden perch
Redfin perch (invasive)

Frogs

Southern brown tree frog

Birds

Mallard (invasive)*
Australian wood duck
Blue billed duck **ENDANGERED**
Shelduck
Common coot
Purple swamphen
Australian raven
Common mynah (invasive)
Little pied cormorant

Reptiles

Eastern long necked turtle

Livestock/Domestic

Cow

Autumn 2019

Fish

Redfin perch (invasive)

Birds

Mallard (invasive)*
Australian wood duck
Blue billed duck **ENDANGERED**
Shelduck
Common coot
Common moorhen
Purple swamphen
Common starling (invasive)
White faced heron
Eastern rosella
Little pied cormorant

Mammals

Sugar glider
Common ringtail possum
House mouse (invasive)
Black rat (invasive)

Livestock/Domestic

Cow
Chicken

Macro Invertebrate Families

Notonectidae
Corixidae
Chiltoniidae (formally Ceinidae)
Ancyliidae
Coenagrionidae
Planorbiidae
Veliidae
Dytiscidae
Leptoceridae
Tanypodinae
Chironominae
Acarina

Other observations

Wildlife observed – Ducks, frogs, fish

*Mallard could also be the native Pacific black duck

Average number of wildlife detected per dam in this eDNA farm dam biodiversity project:

8 native species / 2.5 invasive species / 18 macroinvertebrate families (5 dams surveyed only)

Turbidity affects how far light can penetrate into the water. Less light restricts photosynthesis of green plants meaning less food and oxygen is available for aquatic animals. Turbidity tube range: 400 - 10/9, with 10 or 9 considered very clear.

Conductivity is used to measure salinity. While salts are vital for aquatic life, salinity above the normal range for a species will negatively impact it (be that wildlife, livestock, crops). Conductivity measurement: 1 millisiemens/centimeter [mS/cm], with 0 > 0.3 low, 0.3 - 0.8 medium, 0.8 - 2.5 high, 2.5 - 5.8 very high, >5.8 extremely high.

Dam: 11A, Jindivick

Turbidity: 9 (top of gauge) Conductivity: 0.04ms

Dam notes

Small, gully location, spring fed/runoff, no livestock access, aquatic vegetation, forest/revegetation surrounding

Initial observational assessment undertaken November 2019



7

native species

2

invasive species

1

livestock / domestic

Wildlife detected

Late spring 2018

Frogs

Southern brown tree frog
Eastern common froglet
Striped marsh frog

Birds

Mallard (invasive)*
Australian wood duck

Autumn 2019

Frogs

Southern brown tree frog
Striped marsh frog
Spotted marsh frog

Birds

Mallard (invasive)*
Australian wood duck
Australian magpie
Satin bowerbird
Common starling (invasive)

Livestock/Domestic

Cow

Other observations

Wildlife observed by owner – lace monitors, wallabies, kangaroos, snakes, birds, cormorants.

Note

Horse eDNA was also detected at this dam, however at extremely low abundance. As a result it initially missed the threshold for reporting.

*Mallard could also be the native Pacific black duck

Average number of wildlife detected per dam in this eDNA farm dam biodiversity project:

8 native species / 2.5 invasive species / 18 macroinvertebrate families (5 dams surveyed only)

Turbidity affects how far light can penetrate into the water. Less light restricts photosynthesis of green plants meaning less food and oxygen is available for aquatic animals. Turbidity tube range: 400 - 10/9, with 10 or 9 considered very clear.

Conductivity is used to measure salinity. While salts are vital for aquatic life, salinity above the normal range for a species will negatively impact it (be that wildlife, livestock, crops). Conductivity measurement: 1 millisiemens/centimeter [mS/cm], with 0 > 0.3 low, 0.3 - 0.8 medium, 0.8 - 2.5 high, 2.5 - 5.8 very high, >5.8 extremely high.

Dam: 12A, Jindivick

Turbidity: 10 Conductivity: 0.1ms

Dam notes

Medium, open paddock location, runoff, no livestock access, aquatic vegetation, some single trees surrounding

Initial observational assessment undertaken November 2019



8

native species

1

invasive species

2

livestock / domestic

20

macro invertebrate families

Wildlife detected

Late spring 2018

Fish

Pygmy perch species (Southern or Yarra)

Frogs

Southern brown tree frog
Eastern common froglet
Striped marsh frog

Birds

Mallard (invasive)*

Livestock/Domestic

Cow

Autumn 2019

Fish

Pygmy perch species (Southern or Yarra)

Frogs

Eastern common froglet
Striped marsh frog

Birds

Mallard (invasive)*
Australian wood duck
Australian raven
Grey shrikethrush
Ardea species (Heron or Egret)

Livestock/Domestic

Cow
Chicken

Other observations

Wildlife previously observed - Frogs, wombats, ducks, cormorants, pygmy perch, dwarf galaxia, hares, rabbits

Macro Invertebrate Families

Aeshnidae
Corduliidae
Libellulidae
Lestidae
Coenagrionidae
Atyidae
Notonectidae
Corixidae
Belostomatidae
Physidae
Chiltoniidae (formally Ceinidae)
Oligochaeta
Dugesidae
Pleidae
Acarina
Ceratopogonidae
Mesoveliidae
Hydroptilidae
Tanypodinae
Chironominae

*Mallard could also be the native Pacific black duck

Average number of wildlife detected per dam in this eDNA farm dam biodiversity project:

8 native species / 2.5 invasive species / 18 macroinvertebrate families (5 dams surveyed only)

Turbidity affects how far light can penetrate into the water. Less light restricts photosynthesis of green plants meaning less food and oxygen is available for aquatic animals. Turbidity tube range: 400 - 10/9, with 10 or 9 considered very clear.

Conductivity is used to measure salinity. While salts are vital for aquatic life, salinity above the normal range for a species will negatively impact it (be that wildlife, livestock, crops). Conductivity measurement: 1 millisiemens/centimeter [mS/cm], with 0 > 0.3 low, 0.3 - 0.8 medium, 0.8 - 2.5 high, 2.5 - 5.8 very high, >5.8 extremely high.

Dam: 13A

Turbidity: 10 (top of gauge) Conductivity: 1.3ms

Dam notes

Medium, open paddock location, spring fed/run off, livestock access, aquatic vegetation, single trees surrounding, some rehabilitation, fenced

Initial observational assessment undertaken November 2019



8

native species

2

invasive species

2

livestock / domestic

Wildlife detected

Late spring 2018

Frogs

Southern brown tree frog
Striped marsh frog

Birds

Mallard (invasive)*
Australian wood duck
Australian grebe

Mammals

Sugar glider

Livestock/Domestic

Cow

Autumn 2019

Frogs

Striped marsh frog

Birds

Mallard (invasive)*
Australian wood duck
Common moorhen
Australian grebe
Eastern rosella

Mammals

Common brushtail possum
Black rat (invasive)

Livestock/Domestic

Cow
Chicken

Other observations

Wildlife observed by owner – snakes, frogs, ducks, yabbies.

Note

Horse eDNA was also detected at this dam, however at extremely low abundance. As a result it initially missed the threshold for reporting.

*Mallard could also be the native Pacific black duck

Average number of wildlife detected per dam in this eDNA farm dam biodiversity project:

8 native species / 2.5 invasive species / 18 macroinvertebrate families (5 dams surveyed only)

Turbidity affects how far light can penetrate into the water. Less light restricts photosynthesis of green plants meaning less food and oxygen is available for aquatic animals. Turbidity tube range: 400 - 10/9, with 10 or 9 considered very clear.

Conductivity is used to measure salinity. While salts are vital for aquatic life, salinity above the normal range for a species will negatively impact it (be that wildlife, livestock, crops). Conductivity measurement: 1 millisiemens/centimeter [mS/cm], with 0 > 0.3 low, 0.3 - 0.8 medium, 0.8 - 2.5 high, 2.5 - 5.8 very high, >5.8 extremely high.

Dam: 13B

Turbidity: 10 (top of gauge) Conductivity: 2.4ms

Dam notes

Medium, open paddock location, Run off, livestock access, aquatic vegetation, single trees surrounding, some pugging

Initial observational assessment undertaken November 2019



10
native species

2
invasive species

1
livestock / domestic

Wildlife detected

Late spring 2018

Frogs

Southern brown tree frog
Eastern common froglet
Striped marsh frog

Fish

Short finned eel

Birds

Mallard (invasive)*
Australian wood duck
Common moorhen
White faced heron

Livestock/Domestic

Cow

Autumn 2019

Fish

Short finned eel

Birds

Mallard (invasive)*
Australian wood duck
Common moorhen
Australian raven
Noisy miner
Common mynah (invasive)
White faced heron
Eastern rosella

Livestock/Domestic

Cow

Other observations

Wildlife observed by owner – birds, frogs

*Mallard could also be the native Pacific black duck

Average number of wildlife detected per dam in this eDNA farm dam biodiversity project:

8 native species / 2.5 invasive species / 18 macroinvertebrate families (5 dams surveyed only)

Turbidity affects how far light can penetrate into the water. Less light restricts photosynthesis of green plants meaning less food and oxygen is available for aquatic animals. Turbidity tube range: 400 - 10/9, with 10 or 9 considered very clear.

Conductivity is used to measure salinity. While salts are vital for aquatic life, salinity above the normal range for a species will negatively impact it (be that wildlife, livestock, crops). Conductivity measurement: 1 millisiemens/centimeter [mS/cm], with 0 > 0.3 low, 0.3 - 0.8 medium, 0.8 - 2.5 high, 2.5 - 5.8 very high, >5.8 extremely high.

Dam: **McKD2A**

Dam notes

No initial observational assessment taken on dam. Very low eDNA water sample volume and only one sampling occasion, which may limit results

2

native species

1

invasive species

1

livestock / domestic

Wildlife detected

Late spring 2018

No eDNA samples taken

Autumn 2019

Frogs

Striped marsh frog

Fish

Eastern mosquitofish (invasive)

Mammals

Sugar glider

Livestock/Domestic

Cow

Dam: **McKnew2**

Dam notes

No initial observational assessment taken on dam. Very low eDNA water sample volume and only one sampling occasion, which may limit results

3

native species

1

invasive species

1

livestock / domestic

Wildlife detected

Late spring 2018

No eDNA samples taken

Autumn 2019

Frogs

Striped marsh frog

Fish

Short finned eel

Birds

Mallard (invasive)*

Australian wood duck

Livestock/Domestic

Cow

*Mallard could also be the native Pacific black duck

Average number of wildlife detected per dam in this eDNA farm dam biodiversity project:

8 native species / 2.5 invasive species / 18 macroinvertebrate families (5 dams surveyed only)

Turbidity affects how far light can penetrate into the water. Less light restricts photosynthesis of green plants meaning less food and oxygen is available for aquatic animals. Turbidity tube range: 400 - 10/9, with 10 or 9 considered very clear.

Conductivity is used to measure salinity. While salts are vital for aquatic life, salinity above the normal range for a species will negatively impact it (be that wildlife, livestock, crops). Conductivity measurement: 1 millisiemens/centimeter [mS/cm], with 0 > 0.3 low, 0.3 - 0.8 medium, 0.8 - 2.5 high, 2.5 - 5.8 very high, >5.8 extremely high.