



Citizen Science

ECOLOGY OF THE PLATYPUS



Brought to you by:

PLANET WARRIOR 

Education



In partnership with:

ODONATA

WELCOME

Welcome wildlife explorer to our ecology of the platypus lesson!
This illustrated lesson is proudly brought to you by Planet Warrior Education in partnership with the Great Australian Platypus Search, Odonata and Outback Academy Australia.

Planet Warrior and our collaborators, Odonata and Outback Academy Australia, acknowledge Australia's First Nations People across Australia. We appreciate the role First Nations People play today, and have played for all time in keeping Country and all within it healthy and protected.

The platypus is special to many nations, featuring in many groups Dreaming Stories. We look forward to collaborating with First Nations Peoples across Australia as we learn more about the platypus, and protect them for generations to follow.



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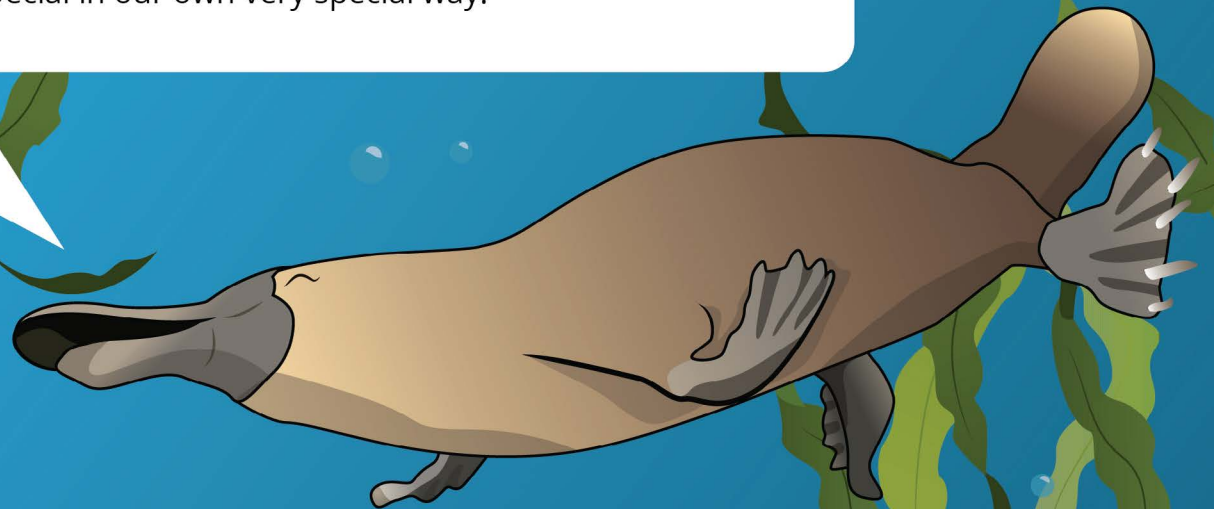
ODONATA

LESSONS FROM THE PLATYPUS

The platypus has the features of many different animals. **HOW MANY OF THESE FEATURES CAN YOU LIST?**

There is no doubt that the platypus is a unique creature. Perhaps we can look to the platypus for a lesson in uniqueness, embracing all of our features and accepting us as we are?

"Please listen," said Platypus patiently. "Everyone is special in their own special way and I don't have to join any group to prove that. After all, I have a bit of animal in me because of my fur and because I like running across the land, but I have a bit of bird in me too, because my wife lays eggs and we both have beaks. And if that's not enough, I also have a bit of water creature in me because my home is near the water's edge and I like swimming and exploring the underwater world. So you see, I don't have to join any special group to be special. But it's not only me - everyone of us has something that makes us special in our own very special way."



THE CULTURAL SIGNIFICANCE OF THE PLATYPUS

Culturally, the platypus is an icon of uniqueness and individualism as told through Dreaming Stories.

Dreaming Stories teach children and others about the Ancestors, creation of the special features of landscapes and waterways and all living creatures. Dreaming stories also teach children and others about their place in the world, responsibilities, right and wrong. All animals hold separate purpose and meaning as part of their special groups. However, the platypus was not part of one group. Dreaming stories share that despite groups inviting the platypus to join them such as ducks (bill) and kangaroo (fur), it refused, dictating that it was part of no one group, yet part of all groups due to its similarities with some of the physical attributes of each group.

One Dreaming Story portrays the beginnings of the species, where a young duck ventured too far from home, despite the warnings of the duck's tribe, warning of Mulloka, or Waaway (the water devil). The young duck was abducted by Biggoon, who was a large water rat, and was made his wife. Upon escape, the duck returned to its tribe, where she lay two eggs. From the eggs hatched three baby platypuses. The three babies were banished from the tribe. The baby platypodes had spurs on their hind legs, like Biggoon's spear, and had soft fur, not feathers. They also had four feet instead of two.

The platypus is remembered and taught as a commemorator to the Great Spirit for bringing diversity and wisdom to the world of animals. Because of this, they are respected.



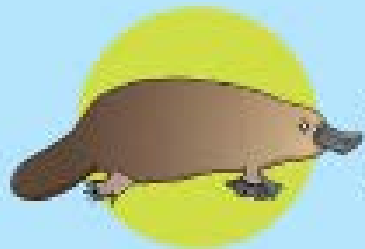
Let's Listen to an Elder sharing a Dreaming story of how First Nations people believe the platypus acquired its features.



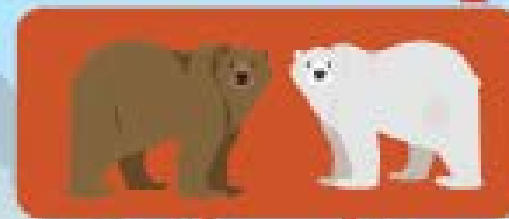
CLASSIFICATION OF LIVING THINGS

To help us better understand the world around us, we can group living things based on basic and shared characteristics.

Organisms within each group can then be further divided into smaller groups. These smaller groups are based on more detailed similarities within each larger group. Characteristics such as appearance, reproduction and mobility are just a few ways living organisms are grouped together. These specialised groups are collectively called the classification of living things.



THE NEXT SLIDE WILL TELL YOU ALL ABOUT THE CLASSIFICATION OF THE PLATYPUS.



CLASSIFICATION OF THE PLATYPUS

KINGDOM
Animalia

A platypus belongs to the animal kingdom. Animals are multi-celled living things that get the energy they need for survival, and the nutrients they need for growth and repair, by feeding on other living things.

PHYLUM
Chordata

A platypus belongs to the phylum chordata. Chordata are a group of animals that includes vertebrates.

CLASS
Mammalia

A platypus belongs to the class mammalia. Mammals are a group of warm-blooded vertebrates that nourish their young with milk secreted by mammary glands.

ORDER
Monotremata

A platypus belongs to the order monotremata. Monotremes are egg-laying mammals. Platypuses and Echidnas are both monotremes.

FAMILY
Ornithorhynchidae

A platypus belongs to the family Ornithorhynchidae. The duck-billed platypus is the only living member of this family.

GENUS
Ornithorhynchus

Ornithorhynchus anatinus is the scientific name for a platypus.


SPECIES
Ornithorhynchus anatinus

DESCRIPTION OF THE PLATYPUS

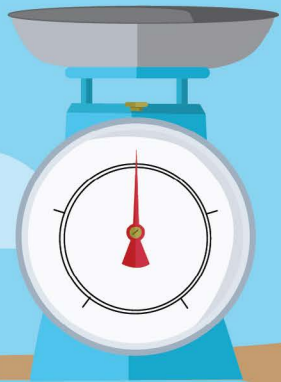
The platypus is a unique Australian animal known as a **MONOTREME**. They are only one of five monotremes currently living; the other four being species of echidna. Monotremes are similar to mammals, however they do not have teats for young to suckle from and they lay eggs!

MONOTREMES

WHAT IS THE PLURAL FORM OF PLATYPUS? If we use the Greek plural, it would be platypodes, however the more common plural is platypuses. The choice is yours! We prefer platypodes.



A Male platypus will grow to roughly 50cm long, while a female will grow to 40cm long.



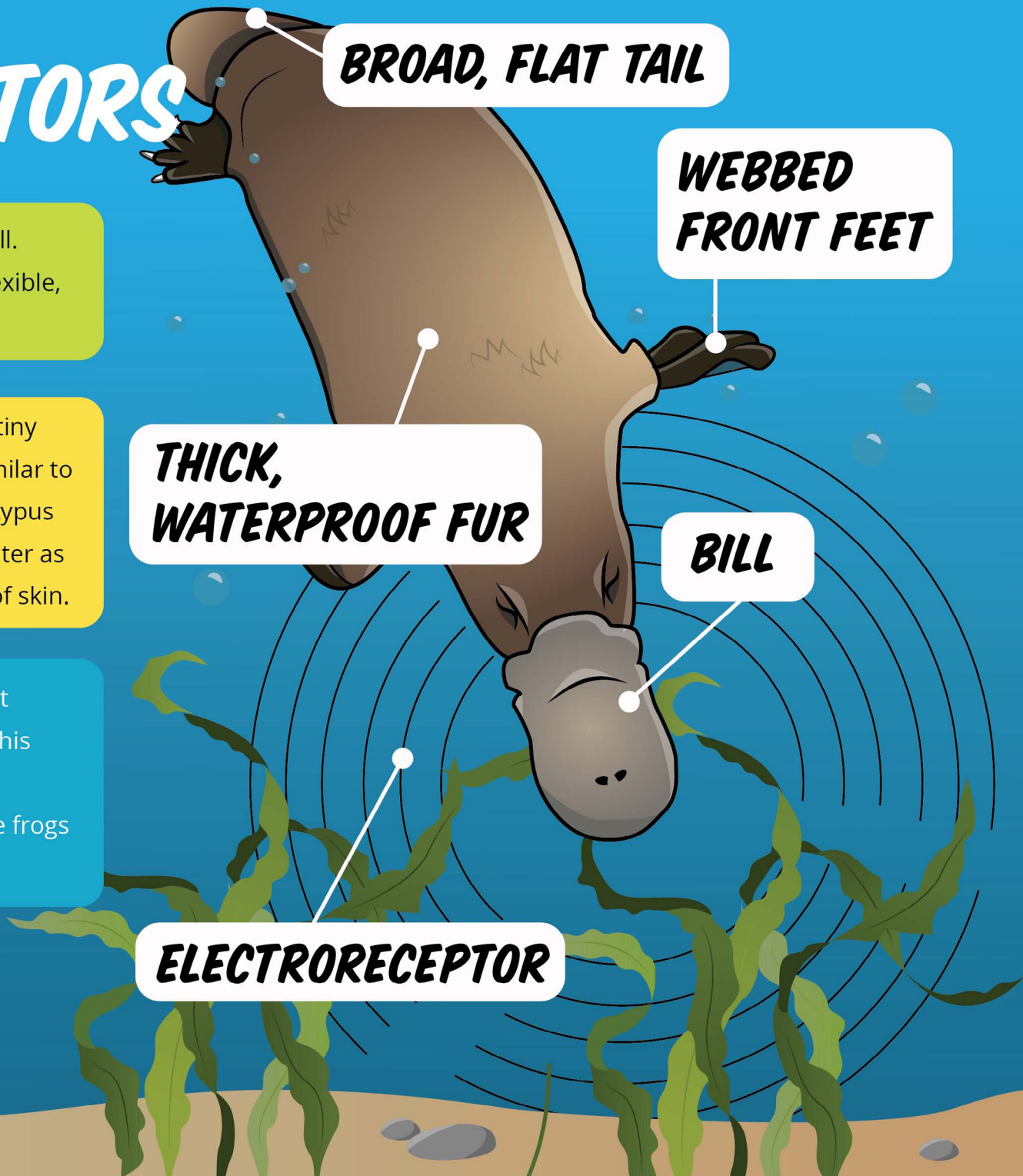
A Platypus is a small creature, weighing 3.5kg for males and 2kg for females.

ELECTRORECEPTORS

The most identifiable feature of a platypus is their bill. Much like the rubber of a shoe sole, their bills are flexible, smooth, and have a texture similar to soft leather.

Platypodes use their bills as a 'sixth sense' to detect tiny electrical signals from their prey within the water similar to the ampullae of Lorenzini that a shark utilises. A platypus will use their 'sixth sense' to maneuver within the water as their eyes, nostrils, and ears are covered with folds of skin.

The electroreceptors in their bill allow them to detect miniscule amounts of movement within the water. This comes in handy when they are searching for bottom-dwelling invertebrates, small vertebrates like frogs and fish to feast on.



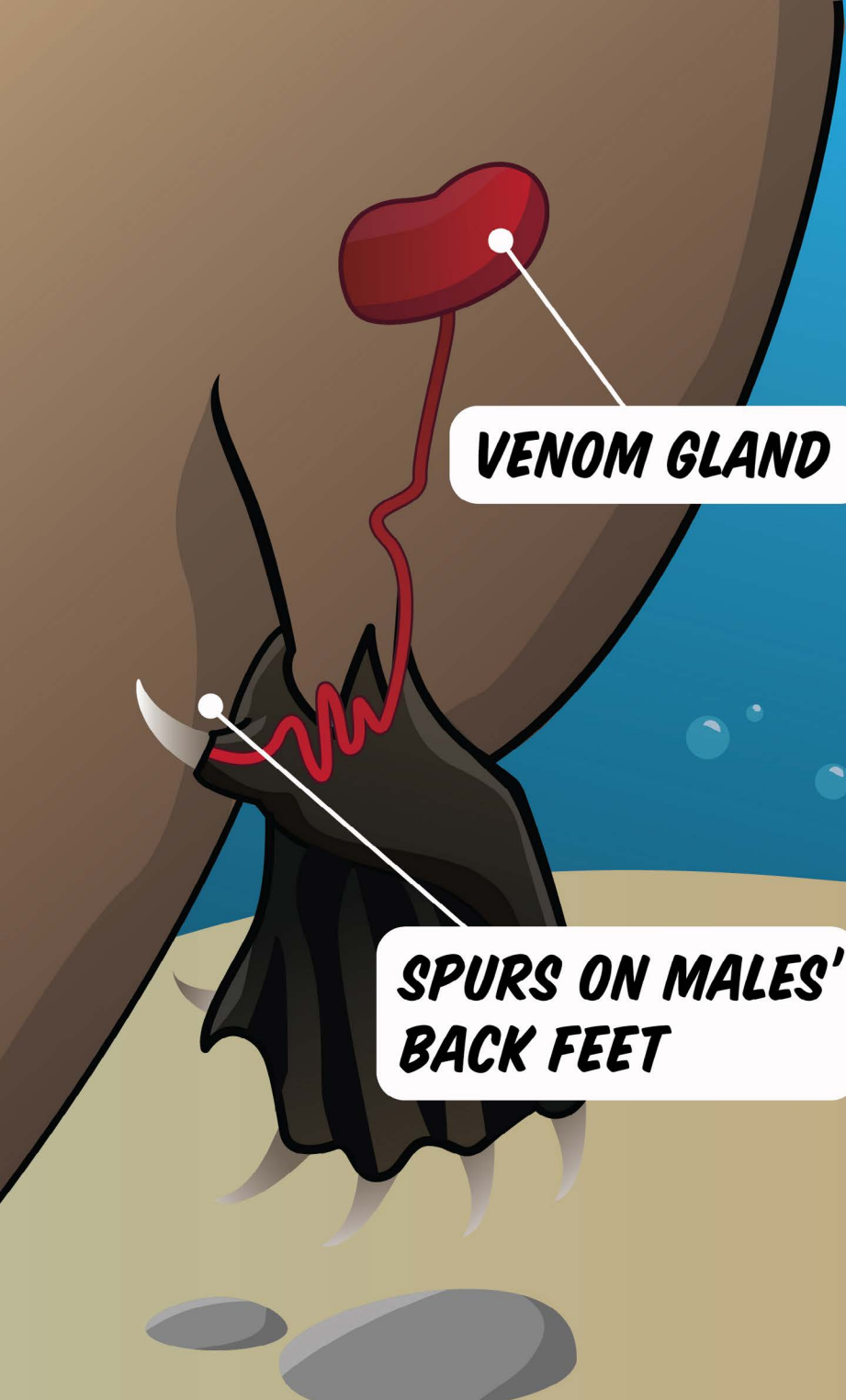
BROAD, FLAT TAIL

WEBBED FRONT FEET

THICK, WATERPROOF FUR

BILL

ELECTRORECEPTOR



VENOM GLAND

**SPURS ON MALES'
BACK FEET**

A platypus's thick, waterproof fur helps it to stay dry and warm in the water for long periods of time. The thick guard hairs are seen on the surface, hiding and protecting the under-fur, which remains dry when submerged in the water. Platypodes can remain underwater for up to 10 minutes before coming to the surface to breathe.

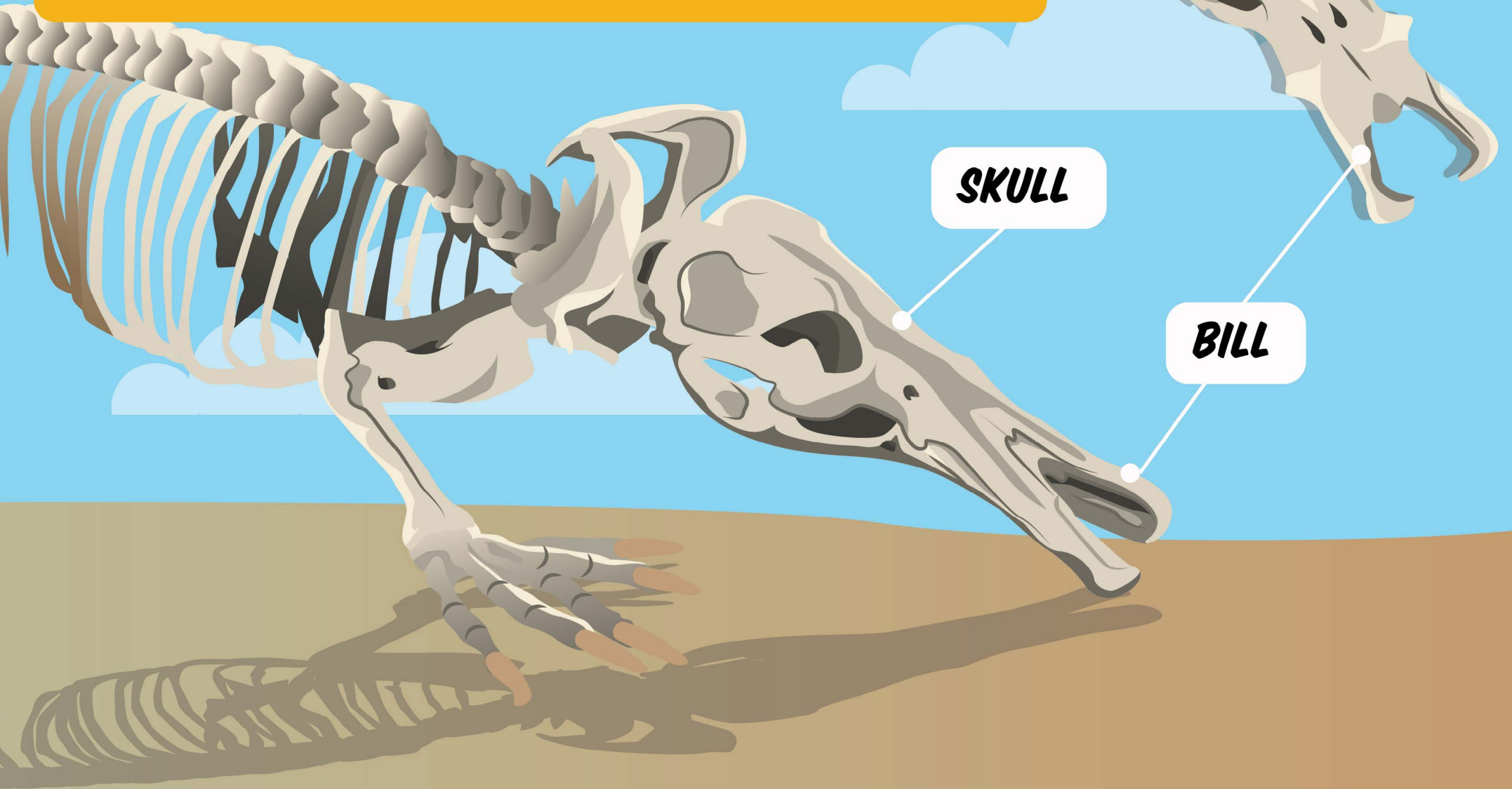


Platypodes are highly adapted to an aquatic lifestyle. Their webbed feet and paddle-like tail make them masters at maneuvering in waterways. A platypus will use its front legs to propel itself through the water, and its hind legs to steer, and brake.

Males can easily be distinguished from females. Male platypodes have venomous spurs on their hind legs. These spurs are connected to venom glands above the thighs. The males use these spurs to compete with other males for territory and females during the breeding season.

SKELETON

We cannot talk about a platypus without mentioning their strange skeleton! If you have ever seen a platypus skeleton you might have been shocked by the pincer-like structure on the platypus's bill; these bony prongs support the leathery bill which is full of electroreceptors.



BURROWING

Platypodes prefer **FRESHWATER** rivers, streams, creeks, and lagoons with steep banks that have overhanging vegetation and logs, as well as root systems within the soil.

A platypus will **BURROW INTO THE BANK JUST ABOVE THE WATER LEVEL**, often amongst root systems. Nesting burrows up to thirty meters long have been recorded!



BREEDING

Once a female has completed her burrow, she will block the entry with soil in preparation to lay eggs. Blocking the burrow also allows temperature and humidity to regulate for incubation. These burrows not only provide a safe place to raise young, but also a safe place to hide from predators; this makes them essential for the species' survival.



ACTUAL SIZE



Platypus eggs are about 1.7 cm in diameter and they are rounder than most bird eggs. After a female platypus lays her eggs, she will curl around them, incubating them for seven to ten days.

DISTRIBUTION

Relatively little is known about the species distribution throughout Australia. What we do know is that platypodes require well established waterways or permanent river systems. Platypodes can be found in both tropical and alpine areas. Such areas range from eastern Queensland, eastern NSW, Victoria, and Tasmania.

This is why the Great Australian Platypus search is such an important project! The data obtained from this project will give us a clearer insight into the distribution and population size of platypus!

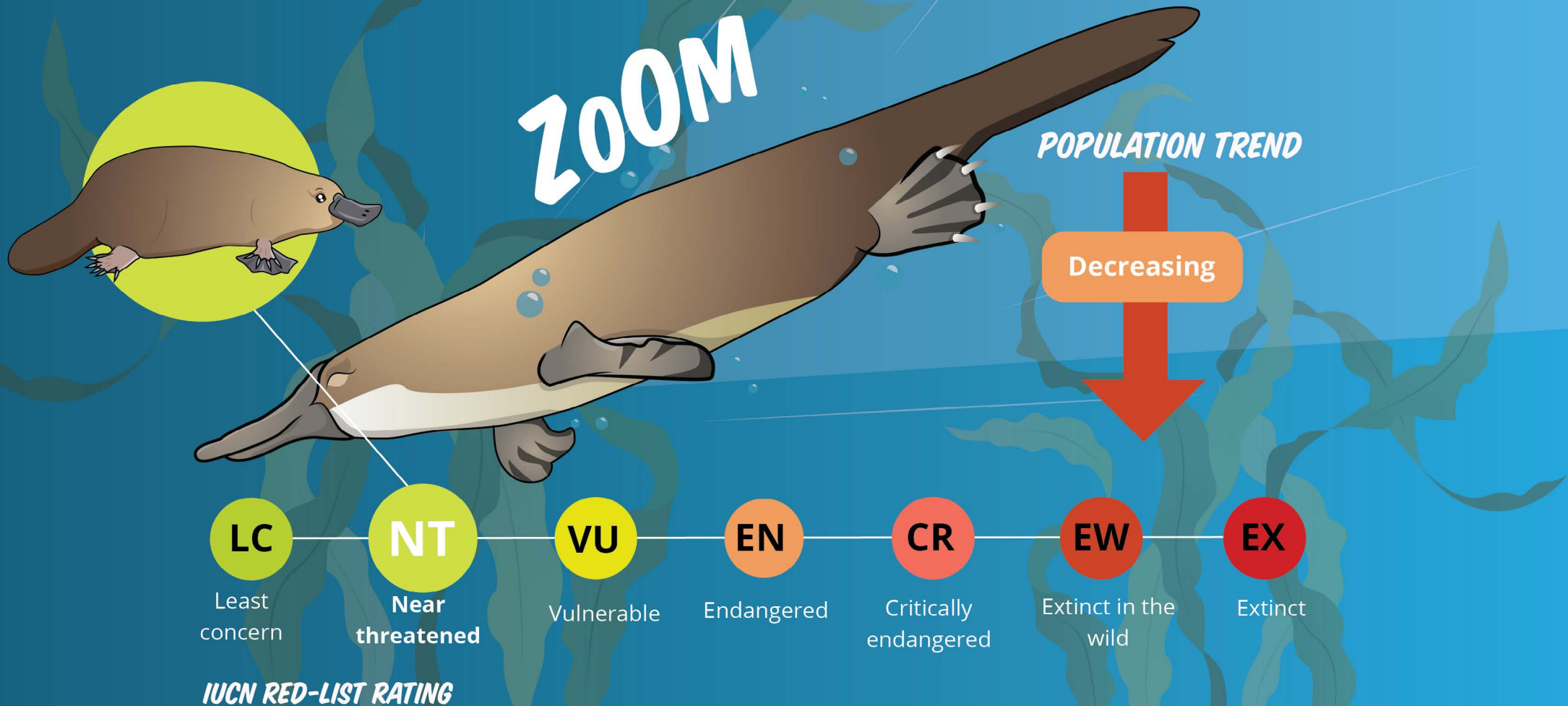


Figure 1: Rough representation of platypus distribution, according to Atlas of Living Australia

CONSERVATION STATUS

Within South Australia the species is near extinct, with only a handful of populations remaining. Determining the conservation status of the platypus is challenging due to data deficiency, so their current population is therefore a rough estimate.

The inaccuracy of this data is due to several reasons; however, it is primarily due to the animal's shy behavior making them difficult to capture or observe in the wild. Great effort and patience must be taken to capture and re-capture animals to collect accurate data.



THREATS

Much like most Australian species, platypodes face man-made and natural threats.

MAN-MADE THREATS

HABITAT DEGRADATION is a set of processes by which habitat quality is reduced.

HABITAT DESTRUCTION is the process by which a natural habitat becomes incapable of supporting its native species.

Habitat degradation and destruction are the primary threat for platypodes. While habitat degradation can occur naturally (e.g. drought, floods) it is human activity such as **LAND CLEARING, WATER EXTRACTION, CONSTRUCTION, MINING, INDUSTRIAL PRACTICES AND POLLUTION** that are causing considerable damage to native ecosystems.

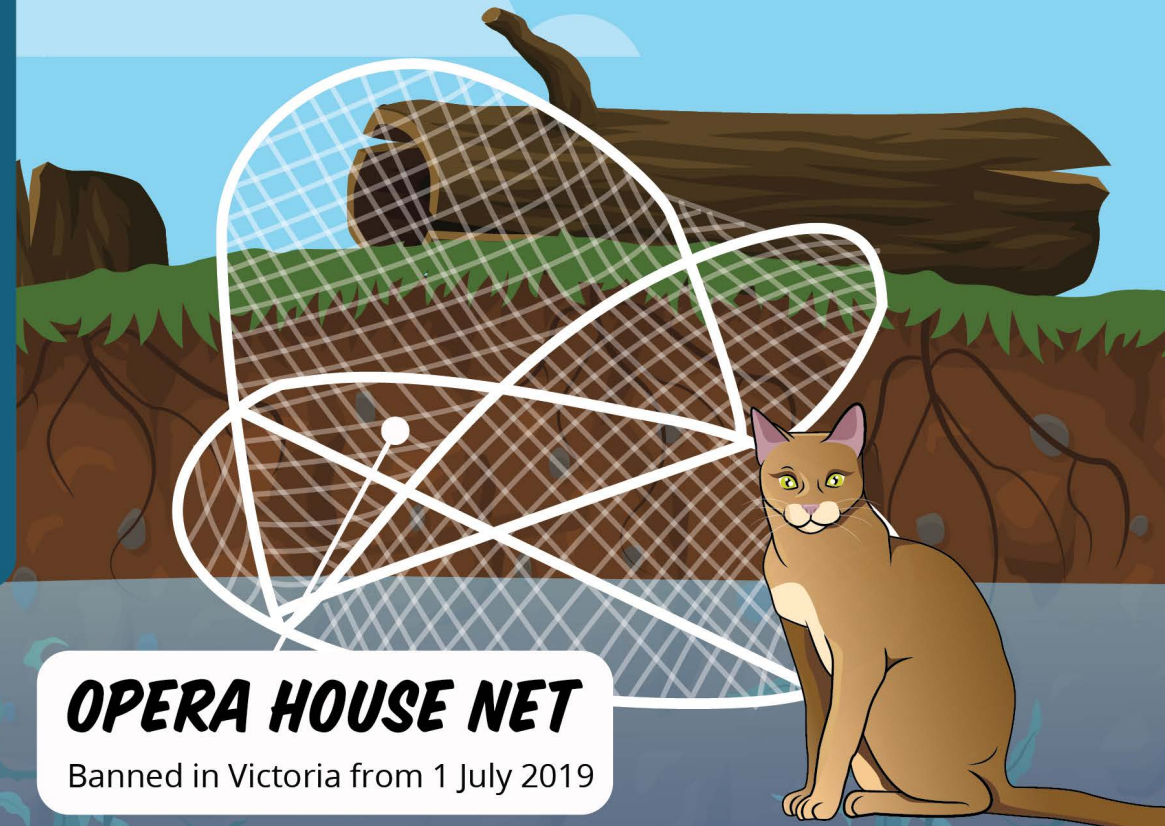
The loss of their habitat causes platypodes to leave waterways and roam around to find a new home, which leaves them vulnerable to predation.



INTRODUCED SPECIES are also a threat for the platypus.

Introduced species include the European Fox, dogs, and cats (domesticated and feral).

Additional threats include netting, such as opera house netting, poor water quality, and disease.



OPERA HOUSE NET

Banned in Victoria from 1 July 2019



WATER MANAGEMENT

The critical issues surrounding conservation efforts for platypodes in the wild revolve around two key areas: water management and waterway management.

WATER MANAGEMENT involves the preservation of high-quality water within a waterway. This includes managing run off from urban and agricultural areas. It aims to maintain or improve water quality and flow regimes of a waterway.

WATERWAY MANAGEMENT has some overlap with water management, however, it particularly focuses on our effect on the waterway. For example, the use of heavy machinery around a waterway temporarily affects platypus habitation. It can also cause permanent damage to the banks of the waterway, which could further affect platypodes in the area.



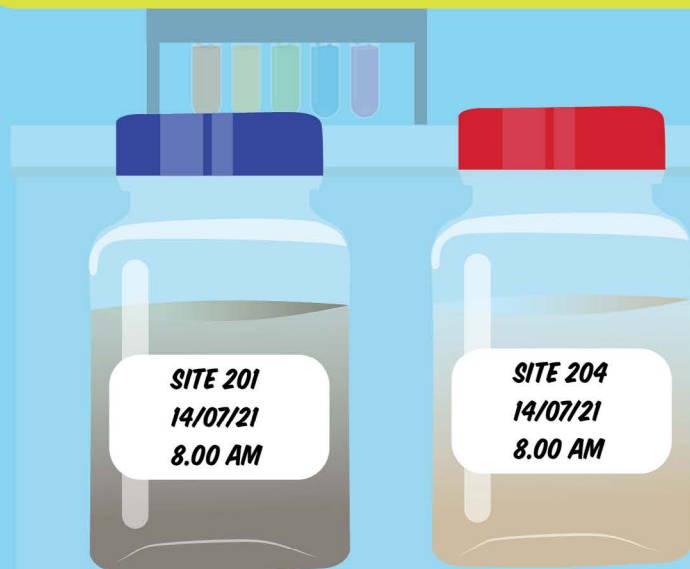
WATER SAMPLES

WHY IS WATER TESTING DONE?

A water sample for an aquatic system might be undertaken to test and monitor the health of an ecosystem over time or to determine whether any activities such as run off, agricultural practices or urbanisation are having an impact on that aquatic system.

WHAT MIGHT YOU TEST FOR?

What you are testing for changes based on the objective of the study. When conducting a water sample you may test the temperature, salinity (the level of salt present), dissolved oxygen, turbidity (the cloudiness of the water), and pH of the aquatic system, as these parameters affect what species can live within that ecosystem, as these parameters effect what species can live in within the ecosystem. If you notice that an aquatic system has had a visually large increase in the amount of algae, you might also test for contaminants such as Escherichia coli (E. coli), faecal matter, metals and elements such as ammonia, phosphorous and nitrogen.



pH scale



ACID

ALKALINE

pH is a scale of acidity from 0 to 14. It tells how acidic or alkaline a substance is. More acidic solutions, have a pH lower than 7. More alkaline solutions have a pH higher than 7. Substances that aren't acidic or alkaline (neutral) usually have a pH of 7.

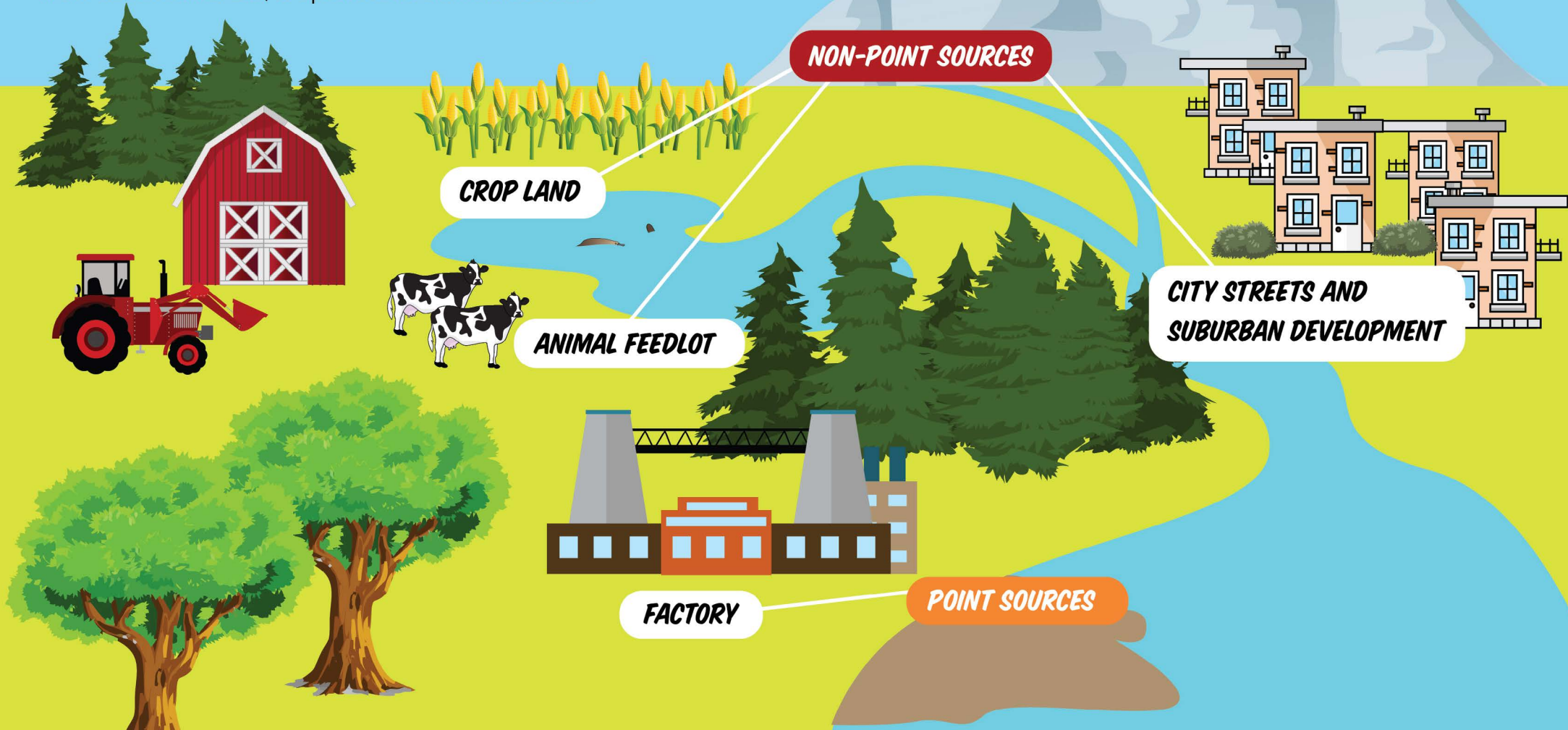
HOW DOES WATER SAMPLING HELP KEEP AN AQUATIC ECOSYSTEM HEALTHY?

By thoroughly assessing water quality, scientists and ecologists are able to gain valuable information about the health of an aquatic system. If water contamination is taking place, water sampling results can help to identify the cause of the contamination. From here, the appropriate measures can be taken to ensure the ongoing health of the aquatic system.

Water contamination can come from a **POINT SOURCE** or a **NON-POINT SOURCE**.

A **POINT SOURCE** of water contamination comes from a single place such as a pipe or wastewater treatment plant.

A **NON-POINT SOURCE** of water contamination can sometimes be harder to identify. Some examples of non-point sources of pollution include run off from suburban areas, cropland and animal feedlots.



EDNA TESTING

Collecting DNA from certain species is often simple, however, for species where numbers are limited, and sightings are rare, other techniques must be used to collect DNA. *THIS IS CALLED EDNA, OR ENVIRONMENTAL DNA.*

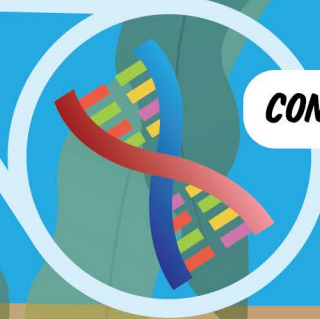
As an alternative to collecting raw DNA samples from a creature, eDNA allows scientists to collect material of a species by gathering accumulations of DNA rich elements. These elements include hair, faecal matter, skin, carcasses, and mucus. These elements may also be part of a mixture in the environment, such as in soil or water, where a sample must be taken to measure the presence of DNA.

This collection technique allows for cost effective analysis of a species to determine population size and distribution without using invasive testing methods on elusive or endangered species.



DNA (DEOXYRIBONUCLEIC ACID)

CONTAINS EDNA

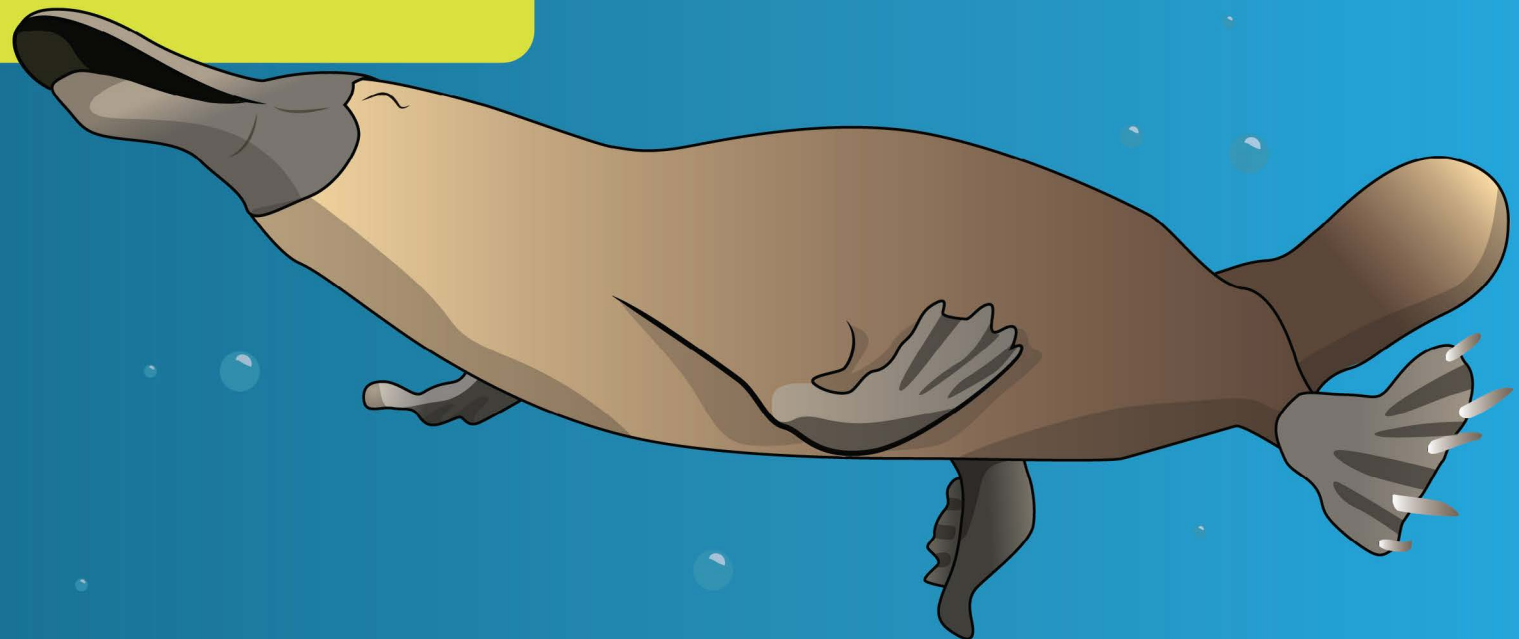


THE GREAT AUSTRALIAN PLATYPUS SEARCH

Australia has vast waterways throughout the continent, allowing for a diversity like no other, in one nation. Due to this, collecting data from water samples becomes extremely difficult, often costing thousands of dollars and even more work hours to contribute anything meaningful to the study.

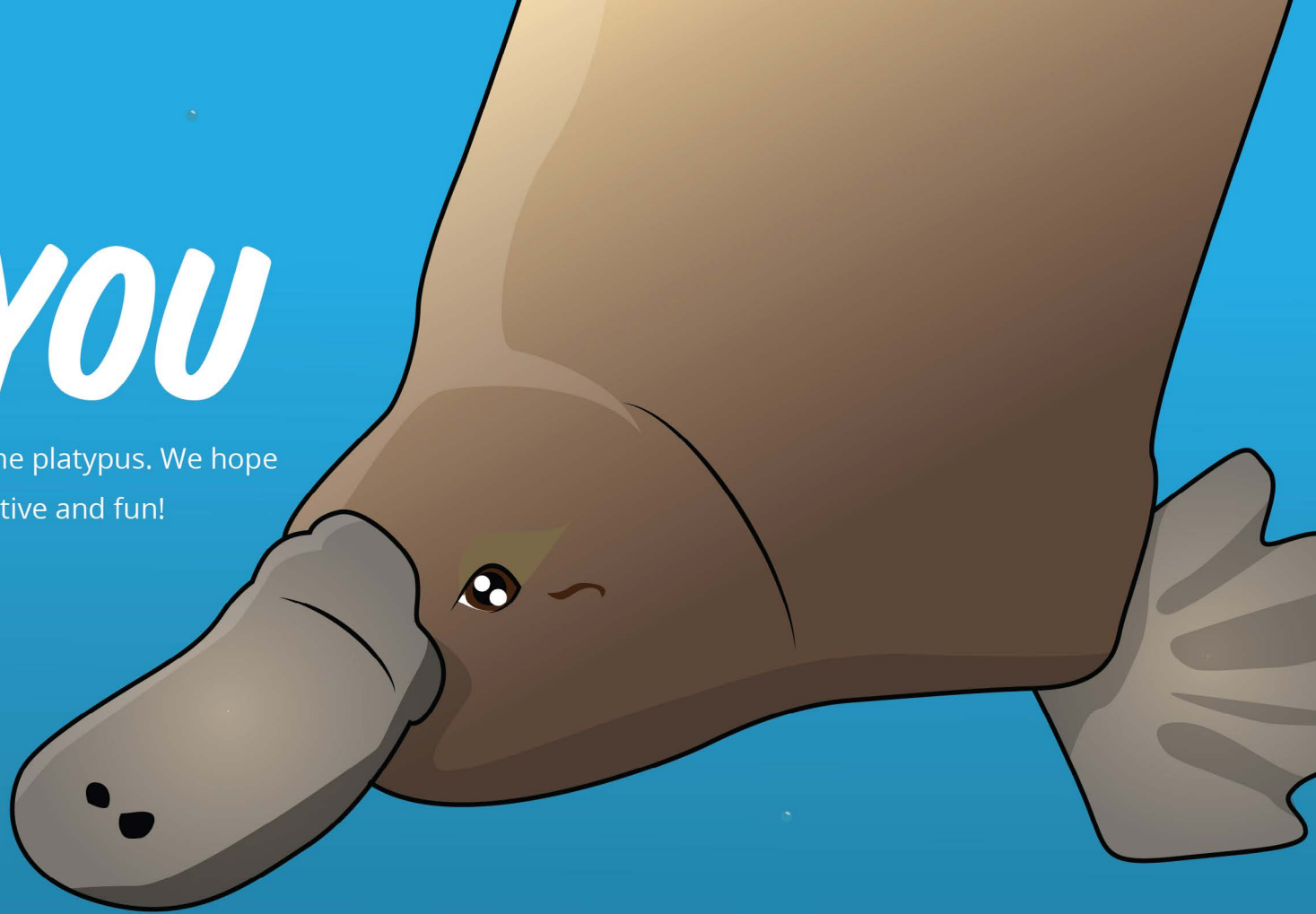
The Great Australian Platypus Search (GAPS) is a state-wide investigation into platypus populations throughout Victoria. The GAPS provides you with water testing kits to conduct your very own water testing! The data collected through the GAPS app and from the water samples allows scientists to gain a deeper understanding of our duck-billed friends! A better knowledge and understanding means we can better conserve and protect Australia's vast biodiversity.

The Great Australian Platypus Search is using eDNA detection technology to develop a comprehensive map of platypus populations across the state of Victoria!



THANK YOU

Thank you for wanting to learn more about the platypus. We hope that you have found this lesson both informative and fun!



ODONATA

ABOUT PLANET WARRIOR EDUCATION

WHO IS PLANET WARRIOR EDUCATION?

Planet Warrior Education (PWE) is an Australian based environmental education organisation. PWE specialises in producing highly engaging and memorable science resources for children. Their comprehensive activity books and online science program are a joyous way for children to advance their scientific knowledge and connect to the natural world.



THE PLANET WARRIOR EDUCATION TEAM

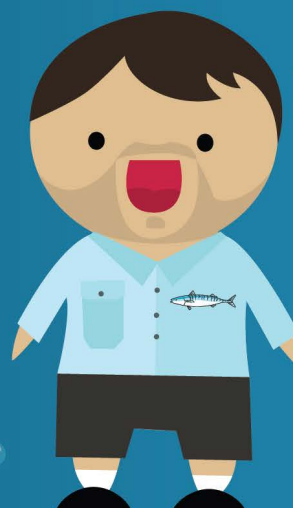
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