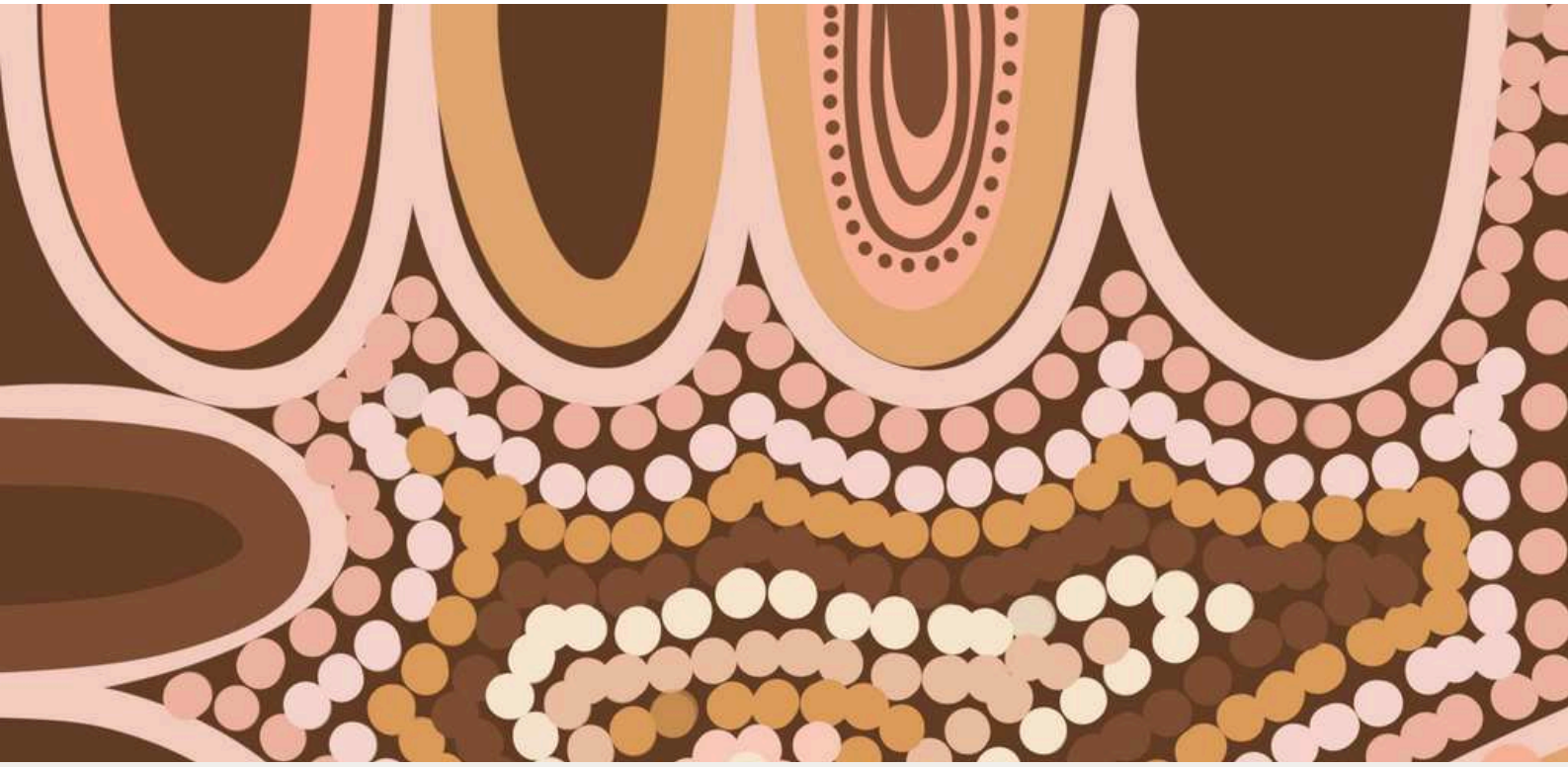
TURTLES IN SCHOOLS

TERM 1 WORKBOOK

Photo credit: Ricky Spencer

1 Million Turtles

COMMUNITY CONSERVATION PROGRAM



ACKNOWLEDGEMENT OF COUNTRY

1 Million Turtles Community Conservation Program acknowledges the Traditional Custodians of the lands, waterways, and skies across Australia, where we live, learn, and work.

We pay our deepest respects to Elders past, present and emerging and extend our respect to all Aboriginal and Torres Strait Islander peoples.

We recognise the deep knowledge and continuing connection First Nations peoples have to the land, waters and culture, and we are grateful for their ongoing care of Country.

Photo credit: Dr James Van Dyke

TURTLES IN SCHOOLS

Produced by the
1 Million Turtles Community Conservation Program
and funded by
The Foundation for National Parks and Wildlife.

In the pages that follow, you will find a comprehensive set of lesson plans. Our initiative is not just about imparting knowledge but fostering a deep connection between students and their natural environment and instilling a sense of responsibility and awareness of freshwater turtles and their conservation.

As we embark on this educational venture, we extend our gratitude to educators, students, and all those who champion the cause of conservation. The Turtles in Schools Program is not just a curriculum; it is a movement to inspire the next generation of environmental custodians.

Thank you,

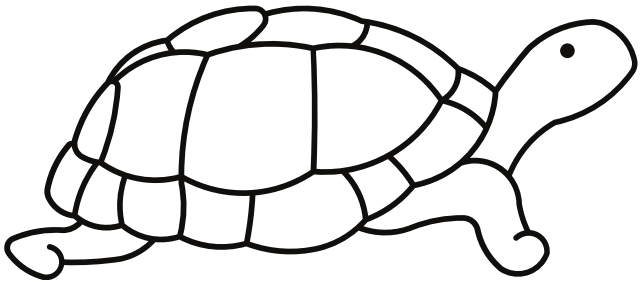
1 Million Turtles Community Conservation Program

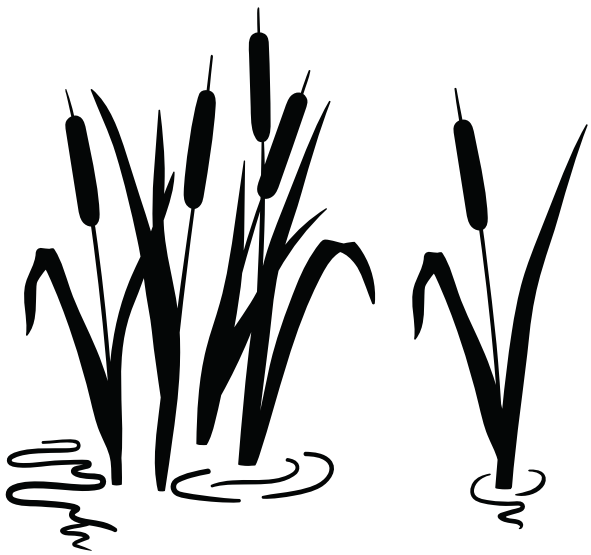
Test your Understanding

Read the following passage and answer the questions on the following page:

In recent decades, Australia has witnessed a concerning decline in freshwater turtle populations, raising alarms among conservationists and researchers. Freshwater turtles spend most of their lives in freshwater habitats such as rivers, streams, lakes and swamps. Australia is home to 25 species of freshwater turtle, with all but one belonging to the family Chelidae. Freshwater turtles fill multiple ecological roles in the food web including top predators, herbivores and scavengers, and are often referred to as the “vacuum cleaners” of the river.

Despite their ecological importance freshwater turtles are facing significant threats to their survival. Invasive species such as European red foxes and feral pigs prey upon turtle nests and nesting females which reduces recruitment into the population and can hamper population growth. Urban development, agriculture, and infrastructure projects, contribute to the alteration and destruction of wetland habitats and reduce the availability of suitable habitat for freshwater turtles. The introduction of new diseases into freshwater turtle populations can have devastating effects on population size and survival. Additionally, rising temperatures may affect nesting success, as turtles rely on specific temperature ranges for egg incubation, while flooding may cause turtle nests to become inundated.





Test your Understanding

Questions:

Q1: Why are conservationists and researchers concerned about freshwater turtles?

Q2: What ecological role do freshwater turtle fill in the food web?

Q3: Name two threats to freshwater turtle populations.

Q4: For one of the threats named in question 3, specify the impact it has on freshwater turtle populations.

Test your Knowledge

Questions:

Q1: Which of the following are examples of wetland environments?
(a) River, billabong, desert, rainforest
(b) Swamp, mangroves, rainforest, river
(c) River, stream, billabong, swamp
(d) Swamp, mangroves, ocean, rainforest

Q2: Which of the following are threats to wetland environments?
(a) Urbanisation
(b) Pollution
(c) Water extraction
(d) All of the above

Q3: Baby freshwater turtles are called:
(a) Tadpoles
(b) Flotilla
(c) Lounge
(d) Hatchlings

Q4: What is the top of a turtles shell called?
(a) Carapace
(b) Scute
(c) Bony plate
(d) Plastron

Q5: Which of the following is NOT a characteristic of freshwater turtles.
(a) They brumate over winter.
(b) They lay eggs.
(c) They are ectothermic (cold-blooded).
(d) They live in saltwater environments.

Test your Knowledge

Questions:

Q6: Explain why wetlands are important ecosystems.

Q7: Explain how human activities can impact wetland environments.

Q8: List two adaptations that help freshwater turtles survive in wetland environments.

Q9: Draw the lifecycle of a freshwater turtle.

Turtley-Awesome Turtle Tales

Write a captivating tale about your experience with a turtle. Your tale may be real or fictional.

Classroom Activities

ACTIVITY

What I Know (K), What I Want to Know (W), What I Learnt (L)

Materials:

- Large chart paper divided into 3 sections labeled "K" (Know), "W" (Want to Know), and "L" (Learnt).
- Markers or pens

Instructions:

(1A) Brainstorm what you Know (K) about wetlands and freshwater turtles. Write them in the “What I Know” column.

(1B) Write questions of “What I Want to Know” in the Want to Know (W) column.

What I Know (K)	Want to Know (W)	What I Learnt (L)

LESSON

TERM ONE

WETLAND HABITATS

- Learning Intentions
- Background
- Activities
- Curriculum Mapping

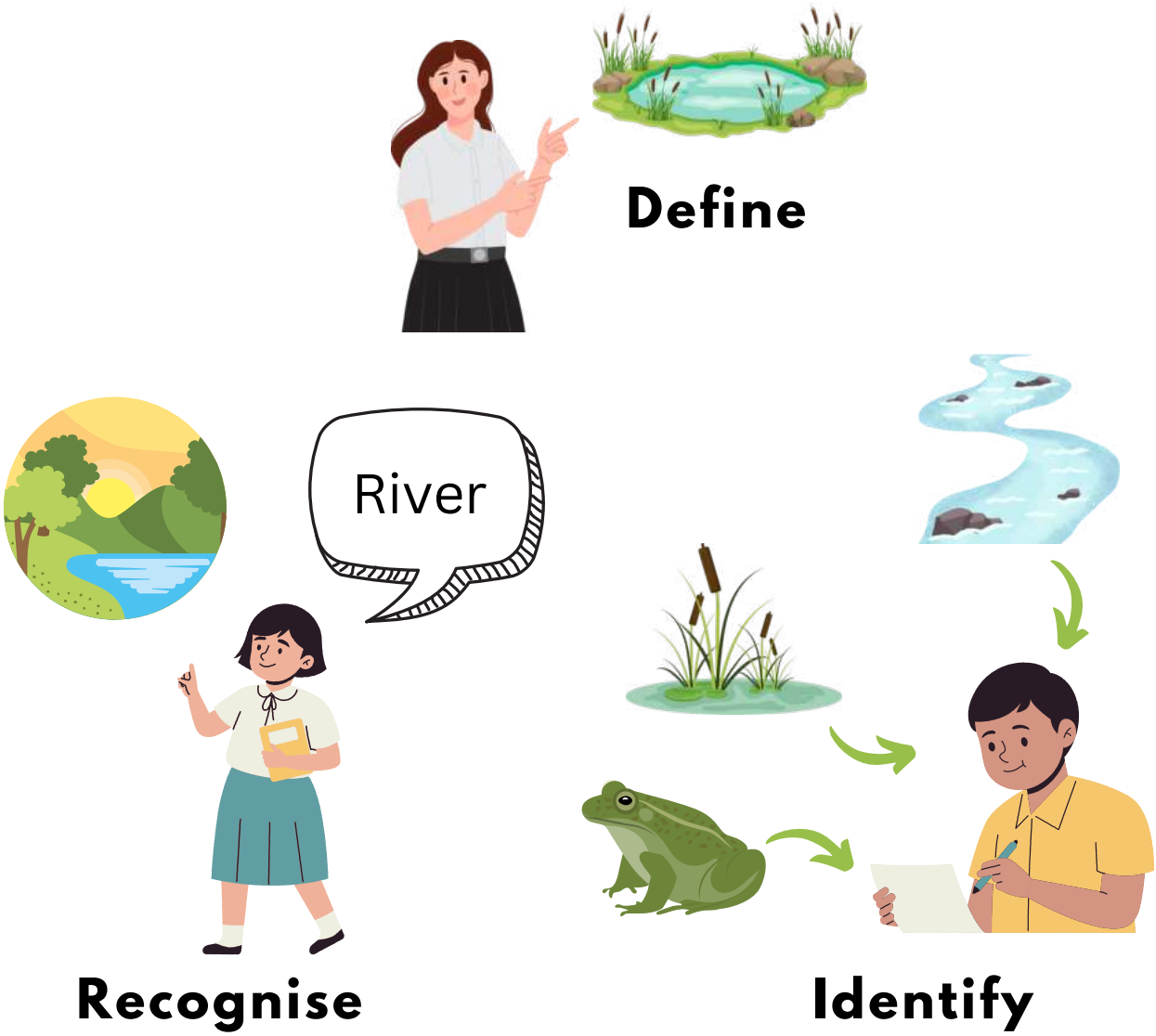
Photo credit: Marilyn Connell

Learning Intentions

(1) Define a wetland environment;

(2) Recognise the different habitats (i.e. riparian zone, aquatic zone) within a wetland environment;

(3) Identify aspects of the riparian zone that support the aquatic environment.



Background Information

What is a wetland?

A wetland is land that is covered temporarily or permanently by water (i.e. swamps, billabongs, lakes, marshes).

In a wetland environment there are two main habitats, which are interconnected:

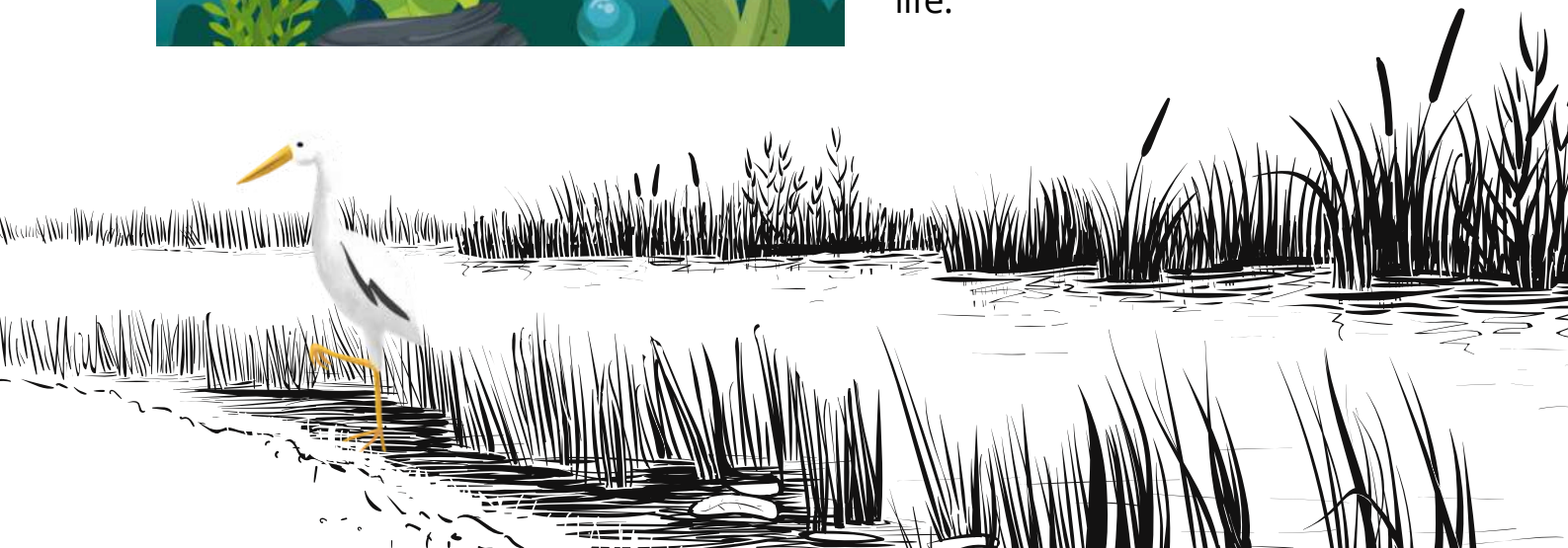
1. The riparian habitat
2. The aquatic habitat

Riparian Habitat:

Riparian habitats are the areas of land that exist along the banks of a river, stream, lake or wetland. Riparian habitats are characterised by aquatic and semi-aquatic plants, as well as shrubs and trees.

Aquatic Habitat:

Aquatic habitats are the waters (i.e. rivers, lakes, ponds and wetlands) which support aquatic life.



Function of the Riparian Habitat

Riparian habitats provide important functions which support both aquatic and terrestrial ecosystems.

(1) Bank stability, control of erosion and water quality:

Riparian vegetation plays a crucial role in stabilising the banks of water bodies. The extensive root systems of plants help bind the soil together, preventing erosion caused by the force of flowing water. Stable banks reduce the amount of sediment entering the water. The root systems of riparian plants also act as natural filters, trapping pollutants and sediment from runoff before they reach the water, thereby improving water quality.

(2) Shade and temperature:

The plants within the riparian zone also provide shade to the aquatic habitat, which helps regulate water temperature, preventing excessive overheating of the water. This is crucial for the survival of many aquatic organisms, as they are adapted to specific temperature ranges. Additionally, the shade also helps control the growth of algae, preventing excessive algal blooms.

(3) Nutrient cycling:

Riparian zones act as transition areas where nutrients from the surrounding terrestrial ecosystems are transferred to the aquatic habitat. Leaves, branches, and other organic matter that fall into the water from riparian vegetation provide a source of nutrients for aquatic organisms.

This input of organic matter fuels the food web in the aquatic habitat, supporting the growth of algae, bacteria, and other microorganisms, which in turn become food for larger organisms such as insects, fish and freshwater turtles. The interconnected nature of nutrient cycling between riparian and aquatic zones is essential for the overall productivity and functioning of the ecosystem.

(4) Wildlife Habitat:

Riparian zones provide valuable habitat and resources for a wide variety of wildlife species. Aquatic organisms, such as fish and amphibians, often rely on the shelter, food, and spawning areas provided by the vegetation and structure of riparian zones. Many birds, including waterfowl and wading birds, depend on riparian habitats for nesting, foraging, and resting during migration. Riparian corridors can serve as important wildlife corridors, allowing animals to move between different habitats and facilitate gene flow and species dispersal.

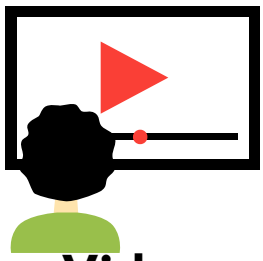
Classroom Activities

ACTIVITY 1

(1A) Watch the following video as a class. The video gives an overview of wetlands.

Link to video: https://www.youtube.com/watch?v=k9UbKlBc3W4 [Copy and paste into browser]

(1B) As a class, discuss what you learnt from the video and what you know about wetlands in general. Write your ideas on the whiteboard.



Video

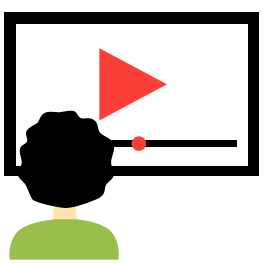
Discuss

ACTIVITY 2

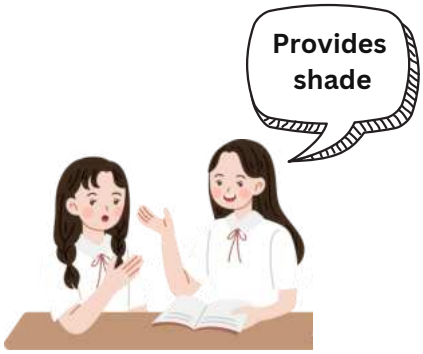
(2A) Watch the following video about the benefits of the riparian zone.
Link to video: https://www.youtube.com/watch?v=PmeTuFQuF7k [Copy and paste into browser]

(2B) As a class, discuss the benefits of the riparian zone.

Introduce



Video

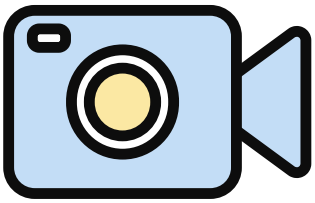


Discuss

Video Reflection

3

Three things I learnt while watching



2

Two questions I have from the video

1

One fact I found most interesting

Classroom Activities

ACTIVITY 3

(3A) Look at examples of a healthy riparian zone and a degraded riparian zone. As a class, discuss characteristics of the riparian zone which contribute to the health of the aquatic environment.

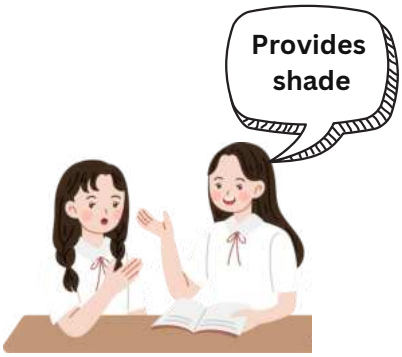
(3B) Draw a riparian habitat and its relation to the aquatic habitat.

(3C) Explain the features of the riparian habitat which support the health of the aquatic environment. Students might explain the following:

- Healthy riparian zone:
  - Trees, shrubs, aquatic vegetation
  - Bank stability, minimal erosion
  - Terrestrial wildlife

- Degraded riparian zone:
  - Grasses
  - Bank erosion

Show



Explain

Draw

Examples of healthy and degraded riparian zones

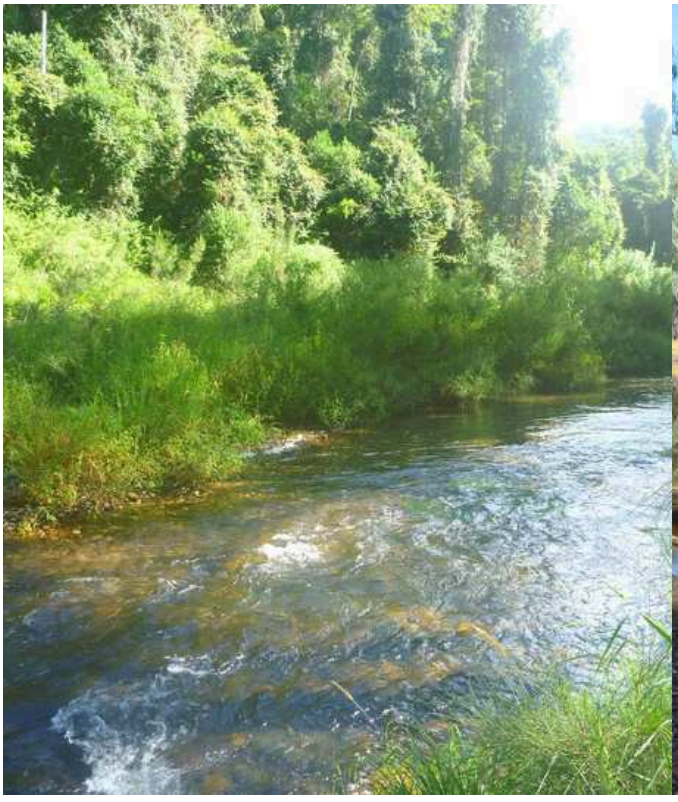
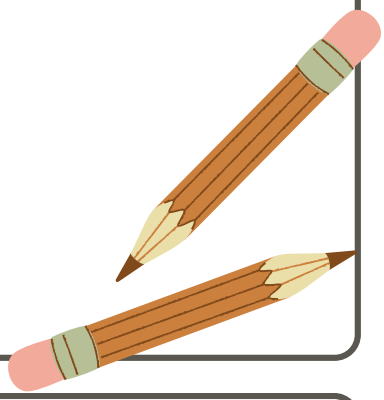


Photo credit: Dr Kristen Petrov

Wetland Habitats Worksheet

Draw a healthy riparian zone and a degraded riparian zone



Explain how the riparian zone supports the aquatic environment

LESSON 2

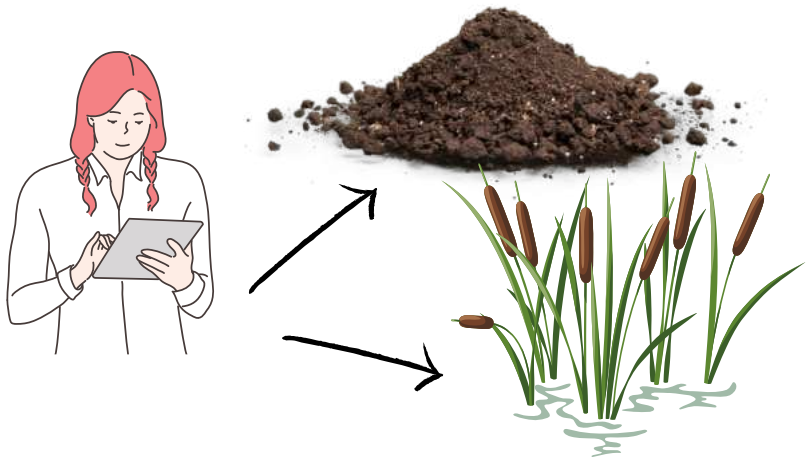
TERM ONE

ABIOTIC AND BIOTIC FACTORS

- Learning Intentions
- Background
- Activities
- Curriculum Mapping

Learning Intentions

(1) Define and identify abiotic and biotic factors within the wetland environment.

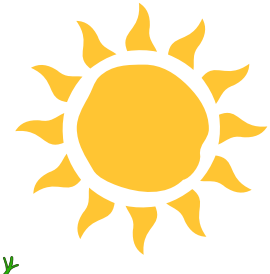


Define and Identify

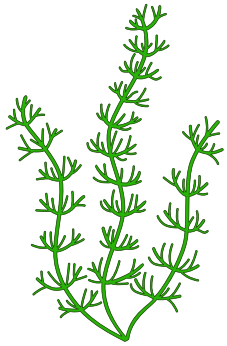
Background Information:

What are abiotic and biotic factors?

Abiotic
Non-living components of an ecosystem. Examples include temperature, light, air, soil, water.



Biotic
Living components of an ecosystem. Examples include plants, fungi, bacteria, animals.

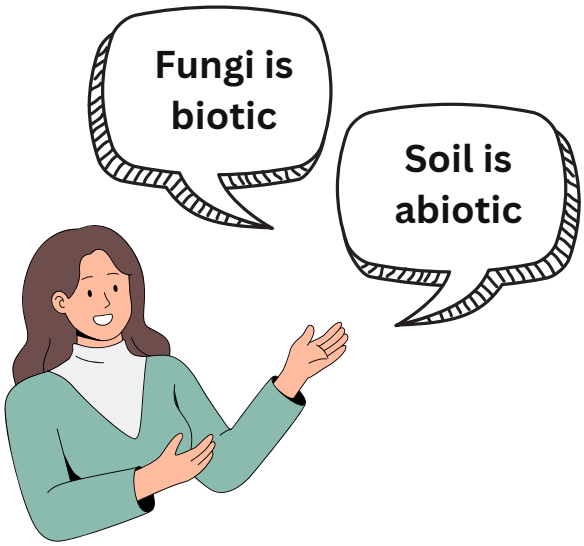


Classroom Activities

ACTIVITY 1

(1A) View images of wetland ecosystems.

(1B) As a class, identify abiotic and biotic factors in the wetland environment. Write your ideas on the whiteboard.



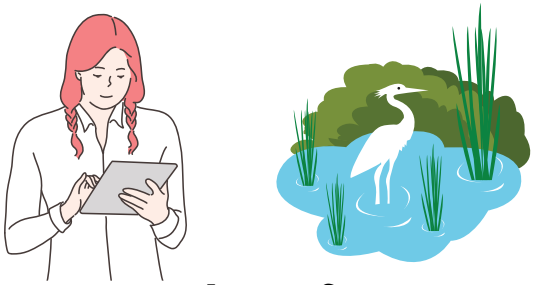
Explain

Discuss

ACTIVITY 2

(2A) Identify biotic and abiotic factors in the worksheet.

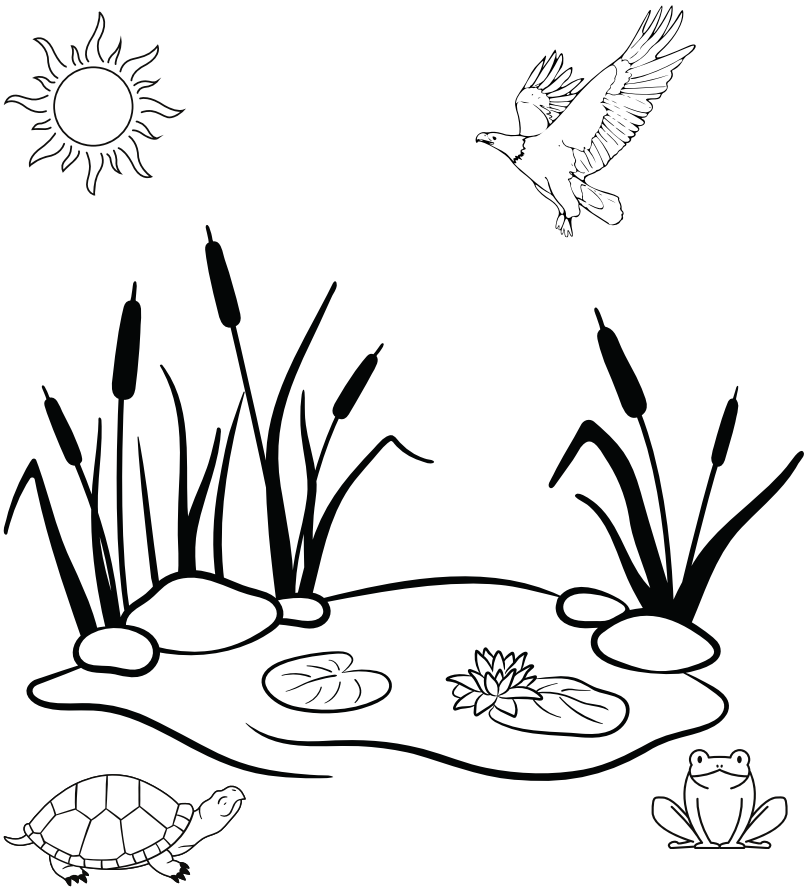
(2B) Write a paragraph about the wetland environment in the worksheet. Identify the abiotic (A) and biotic (B) factors in your sentences.



Identify

Abiotic & Biotic Factors

Identify the abiotic and biotic factors in the wetland below



Abiotic factors

Biotic factors

Write a paragraph about the wetland above. Identify the abiotic (A) and biotic (B) factors in your sentences.

LESSON 3

TERM ONE

FLORA & FAUNA

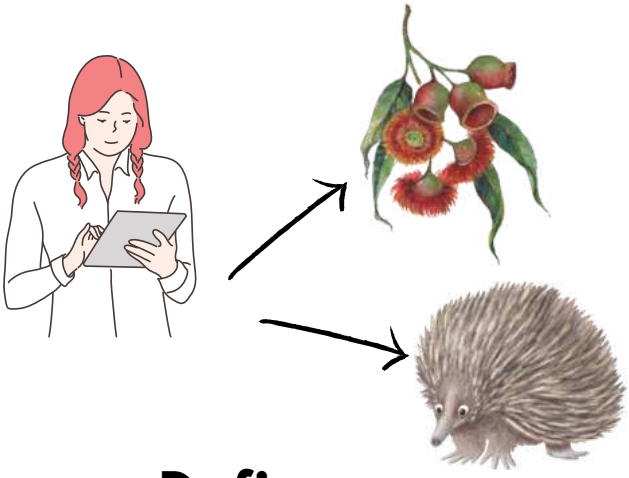
- Learning Intentions
- Background
- Activities
- Curriculum Mapping

Learning Intentions

(1) Define flora and fauna.

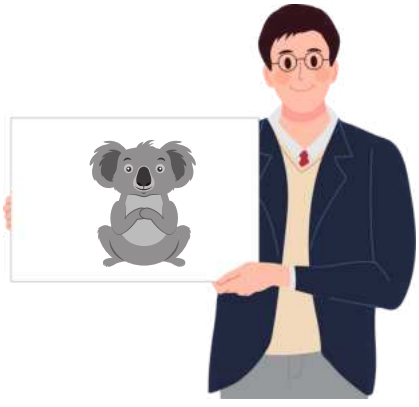
(2) Use literature, search engines and council factsheets to research different flora and fauna within the riparian and aquatic environments of your local wetland and summarise key information;

(3) Demonstrate your knowledge of the fauna/flora by presenting your findings with the class.



Define

Research



Present

Background Information: What are flora and fauna?

Flora: Plants

Fauna: Animals

Scientific name: the taxonomic name of the organism. It includes the genus and species and is mainly used by scientists.

Common name: the name of an organism generally used by the community.

Background Information: Freshwater Flora

Australian freshwater ecosystems support a diversity of flora. Each freshwater ecosystem is unique with its own assemblage of species adapted to specific environmental conditions.

Wetland plants can be divided into three groups; submerged, emergent and riparian (also known as fringing) vegetation.

Submerged vegetation: consists of plants that grow entirely or partially underwater. Some species may have floating leaves and flowers.

Examples include:
Wavy Marshwort (*Nymphoides crenata*): this species have floating waterlily-like leaves. The leaves are bright green in colour. Flowers are bright yellow.

Photo credit: S.Bowen/DPE

Red Water-Milfoil (*Myriophyllum verrucosum*): native submerged plant. The stem can grow up to 4m long and has feathery-like leaves. The species can be green to purple in colour.

Photo credit: NSW Local Land Services

Background Information: Freshwater Flora

Emergent plants: consists of plants rooted in the substrate underwater but with their stems and leaves extending above the water surface. These plants are often found along the edges of water bodies.

Examples include:
Southern Cattail (*Typha domingensis*): commonly grows along the waters edge. Cattails have tall rigid reeds, with flowers in a cylindrical brown-fluffy spike.

Photo credit: Alex Heyman

Common Rush (*Juncus usitatus*): typically grows in dense clumps, up to 3m tall. The stems are cylindrical and are usually green-brown in colour.

Photo credit: Robert Whyte

Background Information: Freshwater Flora

Riparian (fringing) plants: vegetation that grows along the margins of water bodies, including the banks of rivers, lakeshores, and wetland edges. This vegetation serves important ecological functions such as stabilising banks, filtering runoff, providing habitat, and acting as a buffer between land and water.

Examples include:
Paperbarks (*Melaleuca spp.*): commonly found in swampy areas, paperbarks have spongy, paper-like bark.

Photo credit: EAGiven

River Red Gums (*Eucalyptus camaldulensis*): These trees are characteristic of Australian wetlands, providing important habitat for birds, mammals, and insects. Their roots help stabilise riverbanks and prevent erosion.

Photo credit: Gerhard Saueracker

Background Information: Freshwater Fauna

Australian wetland environments are crucial habitats for many species, providing food, shelter, and breeding grounds for a wide range of animals.

Amphibians: Many amphibians rely on wetlands for breeding. They lay their eggs in water or in moist areas near water bodies. Wetlands provide a safe and suitable habitat for their eggs to develop into tadpoles and eventually metamorphose into adult frogs.

Examples include:
Green and Golden Bell Frog (*Litoria aurea*): the species has a bright green back with gold patches. The Green and Golden Bell Frog has experienced severe declines due to amphibian chytrid fungus.

Photo credit: Sydney Olympic Park Authority

Crawling Toadlet (*Pseudophryne guentheri*): this ground-dwelling species grow to 3.5 cm in body length. It has a slightly flattened body. Its back is mottled with brown and grey.

Photo credit: B. Maryan

Background Information: Freshwater Fauna

Freshwater fish: Freshwater fish use wetlands for breeding, shelter and feeding.

Examples include:
Murray Cod (*Maccullochella peelii*): a large predatory freshwater fish found in slow flowing rivers, creeks and streams of the Murray-Darling Basin. The species is highly territorial and aggressive towards other fish.

Photo credit: Rudie H. Kuiter / Aquatic Photographics.

Western Pygmy Perch (*Nannoperca vittata*): small species (up to 8cm), native to south western Australia. Typically found in shallow, slow-moving streams, billabongs and lakes amongst aquatic vegetation.

Photo credit: Rudie H. Kuiter / Aquatic Photographics.

Background Information: Freshwater Fauna

Monotremes: Monotremes (i.e. platypus and echidna) are a group of specialised mammals that lay eggs and have no teats. Pores on the females belly secrete milk for their young.

Platypus (*Ornithorhynchus anatinus*): the platypus has a leathery beak that is used to sift through substrate for invertebrates. Platypus burrow in the banks of rivers, creeks and ponds and may burrow under the roots of riparian vegetation.

Photo credit: Hornsby Shire Council

Reptiles: Reptiles are cold-blooded (ectothermic) vertebrates that use external sources (i.e. the sun) to regulate their body temperature. Reptiles such as freshwater turtles may spend most of their life in wetland environments, while others such as snakes may search for food around wetlands but otherwise spend their life on land.

Examples include:
Eastern long-neck turtle (*Chelodina longicollis*): lives in freshwater environments and is known for making overland movements in search of new habitat.

Photo credit: Rosie Nicolai, OEH

Background Information: Freshwater Fauna

Waterbirds: Wetland environments provide breeding grounds, food sources, migration stopovers, roosting sites and protection for waterbirds.

Examples include:
Little Egret (*Egretta garzetta*): the little egret is a species of small heron. It feeds in both shallow water and on land. In shallow water, it shuffles its foot to stir up aquatic prey.

Photo credit: James Bennett

Purple Swamphen (*Porphyrio porphyrio*): the Purple Swamphen feeds upon emergent plants eating the shoots of reeds and rushes. It is also known for eating small animals such as frogs, snails and ducklings.

Photo credit: Andrew Haysom

Classroom Activities

ACTIVITY 1

(1A) Cut out the pictures of flora and fauna.

(1B) Assign each picture to a category (either flora or fauna) in the worksheet.

ACTIVITY 2

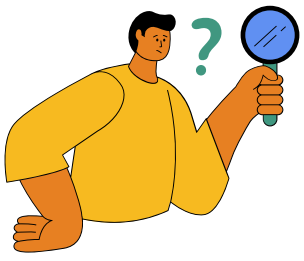
(2A) Independently or as a group research one plant and one animal that may be found at your local wetland. Present your findings to the class.

(2B) In your research identify:

- The species common name and scientific name;
- The habitat the species is found in (aquatic or riparian);
- A description of the species;
- The role of the species in the ecosystem. Does the species support or contribute to the functioning of the wetland ecosystem (i.e. flora may create shade for the aquatic environment).
- Include references and/or a bibliography.

(2C) Draw your chosen species.

Research



Identify

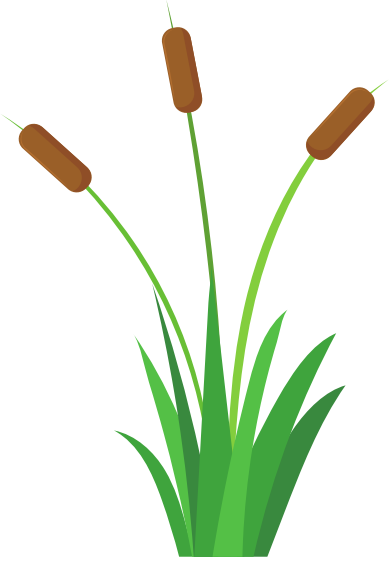
Present

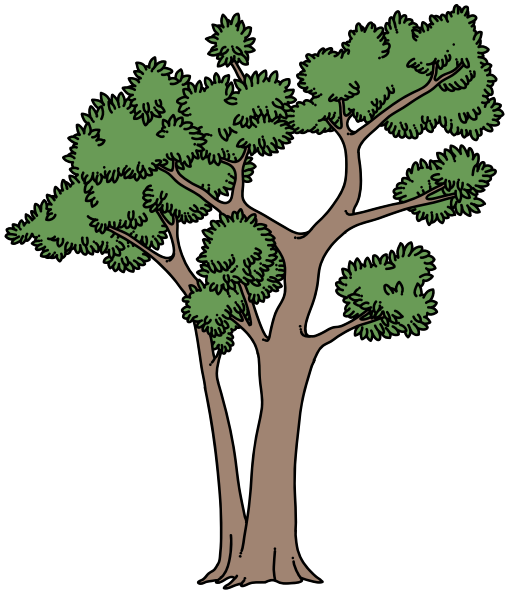
Flora and Fauna

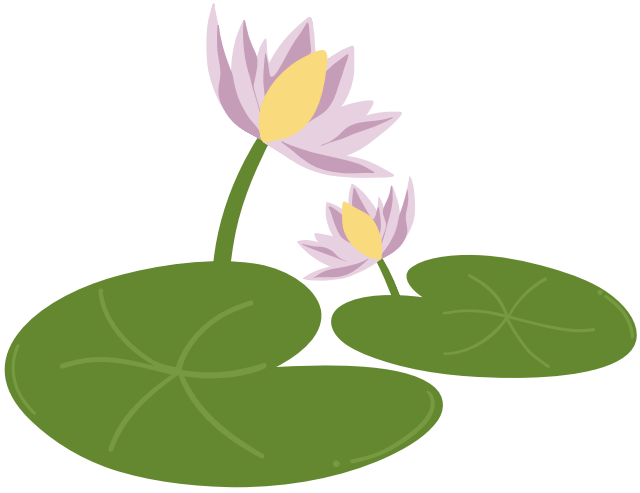
Cut and paste the pictures of flora and fauna and assign each to their category below

Flora	Fauna

Flora and Fauna







Wetland Flora

Fill in the information below about your chosen flora.

Common name

Scientific name:

Species habitat:

Species description:

The role of the species in the ecosystem:

Draw your chosen species:

Wetland Fauna

Fill in the information below about your chosen fauna.

Common name

Scientific name:

Species habitat:

Species description:

The role of the species in the ecosystem:

Draw your chosen species:

LESSON 4

TERM ONE

THREATS TO WETLANDS

- Learning Intentions
- Background
- Activities
- Curriculum Mapping

Photo credit: Dr Donald McKnight

Learning Intentions

(1) Identify and describe threats to wetland environments.

(2) Brainstorm and propose effective mitigation strategies for addressing threats to freshwater habitats.

Identify & Describe

Brainstorm & Propose Ideas

Background Information: Threats to wetland environments

(1) Habitat loss and degradation
Human activities, such as urban development, agriculture, and infrastructure projects, contribute to the alteration and destruction of wetland habitats. Wetland environments may be drained to meet the demand for residential or industrial infrastructure. This loss leads to a decline in biodiversity and disrupts critical ecological processes.

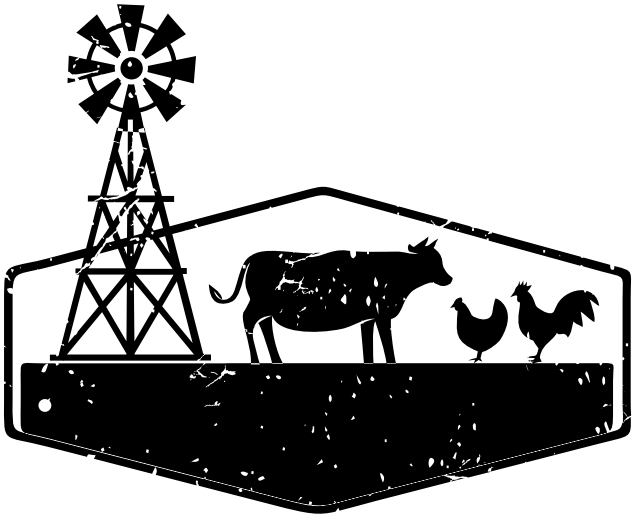
(2) Water extraction and altered hydrology
Excessive water extraction for agriculture, industry or urban water supply can reduce water levels in wetlands. Altered water flow, such as changes in river regulation and the construction of dams can impact the availability and timing of water inputs to wetlands.

(3) Invasive weeds and animals
Invasive species pose a threat to wetland environments by outcompeting native flora and fauna, disrupting natural ecosystems, and altering the structure of wetland habitats. These non-native species often lack natural predators, allowing them to multiply rapidly. Their behaviour may often lead to the displacement of native species, resulting in the loss of vital ecological functions and reducing the overall resilience of wetland ecosystems to environmental changes. Additionally, invasive species may introduce new diseases and parasites into wetland environments.

(4) Climate change
Climate change poses a multifaceted threat to wetland environments by influencing temperature patterns, precipitation levels, and sea levels. Rising global temperatures can alter the hydrological cycle, leading to changes in precipitation and evaporation rates, affecting water availability in wetlands. Additionally, increased frequency and severity of bushfires can directly impact wetlands, causing habitat destruction, soil erosion, and altering the composition of vegetation in the riparian habitat.

(5) Livestock
Livestock can physically damage wetland habitats through trampling of riparian vegetation and disruption of soil structure leading to the erosion of the riparian habitat and increased sedimentation. Trampling can also negatively impact the breeding and nesting sites of various aquatic species (i.e. turtles). Overgrazing by livestock can lead to changes in the structure and composition of plants in the riparian habitat and reduce the availability of food and shelter for aquatic and terrestrial species.

(6) Pollution
Elevated levels of pollutants, such as nutrients, chemicals, and sediments, can lead to water quality degradation, negatively impacting the health of wetland organisms.



Classroom Activities

ACTIVITY 1

(1A) As a class, discuss potential threats to wetland habitats.

(1B) In small groups research one of the threats to wetland habitats. Include references and/or a bibliography.

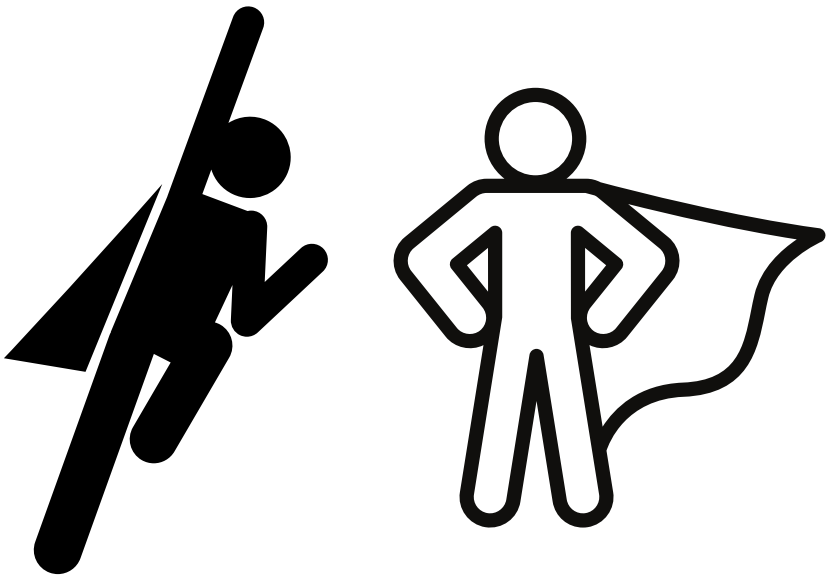
(1C) Propose ways to mitigate your threat.

Discuss

ACTIVITY 2

(2A) Design a wetland superhero character and write a short story about how they use their powers to mitigate one of the threats to wetland habitats.

(2B) Draw or create your wetland superhero using art supplies



Wetland Threats

Fill in the information below about your chosen threat.

Wetland threat: _____

Description of the threat:

Impact of the threat on wetland environments:

Mitigation strategies for the threat:

Wetland Superhero

Write a short story about your wetland superhero and how they use their powers to mitigate one of the threats to wetlands.

LESSON

TERM ONE

FRESHWATER TURTLES

- Learning Intentions
- Background
- Activities
- Curriculum Mapping

Photo credit: Dr Donald McKnight

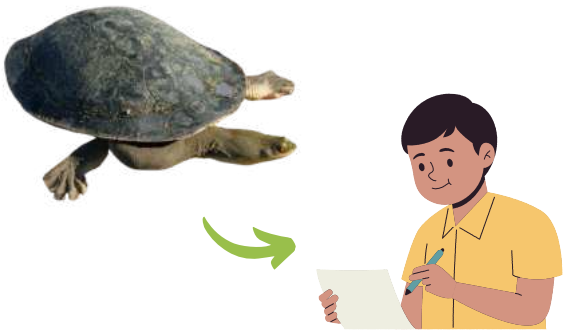
Learning Intentions

(1) Describe a freshwater turtle;

(2) Identify morphological features of a freshwater turtle;

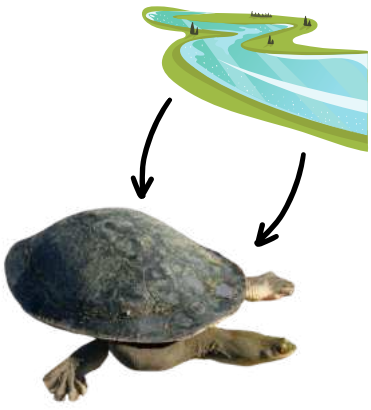
(3) Identify freshwater turtle habitats and explain how freshwater turtles use these habitats throughout their life.

(4) Recognise the role freshwater turtles play in the ecosystem.



Describe

Recognise



Identify

Photo credit (turtles): Dr Donald McKnight

Background Information
Australian freshwater turtles

Freshwater turtles are a diverse group of reptiles that are adapted to aquatic habitats, including ponds, lakes, rivers and wetlands. Australia is home to approximately 26 species of freshwater turtle, with all but one belonging to the Chelidae family. Chelids, withdraw their necks sideways into their shell for protection.

List of Australian freshwater turtles in the family Chelidae:

Chelodina:

- *Chelodina canni*
- *Chelodina burrungangjii*
- *Chelodina expansa*
- *Chelodina longicollis*
- *Chelodina kuchlingi*
- *Chelodina oblonga*
- *Chelodina rugosa*
- *Chelodina steindachneri*

Elseya:

- *Elseya albagula*
- *Elseya dentata*
- *Elseya flaviventralis*
- *Elseya irwini*
- *Elseya lavarackorum*

Elusor macrurus

Emydura:

- *Emydura macquarii*
- *Emydura tanybaraga*
- *Emydura victoriae*
- *Emydura subglobosa subglobosa*
- *Emydura subglobosa worrelli*

Myuchelys:

- *Myuchelys belli*
- *Myuchelys georgesi*
- *Myuchelys latisternum*
- *Myuchelys purvisi*

Pseudemydura umbrina

Rheodytes leukops

Australian freshwater turtle in the family Carettochelyidae:

Carettochelys insculpta

Examples of Australian Freshwater Turtles

Oblong turtle, *Chelodina oblonga*
Photo credit: Dr. Anthony Santoro

Macquarie River turtle, *Emydura macquarii*
Photo credit: Dr. James Van Dyke

Bellinger River turtle, *Myuchelys georgesi*
Photo credit: Dr Kristen Petrov

Mary River turtle, *Elusor macrurus*
Photo credit: Marilyn Connell

Pig-nose turtle, *Carettochelys insculpta*
Photo credit: John Cann

Eastern long-neck turtle, *Chelodina longicollis*
Photo credit: Prof. Arthur Georges

Background Information Australian freshwater turtles

Freshwater turtle morphology

(1) Shell
Freshwater turtles are characterised by a protective shell that consists of two main parts: the carapace (top of the shell) and the plastron (underside of the shell). The outer surface of the carapace and plastron are covered with bony plates called scutes. Scutes are made of keratin (similar to that of fingernails and hair) and they protect the underlying bone.

The arrangement and number of scutes vary among species and contribute to the identification and classification of different species. The size of the turtle shell also varies among species. In some turtle species, there may be differences in shell size between males and females, known as sexual dimorphism.

(2) Limbs
Freshwater turtles typically have four limbs, each equipped with webbed feet. The limbs are well-suited for the turtle's semi-aquatic life, providing both swimming ability and mobility on land. Freshwater turtles can retract their limbs partially or fully into their shells.

(3) Head and Neck
The length of the neck varies among species. Some freshwater turtles have relatively short necks, while others, like snake-necked turtles, possess exceptionally long necks that can extended sideways. The flexibility of the neck allows turtles to reach food sources, bask in the sun, and retract it for protection.

The structure of the mouth and jaw reflects the turtle's diet. Carnivorous species typically have sharp, pointed jaws for gripping and consuming prey, while herbivorous turtles may have beak-like mouths for cutting and chewing vegetation. Turtles lack teeth but have powerful jaw muscles that aid in grasping and processing food.

(4) Eyes and Nostrils:
Freshwater turtles have eyes positioned on the side of their head, providing a wide field of view. Nostrils are located on the top of the snout and allow the turtle to breathe while mostly submerged.

Freshwater turtle habitat use

Freshwater turtles rely on both aquatic and riparian habitats for different aspects of their lives. Freshwater turtles use the aquatic habitat for swimming, feeding, shelter and basking. Freshwater turtles use their webbed feet and streamlined bodies to move through the water. Turtles search for and consume food within the aquatic habitat, such as aquatic plants, invertebrates, fish and carrion (dead animal matter). The riparian habitat offers a variety of food sources for freshwater turtles, including wind-blown leaf matter and terrestrial invertebrates.

Photo credit (turtles): Dr Donald McKnight

Freshwater turtle habitat use

Freshwater turtles are ectothermic which means they rely on external sources of heat to regulate their body temperature. Freshwater turtles will bask on rocks and logs which protrude from the water. The riparian habitat often provides basking locations in the form of fallen trees and branches.

Lifecycle of freshwater turtles

Female turtles leave the water to lay their eggs. Females often select areas with loose, sandy soil and minimal vegetation cover. Females will dig a nest chamber with their hind legs and deposit their eggs inside. They then bury their eggs, leaving them to incubate underground. The incubation period varies among species but usually lasts 2-3 months. After nesting, females return back to the water. When incubation is complete, the eggs hatch and hatchlings emerge from the nest and make their way to the water.

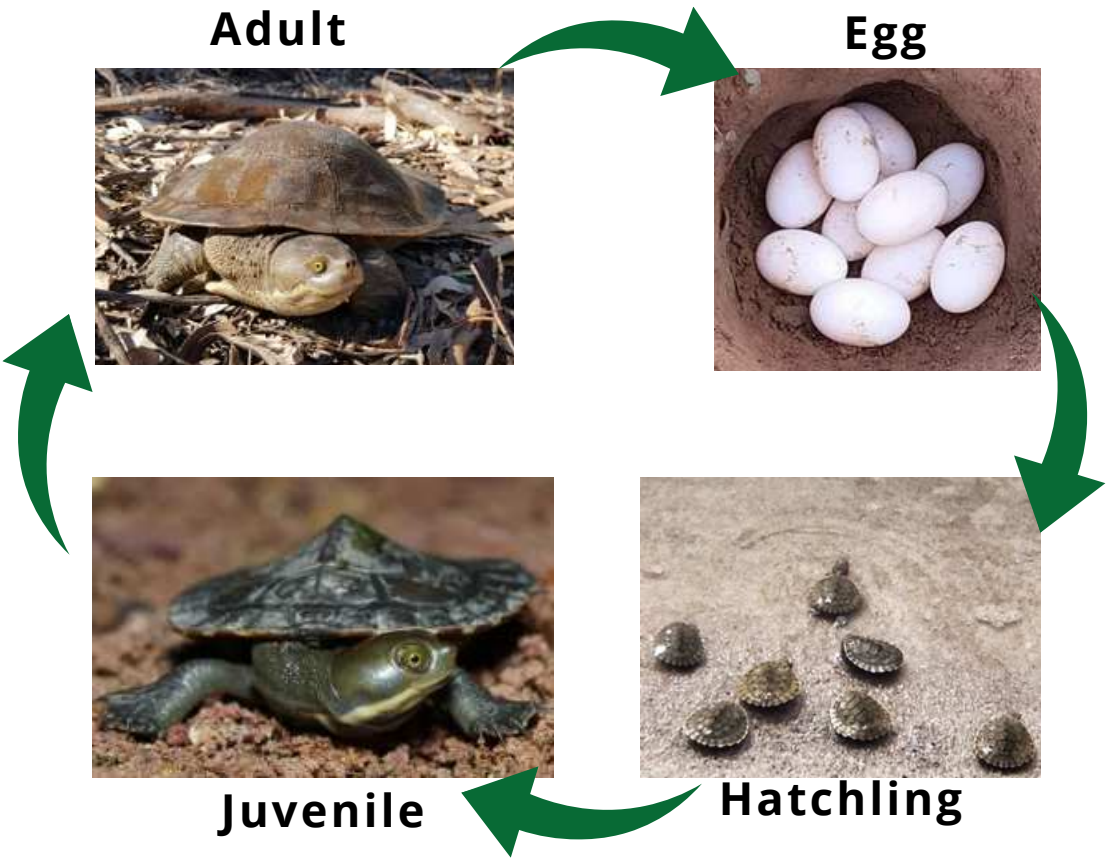


Photo credit (turtles): Dr Donald McKnight, Dr James Van Dyke, Professor Ricky Spencer

Ecological role of freshwater turtles

Turtles are highly generalist consumers and fill multiple ecological roles in the food web including top predators, herbivores, mesocarnivores and scavengers. Freshwater turtles are often referred to as “vacuum cleaners” of the river, as they feed on carrion (dead animal matter) and mitigate the effect of animal decomposition.

Invasive freshwater turtles

The Red-eared slider (*Trachemys scripta elegans*)
The red-eared slider is a species of freshwater turtle native to the midwestern states of the USA and northeastern Mexico. The red-eared slider is widely kept as a pet around the world and has been introduced to many countries outside its native range, including Australia.

Red-eared sliders have a distinctive red or orange stripe behind each eye and yellow-cream coloured stripes on their head, neck and legs. The carapace is dark green to brown in colour and may have yellow and black blotch markings.

Impact of Red-eared sliders:
The Red-eared slider is listed by the IUCN (International Union for Conservation of Nature) as one of the ‘world’s worst invasive alien species’.

The Red-eared slider is a threat to native freshwater turtle species. It is an aggressive species and competes with native species for food, basking habitats and nesting sites.

Who to contact if you see a Red-eared slider:
It is important to report sightings of Red-eared sliders to prevent their spread and minimise their impact on native ecosystems. You can report sightings to FeralScan (feralscan.org.au) or report the sighting to your local authority.

Classroom Activities

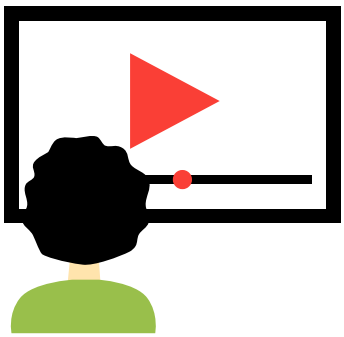
ACTIVITY 1

(1A) As a class discuss what you know about freshwater turtles.

(1B) Watch the following video which provides an overview of freshwater turtles in Australia.

Link to video: [https://www.youtube.com/watch?v=-w6KueWTR-8] (Copy and paste into browser)

(1C) Complete the Video Reflection worksheet below.



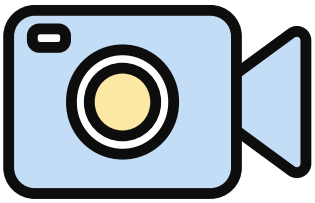
Video

Discuss

Video Reflection

3

Three things I learnt while watching



2

Two questions I have from the video

1

One fact I found most interesting

Classroom Activities

ACTIVITY 2

(2A) In groups, research an Australian freshwater turtle species.

(2B) Search for information using various forms of literature (i.e. articles, books or printouts).

(2C) Collate information relating to the species morphology, distribution, habitat preferences and reproduction. Include references and/or a bibliography.

(2D) Present your findings as a poster and share the information with the class.

Collate

Present

ACTIVITY 3

(3A) Look at images of Australian freshwater turtles.

(3B) Discuss key morphological features, including shell, limbs, head, neck.

(3C) Label key morphological features in the Turtle Morphology Handout.

Discuss

Australian Freshwater Turtles

Fill in the information below about your assigned freshwater turtle species.

Assigned freshwater turtle:

Scientific name:

Description:

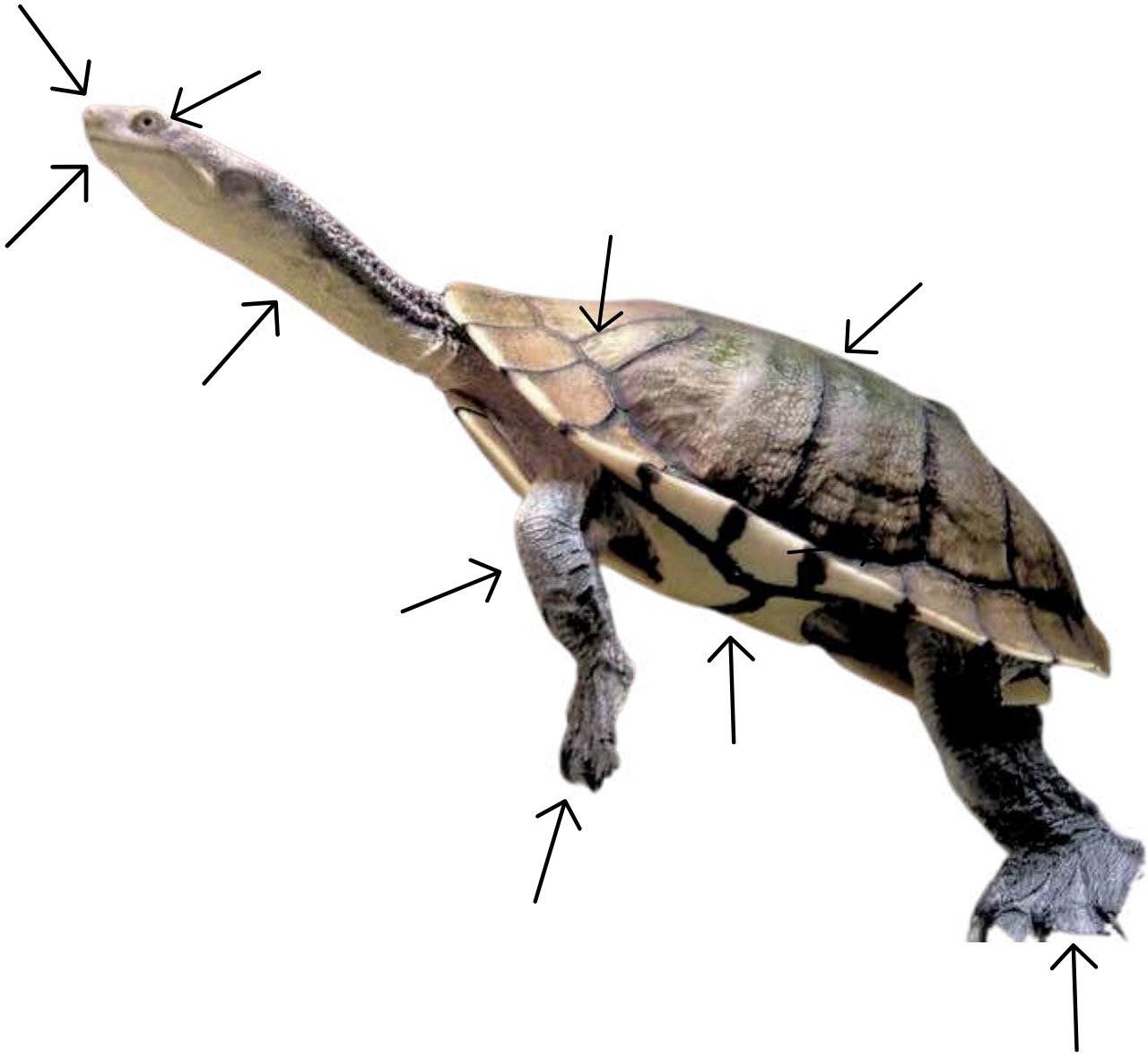
Distribution:

Habitat preferences:

Reproduction:

Freshwater Turtle Morphology

Label the morphological characteristics of the Eastern long-neck turtle



Classroom Activities

ACTIVITY 4

(4A) Create your own freshwater turtle using paper mache.

(4B) Incorporate the morphological features of freshwater turtles that you have learnt about in the prior activities (i.e. webbed feet, scutes etc).

Steps for making a paper mache turtle:

Materials:

- Newspapers
- Cardboard (for the base)
- Masking tape
- Flour
- Water
- Mixing bowl
- Plastic wrap
- Acrylic paint and paintbrushes

Instructions:

1. Create the base: Cut a piece of cardboard into the desired shape of your turtle's shell. This will be the base of your paper mache turtle.
2. Form the turtle shell: Crumple newspapers into balls and tape them onto the cardboard base to create the basic shape of the turtle's shell. Use masking tape to secure the newspaper balls in place.
3. Build the body and limbs: Extend the body and limbs using more crumpled newspaper and masking tape. Shape the limbs and tail.
4. Prepare the paper mache paste: In a mixing bowl, mix equal parts of flour and water to create a paste. Stir until smooth.
5. Apply the paper mache layers: tear newspaper into strips. Dip each strip into the paste, ensuring it's fully coated, and then place it onto the turtle's structure. Smooth out the strips to remove excess paste and create and uniform layer. Continue layering until the entire turtle is covered. Allow each layer to dry before applying the next. Apply several layers of paper mache to ensure the turtle is strong and durable. Aim for at least 3-4 layers.
6. Paint your turtle: Once the paper mache is completely dry, paint your turtle using acrylic paint. Get creative with colours and patterns to make your turtle unique.

LESSON 6

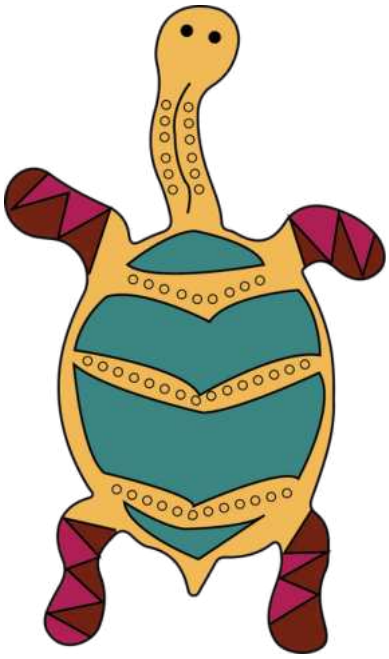
TERM ONE

CULTURAL SIGNIFICANCE OF FRESHWATER TURTLES

- Learning Intentions
- Background
- Activities
- Curriculum Mapping

Learning Intentions

(1) Recognise the cultural significance of freshwater turtles to First Nations People.



Recognise

Background Information:

Importance of freshwater turtles to First Nations People

Freshwater turtles play a crucial role in the cultural heritage of Aboriginal communities, featuring prominently in dreamtime stories, cultural practice and ceremony, art, and as customary food sources.

Classroom Activities

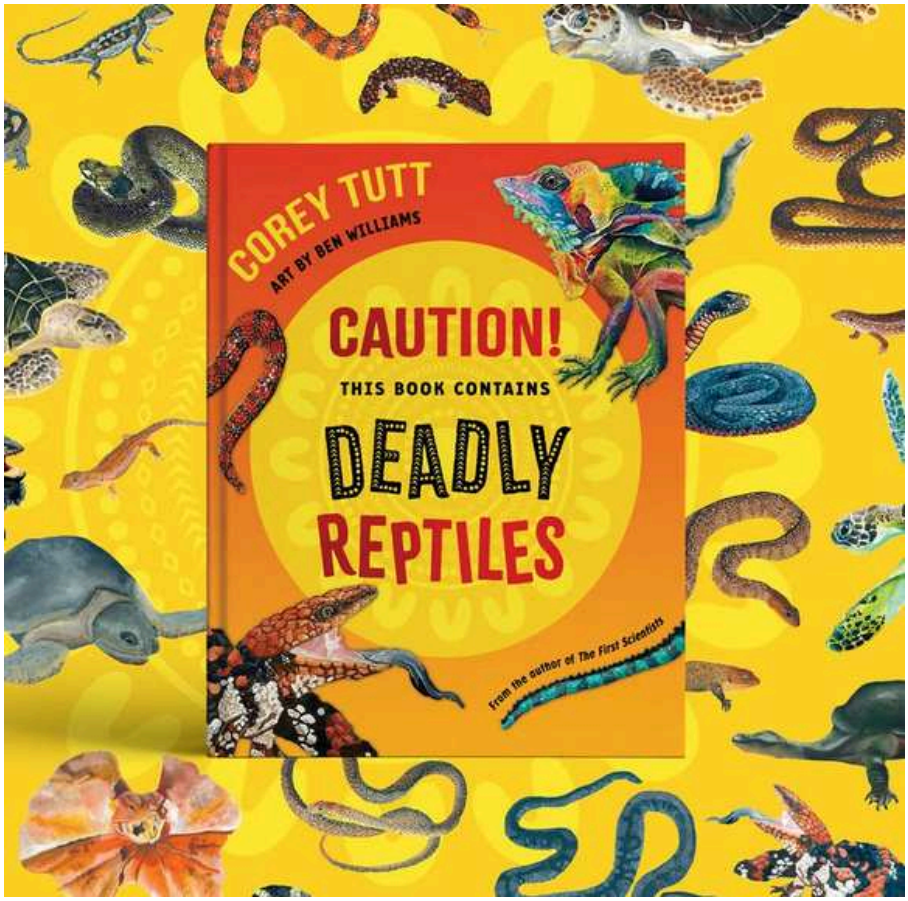
ACTIVITY 1

(1A) As a class, read the book *Caution! This book contains Deadly Reptiles,* written by Corey Tutt, OAM and founder of DeadlyScience (https://deadlyscience.org.au/)

(1B) Engage in a class discussion about what you have learnt.

(1C) Select one *Deadly Reptile* from the book. Create your own **Did you know?** fact card about your chosen reptile and include the Indigenous name of your species.

(1D) Present your fact card to the class and discuss why you found the information interesting.



Classroom Activities

ACTIVITY 2

(2A) Discuss key cultural practices and stories related to freshwater turtles among First Nations People.

(2B) View visual aids, such as images or videos, depicting the role of turtles in Aboriginal Art, Dreamtime stories and ceremonies.

(2C) Engage in a class discussion about what you have learnt.

Discuss cultural practices

Show visual aids

Discuss learnings

ACTIVITY 3

(3A) Research the cultural significance of your local freshwater turtle species. Include references and/or a bibliography.

Research

ACTIVITY 4

(4A) Create turtle rock art. Reflect the cultural significance of freshwater turtles to First Nations People in your design.

(4B) Share your turtle rock art with the class and explain the cultural elements you have incorporated.

Materials:

- Smooth surfaced rocks (i.e. paving or bedrocks)
- Acrylic paints and paint palette
- Paint brushes

Turtle Rock Art

Create and Share

Cultural Significance

Fill in the information below about the cultural significance of your local freshwater turtle species.

Local freshwater turtle: _____

Country: _____

Indigenous name: _____

Cultural significance of the species: _____

LESSON 7

TERM ONE

WETLAND OBSERVATIONS

- Learning Intentions
- Background
- Activities
- Curriculum Mapping

Photo credit: Marilyn Connell

Learning Intentions

(1) Identify in real-time, habitats used by freshwater turtles.

(2) Collect data on the distribution and abundance of flora at your local wetland using a transect.

(3) Assess the health of the wetland based on observations.

Identify

Collect

Assess

Photo credit (turtle): Dr Donald McKnight

Background Information
Abundance, Distribution and Diversity

Abundance: refers to the number of individuals of a species in a particular area or ecosystem. It can be measured in various ways, such as counting the number of individuals per unit area (density) or estimating the total number of individuals in a population. Monitoring abundance helps scientists understand population dynamics and species interactions.

Abundance

Distribution: refers to the geographical range of a species. It describes where a species is found and how it is spread out across different habitats or regions. Species distribution can be influenced by factors such as climate, habitat availability and dispersal ability. Understanding species distribution is important for conservation efforts, biodiversity assessments, and predicting species responses to environmental changes.

Distribution

Diversity: refers to the variety of species in a particular area or ecosystem. It encompasses different aspects, including species richness (the total number of species present), species evenness (the relative abundance of each species), and species composition (the identity of species present). Ecosystems with high biodiversity can better withstand environmental disturbances and provide a wide range of ecological services.

Diversity

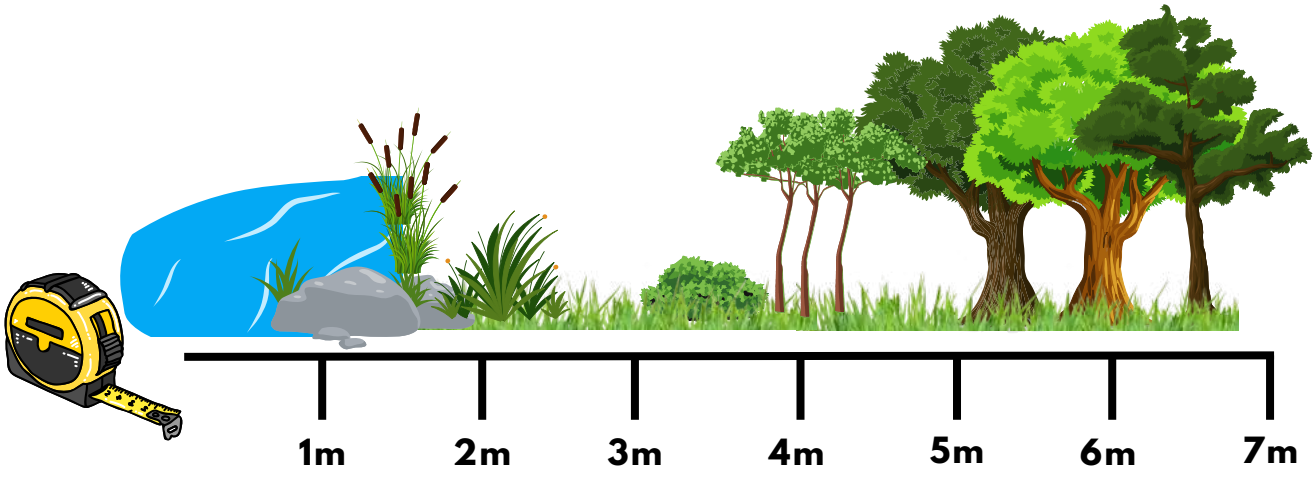
Photo credit (turtles): Dr Donald McKnight

Background Information

What is a Transect? a linear (i.e. straight line) sampling method used to study changes in plants and animals by recording observations along the linear path. Scientists use transects to see how different plants and animals are distributed in an area and their abundance. Transects are best used for animals which are mostly sessile (i.e. those that do not move!).

How is a Transect Done?

1. Choosing a Line: First, scientists pick a straight line that goes across the area they want to study. This line can be as long as they need, from just a few meters to even kilometres.
2. Placing Markers: Along this line, scientists place markers or stakes at regular intervals, for instance every metre. These markers help them keep track of where they are and where they're looking.
3. Recording Organisms: Then, starting from one end of the line, scientists carefully look at the organisms that are right next to the line. They write down what kinds of organisms they see and how many of each kind there are.
4. Measuring Distances: Sometimes, scientists also measure how far each organism is from the line. This helps them understand how they are spaced out in the area.
5. Repeating the Process: Scientists might do this many times, walking along the line and recording organisms at different points. This way, they get a good idea of the distribution and abundance of organisms.



Why Do Ecologists Use Transects?

1. Mapping Distribution: By using transects, scientists can make maps that show how different plants and animals are distributed in an area.
2. Studying Habitats: Transects also help scientists learn about different habitats, like wetlands. They can see how plants and animals change from one habitat to another along the transect line.
3. Monitoring Changes: Scientists can use transects to keep an eye on how plant and animal populations change over time. This is important for understanding how things like climate change or human activities might affect plants, animals and their habitats.

Classroom Activities

ACTIVITY 1

Game: “Transect Explorers":

Materials Needed:

- Cut-out pictures of flora
- Scissors
- Measuring tape
- Stopwatch or timer
- Data recording sheets

Instructions:

1. Flora Cutouts:
    - Cut-out different flora to use in the game. Flora cut-outs are available on the next page.
2. Setting Up the Transect:
    - Designate an area in the classroom where the transect will be placed.
    - Place the measuring tape along the length of the classroom. This will be your transect line.
    - Distribute your flora along the transect line.
    - Each flora should be placed at the nearest 1 metre interval marked on the measuring tape.
3. Data Collection:
    - Once all flora are in position, start the timer. You will have 5 minutes to observe and record all the flora present on the transect line.
    - Students should use their data recording sheets to note down the type of flora, its location in metres along the transect line and the number observed at each sampling location.
4. Discussion:
    - Discuss your findings as a class.

Classroom Activities

ACTIVITY 1 - Continued

Game: “Transect Explorers"

Wetland Activities

ACTIVITY 2

(2A) Walk around your local wetland and observe the riparian and aquatic zones, taking note of abiotic and biotic factors and habitats utilised by freshwater turtles.

(2B) Conduct a transect study and record the abundance and distribution of flora at the wetland. Set up a 10m transect and use field guides to identify plants along the transect.

(2C) Assess the health of the wetland by observing the following:

- Water quality
- Vegetation – diversity and abundance of both riparian and aquatic vegetation.
- Wildlife presence – birds, invertebrates, fish, turtles etc.
- Extent of erosion – observe the stability of bank of the wetland.
- Human disturbances – presence of litter or pollution.

Classroom Activities

ACTIVITY 3: After visiting the wetland

(3A) Create a visual representation of your data, such as bar graphs or pie charts, showcasing the distribution and abundance of flora along the transect.

(3B) Discuss the patterns you observed in your data and explain what these patterns might indicate about the wetland ecosystem.

(3C) Reflect on your wetland visit and write about what you observed. Propose one action you can take to contribute to wetland conservation.

Visualise

Reflect and Write

Wetland Worksheet

Fill in the information as you walk around your local wetland

Describe the water quality:

List potential habitats used by freshwater turtles:

Comment on the extent of erosion around the bank:

List and describe human disturbances observed:

Transect Data Recording Sheet

Distance from Wetland (m)	Plant species observed
1 m	
2 m	
3 m	
4 m	
5 m	
6 m	
7 m	
8 m	
9 m	
10 m	

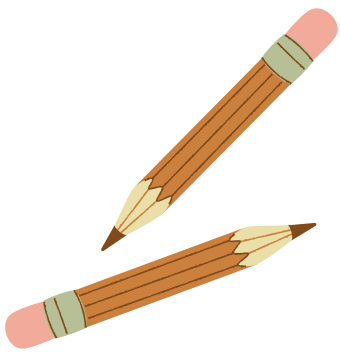
Transect Data Analysis

Create a visual representation of your data showcasing the distribution or abundance of flora along the transect.

Transect Data Analysis

Describe the patterns you observed in your transect data

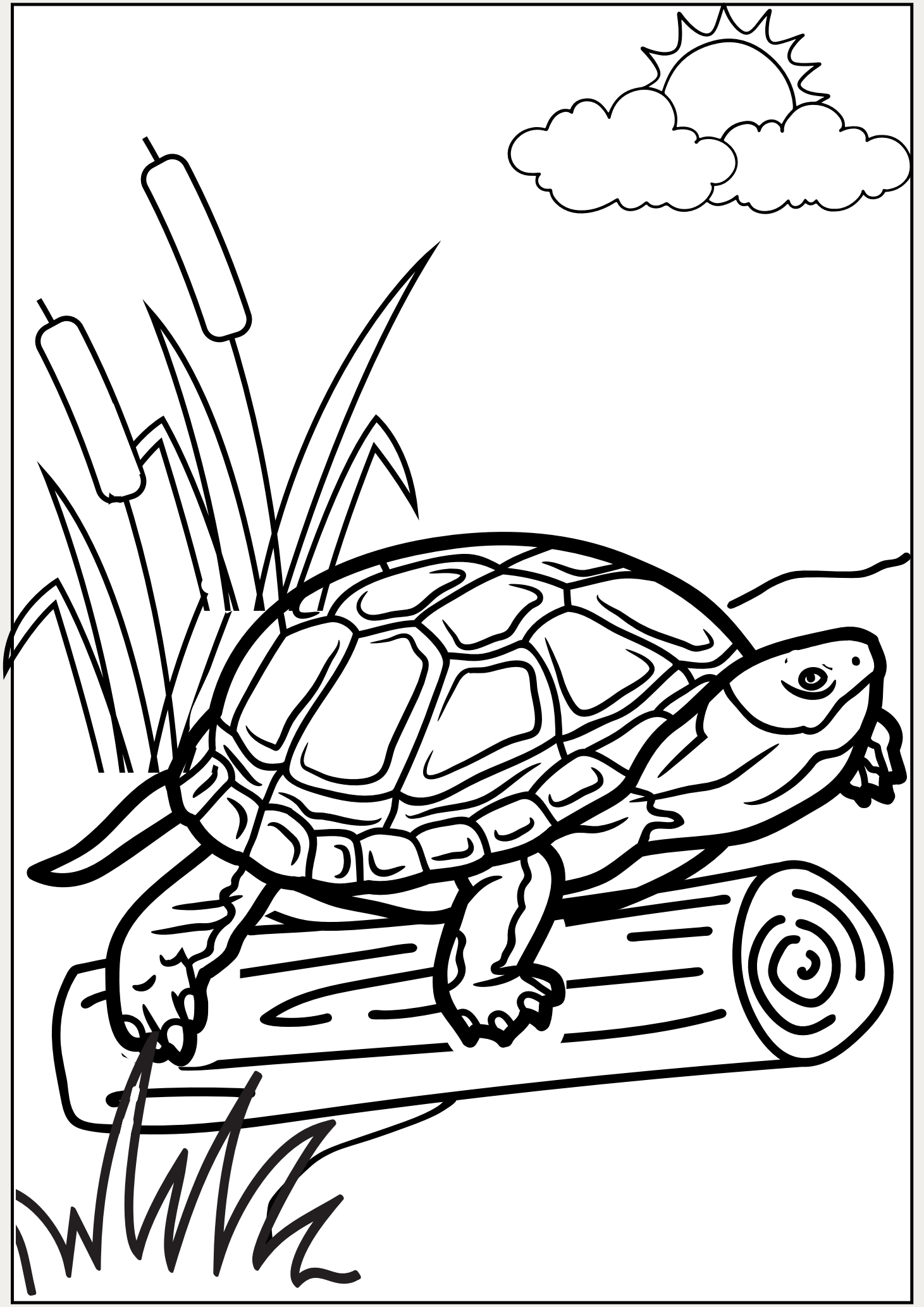
Explain what the patterns above might indicate about the wetland ecosystem.



ALL OF MY

observations

Write a short reflection piece on what you observed at the wetland. In the box below, propose one way you can contribute to wetland conservation



Word Search

G N X R E V X G M W D L G N Y S K G Y D M I D I Y
J F H A U O N T C G K I R A I N P Q W H N T Z Q C
Q E P B R D F E R E Y F Y P P W E T L A N D R Z Z
H M R I O W X P S A Q O K Y X E V L H T I V I W O
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A R P Q F G O S P I S I F Z I I W R X C K G N P E
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M T C W G A E E T P U L X W I P N W A I Q G E A H
I Z E O L J I Q P O L L U T I O N K O L C Q J K T
V H D L H B T H R E A T T M S R K U E N F I L B E

European foxes
Ectothermic
Climate change
Freshwater
Nest predation
Distribution
Urbanisation
Flora
Nest chamber
Mitigation
Webbed feet
Pollution
Hatchling
Abundance
Riparian
Scavenger
Carapace
Transect
Fauna
Carnivore
Wetland
Plastron
Herbivore
Aquatic
Basking
Biotic
Threat
Abiotic
Turtle

Classroom Activities

ACTIVITY

What I Know (K), What I Want to Know (W), What I Learnt (L)

Materials:

- Large chart paper divided into 3 sections labeled "K" (Know), "W" (Want to Know), and "L" (Learnt).
- Markers or pens

Instructions:

(1A) Revisit your Know, Want to Know and Learnt chart and complete the Learnt (L) column.

What I Know (K)	Want to Know (W)	What I Learnt (L)
		

Photo credit (turtle): Dr Donald McKnight