WATERWATCH

Upper Murrumbidgee

# EDUCATION

# Looking for Platypus

## Primary Education: Years K - 6

Classroom resource adapted from '**Sustaining River Life**' Unit 1.4 *Platypus: Challenges of being at the top of the food pyramid*.

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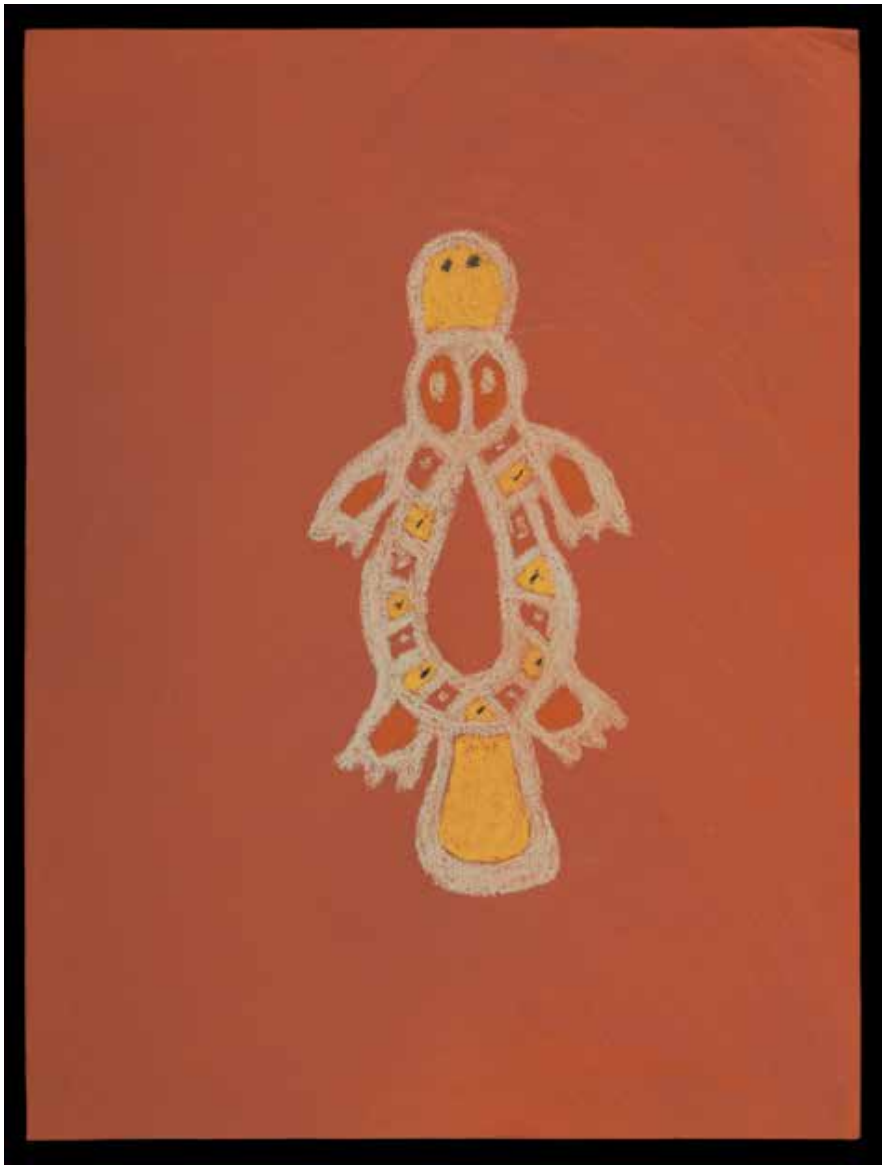
# Looking for Platypus



Mulanggang (platypus), 2015, Wally Bell, Ngunnawal people
Canberra, 40cm x 30cm. National Museum of Australia

# Background Information

The first people to live in the upper Murrumbidgee area were the Ngunnawal, Ngambri and Ngarigo peoples. They have lived there for more than 21,000 years. Living in Country for such a long time provided them with a deep understanding of how everything in nature is interconnected. It was very important to the First Australian peoples to look after the land and its animals, rivers and streams. They only took from the freshwater habitats what was needed and no more. They cared for Country and made sure that the environment was healthy. Waters such as streams, rivers, lakes and billabongs can still be places of significance, which are described and understood through dreamtime stories and songs.

The platypus, which was common to these east coast waterbodies, would once have served as a food source and been a totem for many First Nation people along the eastern parts of Australia. The platypus, or 'Mulanggang' in Ngunnawal language, is an important totem to the Ngunnawal people especially the Yharr clan group from the Yass area.

In recent times, several studies have reported fragmentation of platypus distribution within individual river systems. Despite limited data in some areas, there is evidence of serious declines in populations in many areas within their distribution range, particularly in urban and agricultural landscapes. There is no longer a naturally occurring population within South Australia.

Basic Biology

Platypus are monotremes, as such, their urinary, digestive and reproductive systems all open into a single duct, the cloaca. This structure is very similar to the one found in reptiles and birds. Platypus lay eggs. However, the egg is retained for some time within the mother, who actively provides it with nutrients. Monotremes also lactate, but have no defined nipples, excreting the milk from their mammary glands via openings in their skin similar to sweat glands.

The males possess hollow spurs attached to poison glands. It has been suggested that these are used primarily in fights between males during the breeding season. The female lays eggs in a dedicated nesting burrow that she constructs herself but may still use other non-nesting burrows in the area in which she lives. In this nesting burrow the eggs are incubated and hatch. The young are tiny, blind and naked. They remain in the burrow for about four months during which time the mother provides them with milk. Females begin breeding at two or three years of age and typically lay 2-3 eggs at a time. In the wild platypuses have been recorded as living up to 13 years.

Platypus Photo by Joel Sartori

## Behaviour and diet

Platypus swim along the bottom of freshwater streams and other water bodies with their eyes closed, probing at mud and gravel beds with their highly sensitive bill. Research has shown that electro-receptors in the bill detect the muscle activity of prey. A typical diet consists of a variety of freshwater organisms including crayfish, shrimp, the larvae and nymphs of water insects, snails, tadpoles, worms and small fish. The platypus must eat at least a third of its body weight a day. If our waterways are unhealthy, the numbers of freshwater organisms usually declines and platypus find it harder to get enough food.

The home ranges of males overlap those of several females. The male will keep a non-nesting burrow for both sexes during the breeding season. A healthy waterway, that is good habitat for platypus, has a variety of instream and riverbank habitats. Reeds, riffles, logs and pools are all important. Native riverbank vegetation helps stabilise banks for the platypus to make burrows and protects the platypus from predators such as cats, dogs and foxes.

## Current Threats

Since colonisation of Australia by Europeans the platypus was hunted intensively for its fur until the early 20th century. Until about 1950 it was also subject to accidental drowning in the nets used by inland fisheries, a problem that still persists today with some forms of yabby traps and illegally set nets.

Habitat disruption caused by dams and weirs, agricultural activities and pollution are threatening Australian freshwater systems and, as a consequence, platypus. Healthy freshwater systems have a greater potential to support healthy platypus populations. It is difficult to achieve this when poor land management practices lead to loss of vegetation in areas adjacent to water bodies, stream bank erosion and sedimentation of the water bodies.

In addition to feral animals and habitat loss, platypus die each year as a direct result of human impacts, while platypus in urban waterways are particularly at risk of being tangled in littered debris. Platypus suffer from encounters with abandoned fishing line, six-pack rings, shopping bags, elastic bands, rubber canning jar seals, rubber gaskets, and loops of elastic from garments. Many platypus have scars on their bills and bodies which may have been caused by encounters with sharp objects in the water, such as broken glass, sharp pieces of metal or discarded wire.

Based on information from www.platypus.asn.au. For further information visit http://www.act.waterwatch.org.au/Platypus.html or check https://platypus.asn.au/reading-list/.

# Watching for platypus

Platypus are most often observed near dawn or dusk, although the animals are also sometimes seen in the middle of the day, particularly along waterways where the animals are relatively abundant. They may be more active in the winter months, linked to a reduction in food availability and pre-breeding behaviour.

Males and females are both dark brown in colour, with lighter underparts and a small white spot just in front of the eye. They are surprisingly small - approximately 40 to 60 centimetres in length. They float very low in the water, with a slightly higher profile marking the location of their head and rump. When viewed at a distance from the bank, they can have quite a strong resemblance to a floating stick - and hence are often first recognised by the conspicuous bow wave created as they paddle along the surface.

While platypus sometimes swim strongly in one direction, more often they dive and resurface in a leisurely manner as they feed - generally popping up again within 25 metres of the point where they dived. When foraging, platypus typically remain underwater for less than a minute before returning to the surface to swallow their food and sometimes to groom (usually by scratching with a hind foot).

When a platypus dives, it usually creates a very distinctive circular ripple pattern. This sometimes has a small number of bubbles in the centre, caused by pockets of air being forced from their double layer of fur. When alarmed, a platypus will “splash-dive”, making a relatively loud single or double splashing noise. Normal “duck-dives” for food are much quieter, sometimes (but not always) producing an audible “plop”. Often when people hear a splash and look up to see a circular ripple pattern, it’s more likely to be fish activity.

Australian water rats (Rakali or Ngadyung gunnimang in Ngunnawal language) can easily be mistaken for platypus, especially if the animal is seen only briefly. Rakali are native to Australia and are not like the introduced black rat we sometimes see in bins and sewers. At a distance of more than 20 metres it can be very difficult to tell the two species apart. The thin, white-tipped tail of the Rakali is the most obvious way to distinguish it from a platypus, which has a flat, paddle-like tail. Rakali are also much more likely to be seen out of the water (feeding on a rock or log or running along the bank) than platypus.

Diving ducks (especially Musk ducks) and even turtles can be mistaken for platypus momentarily but are usually readily distinguished upon longer observation.

## TOP FIVE PLATYPUS HOT SPOTS (Canberra Region)

1. **Queanbeyan River**, especially the stretch up and downstream of the Isabella St footbridge.
2. **Lake Burley Griffin**, particularly in the Molonglo Reach section.
3. **Jerrabomberra Creek**, up and downstream of the footbridge in Jerrabomberra Nature Reserve
4. **Murrumbidgee River**, especially Point Hut Crossing, Pine Island, Kambah Pools and Casuarina Sand
5. **Tidbinbilla Nature Reserve**, upstream of the weir in ‘The Sanctuary’.

# Lesson plan (Years K - 2)

## Vocabulary

Platypus (Malungang in Ngunawal)  Threatened,  Habitat

## Objectives

Students will (hopefully) see platypus in the wild.

## Duration of field trip

2 hours—field trip is best conducted in late winter or early spring months in the early morning or early evening. January and February also produce a spike in sightings due to young leaving the burrows for the first time.

## Optional materials

See 'Hints for spotting platypus' at the Australian Platypus Conservancy website: https://platypus.asn.au/sighting/spotting-hints/

Platypus colouring-in sheet: https://www.melbournewater.com.au/media/6911/download

## Fieldtrip lesson plan

This field trip needs to have sufficient competent adults to assist with student supervision as they will be near waterways.

1. Before the lesson or field trip, explain to students that they are on First Nation Country and that people have lived here for over 21,000 years. Research with the students, which First Nation or language group covers their catchment. The teacher might find a dreamtime story about the platypus to tell the students or watch the dreamtime story Tiddalik with the students. https://museumsvictoria.com.au/bunjilaka/about-us/creation-stories/ This will help in understanding the importance of caring for our waterways.

2. Show the students on the map where they will be going on the field trip. What is the name of the waterbody where the platypus watch will happen? What is the First Australian name for it? How far away from the school is it? Is it close or far? Will it take a short or long time to travel there? How will you travel?

3. Discuss with the students what they might expect to see on their field trip. Explain that in many locations platypus numbers are not known.

4. For best results, take the students to an observation site on a waterbody for the hour before dusk or the hour just after dawn. Consult with your local Waterwatch Coordinator to discover known local platypus 'hot spots' and other times of day they may have been observed. Tidbinbilla Sanctuary is one of the best locations for viewing platypus all year round in the ACT and platypus there are often active during the day.

5. At the field trip site, explain to students and adult helpers that they are now going to look for platypus. They are currently listed by IUCN as 'near threatened' as a species and in some locations they are declining rapidly. The number of platypus in the location you are visiting may be unknown. Emphasise to the students that this is a special area because it is possibly one of the homes of Mulanggang (Platypus), the Ngunawal peoples totem, and possibly also home to many other aquatic animals.

6. At the site of the field trip, discuss with the students what natural features they notice in the landscape around them. Using their senses of seeing, hearing and smelling what can they tell about the waterbody? Are there sounds of water babbling, flowing or cascading? Can they see water movement? Can they see muddy or clear water? If there are no watery sounds, is this perhaps a standing body of water such as a pond or lake? Using their sense of smell, are there pleasant or unpleasant odours? What could this mean? How might the landscape have changed over the time since the colonial settlement?

7. Briefly explain to students how to spot platypus (see 'Hints for spotting platypus' notes above). Emphasise the need for patience and careful observation. Remind students that this requires a lot of patience, and some good luck.

8. Spread the students out along the banks of the river in small groups, each with adult helpers. Ask the students to count out the walking paces between each observation point.

9. Have the groups sit quietly along the bank for 15-30 minutes in a spot which commands a reasonable view upstream and downstream.

10. Have students note other animals they may also see.

11. Upon return to the classroom, discuss sightings (or the lack thereof) and other observations.

12. Also discuss how together the community can care for the waterways so that the platypus and other animals can continue to live in the waterways. Explain how scientists use information they collect to help look after the platypus and its habitat. What would happen if the waterways that the platypus and other animals lived wasn't looked after?

13. Ask the students to do their own drawings of a platypus and other things they observed by the water on the field trip.

14. In the sandpit or in a sand tray, re-create the environment of the field trip using rocks, branches etc collected from the playground or brought in by the students.

# Extension Lesson: Platypus Paper Bag Puppet (Years K - 2)

## Duration

1 hour.


**What you will need:**

Brown Paper Lunch Bag

Purple and Brown Construction Paper

Tacky Glue

White Paper for the Eyes

Scissors

Markers or Crayons

**How to Make a Paper Bag Puppet:**

1. Print out the platypus pattern and make copies onto construction paper.

2. Cut a tail shape (pattern not included) from the same color construction paper.

3. Fold in the bottom corners of the bag as shown in the picture.

4. Cut out the patterns and glue them to the bag as shown in the picture to the left. Glue the bottom beak to the bag underneath the top beak.

**Platypus pattern provided in appendices.**

# Lesson Plan (Years 3 - 6)

## Vocabulary

Platypus (Malungang in Ngunawal)  Native water-rat (Rakali or Ngadyung gunnimang in Ngunawal)

Population  Survey  Predator

## Objectives

Students will (hopefully) see platypus and/or rakali in the wild. Students will record field observations in team and try and establish how many platypus are living in their waterway. Students will identify platypus as being at the top of the food chain.

## Duration of field trip

2 hours—field trip is best conducted in late winter or early spring months in the early morning or early evening. January and February also produce a spike in sightings due to young leaving the burrows for the first time.

## Optional materials

See 'Hints for spotting platypus' at the Australian Platypus Conservancy website:

https://platypus.asn.au/sighting/spotting-hints/

Platypus Group Watch datasheet to record sightings (see page below 'Glossary of Terms')

Whiteboard or large writing tablet

Markers, clipboards, pens and stop-watches

## Fieldtrip lesson plan

This field trip needs to have sufficient competent adults to assist with student supervision as they will be near waterways.

1. Before the lesson or field trip, explain to students that they are on First Nation Country and that people have lived here for over 21,000 years. Research with the students, which First Nation or language group covers their catchment. The teacher might find a dreamtime story to tell the students about the platypus or watch the dreamtime story Tiddalik (https://museumsvictoria.com.au/bunjilaka/about-us/creation-stories/) with the students. This will help in understanding the importance of caring for our waterways.
2. Ask students to search the internet for maps to investigate where they will be going on the field trip. Identify different representations of the area eg. satellite images. Find the waterbody intended for the field trip in the landscape. Find the First Australian name for the waterbody. How far away from the school is it? Is it close or far? Will it take a short or long time to travel there?
3. Ask students to research about the platypus and local area to help enhance their experience. Research what the difference is between various waterbodies eg. pool, stream or river. Is the site planned for the field trip significant in any way? How might the landscape have changed over the time since the colonial settlement?

4. Explain to students and adult helpers that they are now going to look for platypus. They are currently listed by IUCN as 'near threatened' as a species and in some locations they are declining rapidly. The number of platypus in the location you are visiting may be unknown. Explain to the students that this is possibly one of the homes of Mulanggang (Platypus), the Ngunawal peoples totem, and also a home to other aquatic animals and plants.
5. For best results, take the students to an observation site on a waterbody for an hour around dusk or dawn. Tidbinbilla Sanctuary is one of the best locations for viewing platypus year-round in the A.C.T and platypus there are often active during the day.
6. Briefly explain to students how to spot platypus (see 'Hints for spotting platypus' notes above). Emphasise the need for patience and careful observation. If feasible, organise the students, with the adult helpers, into several small groups. Spread them out along the banks of the waterbody to spot platypus at different locations, ensuring that the area being observed by each group does not overlap.
7. Have groups sit quietly along the bank for at least 15-30 minutes in a spot which commands a reasonable view up- and downstream. Survey should be undertaken for up to an hour for best results.
8. Use the data sheets provided for each team. On this, record sightings (or the lack thereof) every ten minutes of the survey for up to an hour. If one team observes a platypus in their section at the same time another team sees one in their section, then you have more than one platypus living in our waterway.
9. Also note on the datasheet the date, names of the students, and where the survey took place (name of the waterway and location). Have students note other animals they see also. Remind students that this requires a lot of patience, and some good luck.
10. Upon return, discuss sightings (or the lack thereof). If no platypus were sighted, discuss reasons why this may have occurred. Does 'no sightings' necessarily mean there are no platypus present? Discuss what else in the landscape they saw.
11. In the classroom, discuss those factors that might impact upon the well-being of platypus. Discuss how the community could care for the waterways, by addressing the factors that are likely to impact on platypus populations.
12. Organise students into small groups to discuss what projects the students could undertake to raise awareness of caring for platypus habitat. Students present these ideas to the class.

## Extension Lesson: Platypus and Food Webs (Years 6 - 6)

### Vocabulary

Ecosystem Environment Food chain Food web Habitat Food pyramid Predator/predation
Producers Consumers Herbivores Carnivores Trophic level

### Objectives

Students will be able to give examples of top predators in ecosystems.

Students will identify platypus as being at the top of the food chain.

### Duration

1–3 hours lessons, depending on the level of detail expected

## Materials

Library and internet access.

## Lesson plan

Ask the students to each research platypus as a top predator focusing on their conservation status and what (if anything) is the primary cause of their decline, as well as how they matter to overall ecosystem health. Have the students make 2–5 minute presentation, focusing on threats, and efforts to conserve them. Further, challenge students to seek out the common threats being faced by our largest carnivores, as well as the contributions each carnivore makes to overall ecosystem health. Examples could include:

Macquarie Perch, Murray Cod, Trout Cod, Two-Spined Blackfish, Wedge-Tailed Eagle, Sea Eagle, Dingos

# Playground food chain lesson

Why top predators matter

All living things exist as part of a 'food chain'. Energy moves along this 'chain' beginning with the sun's energy being captured by plants. Energy moves to herbivores as they consume the plants and then to carnivores as they eat the herbivores. 'Food pyramids' show the same relationships but are used to display how many living things are needed at each level, from plants to herbivores, to provide food for a single 'top predator' in a food chain. Food chains become linked to form what is known as a 'food web'. These show all the energy pathways in an ecological community by showing 'who eats who'.

Top predators such as platypus are key 'indicator species' of ecosystem community health. By being at the top of the food pyramid, any disturbances in the levels below affect the amount of energy available in the pyramid, and therefore how many top predators can survive. Because of this, the top predator is most likely to be affected by habitat loss, as it requires the largest amount of energy from it.

As the following activity demonstrates for the students, there are always more plants than herbivores, and more herbivores than predators. Thus, predators are always in relatively small numbers, and often exert a strong influence over the communities in which they live.

Top aquatic predators, such as Murray Cod and aquatic mammals such as platypus, can exert a profound influence on the structure and function of aquatic ecosystems. Yet their numbers have fallen dramatically in the 20th century—by over 90 percent in the case of Murray cod.

Their loss has triggered a cascade of effects through succeeding layers of food webs. The loss of top predators not only has direct effects on the ecosystem (that is, a possible population boom in the species they eat as well as changes in population size of prey even lower in the food chain), but equally, and in some places more significant, behavioural effects (that is, changes in their prey's predator-avoiding behaviour once they are no longer at risk of being eaten).

All large predators perform a very important function in their habitat: helping to regulate and control the populations of other species. When an animal group loses its natural predators, overpopulation, sickness and mass die-offs can result.

## Objectives

Students will explain how energy is lost as it moves through the food chain levels (trophic levels).

## Duration

1 hour.

## Materials

2-4 large buckets (5 litres)

2–4 small buckets (1 litre)

5–10 litres of water or access to a stream/pond (to represent the Sun)

25–30 small perforated cups

25–30 labels featuring a plant or animal and what it eats and if it is a Producer, Herbivore or Carnivore.

## Leaky Bucket Game

1. . Distribute the labels and arrange students into unequal food chains based on these. Some food chains should be as short as two or three levels, others drawn out to four or five. (Big fish eating little fish who eat water bugs is a good example of part of a food chain).

2. Place the Plants (Producers) near the water source (Sun) and explain that for this experiment, we will use water to symbolise energy.

3. Organise food chains behind their producers and pass out perforated cups. Explain that they will be passing energy in their cups from one to the next person behind them in the line.

4. Place the one litre bucket at the end of each food chain. Let's see which food chain will end up with a full bucket soonest.

5. Run the relay several times. Students will notice that the shorter food chains are more quickly able to fill their bucket. Allow them to talk about why this is happening. Lead the conversation to drawing conclusions about what this model says to us about energy travelling up trophic levels.

<u>Key questions to explore are</u>

Why are there fewer big fish than little ones?

Extrapolate to 'Why are there more zebras than lions?' 'More water bugs than platypus?' etc.

Where does the energy get lost to, in real life?

Why can't trophic levels go up infinitely?

## Glossary of Terms

Carnivore - An organism that derives its energy and nutrient requirements from a diet consisting mainly or exclusively of animal tissue, whether through predation or scavenging.

Consumers - Organisms using organic compounds as their source of carbon, need to consume or eat other organisms.

Ecosystem - Consists of all the organisms living in a particular area, as well as all the non-living, physical components of the environment with which the organisms interact, such as air, soil, water, and sunlight.

Environment - All living and non-living things occurring naturally on Earth or some region thereof.

Food chain - Representations of the predator-prey relationships between species within an ecosystem or habitat: a history of who is eating who.

Food web - When you join all the food chains you cna identify in an area, you have a food web, which is a map of who eats who in an Ecosystem.

Habitat - An ecological or environmental niche that is inhabited by a particular type of animal or plant particularly suited to that niche.

Herbivore - Animals that are adapted to eat plants. Herbivory is a form of predation in which an organism consumes principally autotrophs such as plants, algae and photosynthesising bacteria.

Predation - A biological interaction where a predator (an organism that is hunting) feeds on its prey (the organism that is attacked). Predators may or may not kill their prey prior to feeding on them, but the act of predation always results in the death of its prey and the eventual absorption of the prey's tissue through consumption.

Producers - An organism that manufactures its own food, generally using light energy from the Sun and simple inorganic substances. Examples include; plants, algae and photosynthesising bacteria.

Threatened - Likely to become extinct if population decline continues.

Trophic level - A stage in a food chain that reflects the number of times energy has been transferred through feeding, for example, when plants are eaten by animals that are in turn eaten by predators. Plants and plant-eating animals occupy the first two levels, followed by carnivores, usually to a maximum of six levels.

# Platypus Group Watch – DATA SHEET

Name of observer(s)_____

Date_____ Start time_____

Water body_____ Observation point ID number_____

Approximate **length** of channel visible from your observation point (in metres)_____

Approximate **width** of the channel in your observation area: at the narrowest point_____ at the widest point_____

*Rainfall pattern*
0 = no rain
1 = intermittent drizzle
2 = steady drizzle
3 = intermittent rain
4 = steady rain

*Cloud cover*
0 = no cloud cover
1 = some cloud (less than 50% cover)
2 = much cloud (more than 50% cover)
3 = completely overcast

*Surface condition*
0 = entire water surface is flat and calm
1 = some ripples, but would not interfere with seeing a platypus
2 = some (less than half) of the surface is choppy enough that it could interfere with seeing a platypus
3 = more than half of the water surface is choppy

| Observation period | Rainfall pattern | Cloud cover | Surface condition | No. of platypus | No. of water-rats | Comments |
|---|---|---|---|---|---|---|
| 0-10 mins | | | | | | |
| 10-20 mins | | | | | | |
| 20-30 mins | | | | | | |
| 30-40 mins | | | | | | |
| 40-50 mins | | | | | | |
| 50-60 mins | | | | | | |

Total number of platypus (= number of individuals) seen_____

Total number of water-rats (= number of individuals) seen_____

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# Platypus Group Watch
## HOW TO RECORD YOUR DATA

**I've never previously seen a platypus or a water-rat in the wild. What's the best way to detect these two animals and tell them apart?**
Both platypus and water-rats are most likely to be detected by ripples in the water – concentric "bull's-eye" ripples when they dive, or a wake of V-shaped ripples as they swim. The two species are about the same size and colour, and both float very low in the water. However, the tail of a platypus is flat, broad and uniformly dark whereas the tail of a water-rat is much thinner and has a conspicuous white tip. As compared to a platypus, water-rats also spend much more time running and resting on land.

**What other sorts of animals may be confused with a platypus or water-rat?**
Water birds such as coots, grebes and ducks are most likely to be mistaken for a platypus or water-rat if they're spotted just as they dive underwater. Wait for the animal to pop back up to the surface before deciding if it's a bird or not. Carp are a common source of confusion in places when these fish are abundant, due to their habit of feeding in shallow water for long periods with their back exposed out of the water – look for scales and fins.

**I think I may have seen a platypus or water-rat, but I only got a quick glimpse. Should I count this as a sighting?**
If you're not completely confident about the identity of an animal, record the sighting by placing a "?" in the appropriate space on the data sheet, and describe what you saw in the adjoining Comments section.

**I think that I may have seen two different platypus active in the same place at the same time. How can I tell for certain if only one platypus is present as opposed to two or even more?**
Unfortunately, one platypus tends to look much like another. To be on the safe side, don't record the presence of more than one platypus at a given site unless (1) you see two or more animals on the surface at the same time or (2) you see an animal return to the surface immediately after one has dived in a different location.

**How should my group deal with the possibility that the same platypus may be seen by different observers as the animal swims upstream or downstream?**
Before starting a Group Watch session, all participants should synchronise their watches. When the session is finished, this generally makes it possible to figure out if animals were recorded at two or more survey sites by comparing the time(s) that one animal or more disappeared from view at a given survey site with the time(s) that animals appeared at neighbouring sites.

**When should I record weather and surface conditions on my data sheet?**
Information about weather and water surface conditions should be recorded at the same time that you record the number of animals seen in each 10 minute observation period – namely, at the end of each period.

**What information should be included in the Comments section of the data sheet?**
The Comments section provides space to record when platypus or water-rats are first seen (and also when they disappear); their direction of travel (upstream or downstream); brief descriptions of their behaviour (for example, "dived three times"); and what other freshwater species are seen in the course of the survey session (water birds, tortoises, carp, etc.).

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This program has been made possible by support from THE SARA HALVEDENE FOUNDATION.