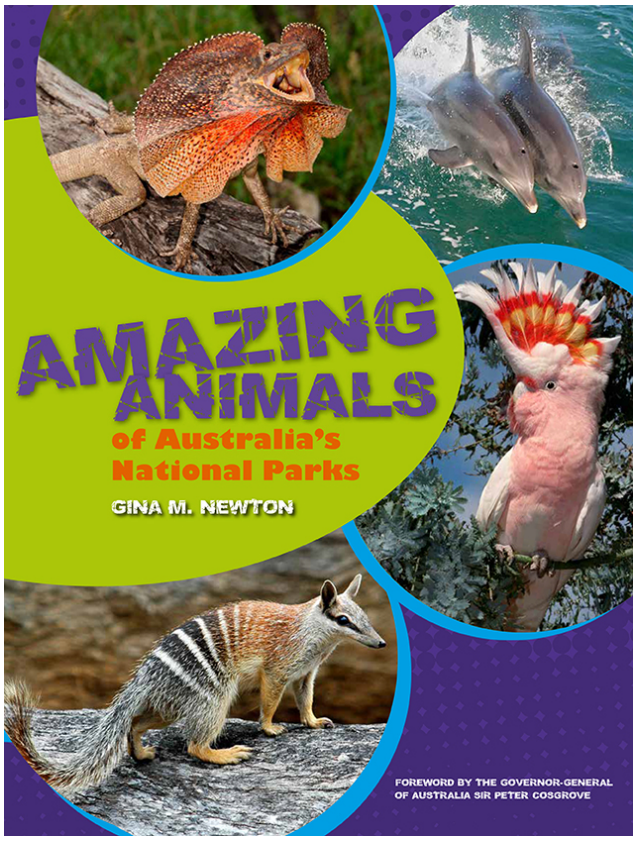
TEACHERS' NOTES: YEAR 4 (AGES 9–10)
Amazing Animals of Australia's National Parks
by Gina M. Newton



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AUSTRALIAN CURRICULUM LINKS (version 8.2)

Living things have life cycles. (ACSSU072)

- describing the stages of life cycles of different living things such as insects, birds and frogs
- recognising that environmental factors can affect life cycles such as fire and seed germination

Living things depend on each other and the environment to survive. (ACSSU073)

- investigating how plants provide shelter for animals
- observing and describing predator–prey relationships

recognising that interactions between living things may be competitive or mutually beneficial

Background information for teachers

a) All living things, including animals, have a life cycle. A 'cycle' refers to a series of events that are repeated in a certain order (i.e. they are 'sequential'). Animals are born, they grow up, they have young (reproduce), and they die—these represent different 'stages' of the life cycle. The younger stages may not look anything like the adult stage. Different types of animals have different types of life cycles. For example, the life cycle of an insect is very different from the life cycle of a mammal. Sometimes, even the same type of animals can have a different life cycle, particularly in the types of stages that occur (for example, some fish hatch from eggs and some are born live from their mother). At some stage, all cycles involve the 'metamorphosis' from an immature form to an adult form. Metamorphosis can be abrupt (or sudden) or it can be more gradual. Different stages of the life cycle may also utilise different parts of the environment and different resources (e.g. different food).

b) Environmental factors can be very important in affecting the life cycle of an animal or insect. Factors such as temperature and the availability of food resources can affect the timing of the different stages in a life cycle, or indeed if reproduction even occurs. For example, in harsh years when there isn't much food or water around, some types of animal may not reproduce at all (e.g. Quokkas). If food is extra plentiful, then more offspring may be born than usual, which may lead to a 'boom-and-bust' cycle of population growth. As another example, if the weather is colder than usual, some animals may delay reproduction until it is warmer, or alternatively some insects may lay their eggs earlier as the egg stage may survive longer in the cold than the older stages would. For some animals, like many reptiles, the temperature of the soil that the eggs are incubated in determines the sex of the offspring. For example, for all sea turtles, higher incubation temperatures produce more female hatchlings, while lower incubation temperatures produce more male hatchlings. This is called TSD—temperature-dependent sex determination.

c) Animals depend on their environment to help them to survive, and the plants and soils in their habitat can be especially important. Plants and soils are often used by animals to build or excavate places to live, or shelter or nest. These structures provide them with shelter from the weather (rain, wind, heat, cold) and protection from predators. They can also provide safe places in which to produce their young. Some examples include: tree hollows in old gum trees; nests built in the tree tops; burrows in the ground; dens under rocks; or spaces inside old logs lying on the ground.

d) A predator is an animal that lives by hunting, killing and eating other animals. The prey is an animal that is hunted or seized for food. Predators can also be prey, depending on where they occur in a food chain (e.g. a snake is a predator because it eats mice, but it can also be prey because it can be eaten by a predatory bird, like an eagle). Some predators might also act as scavengers and eat dead animals (carrion). An 'apex' predator is at the very top of the food chain and nothing else will eat it (e.g. dingo, eagle, shark). An 'ambush' predator is one that hides and launches a surprise attack. In this case, the prey is caught by stealth or strategy, rather than simply being hunted down by the strength or speed of the predator. In natural systems, there are usually many more prey animals than there are predators. Predators can serve a very important ecological role in some habitats by keeping the numbers of a prey species in balance with the amount of resources available (such as food, shelter, water).

e) Interactions or relationships between living things may sometimes be competitive. For example, two different species of animal may compete for similar resources such as food, shelter or water. If one species is better at competing they may possibly drive the other species away from a particular habitat. For example, invasive species such as the Cane Toad may compete with native frogs for breeding sites.

   Alternatively, interactions or relationships between living things can sometimes be mutually beneficial—that is, both species get some reward. A good example is the beneficial pollination of plants that occurs from the behaviour of nectar-eating animals and insects (e.g. birds, fruit bats, bees). Another example is the dispersal of the seeds of trees and bushes through the droppings of animals that eat fruits and seed pods.

Activities

1. **Key Glossary Words**

   Students look up these words in the glossary of the book and copy at least one into their books: ambush predator; apex predator; boom-and-bust (cycle); dispersal; ecological role; incubate; incubation; metamorphosis; scavenger.

2. **Understanding Life Cycles**

   Have a discussion with the class so that students understand what a life cycle is for an animal. Convey that it is about the 'reproductive' cycle of an animal having young. It starts with the young being produced by laying eggs or live birth, the young then grow up into an adult, and the adult reproducing young before it dies. Make the point that it is a 'sequential' and 'predictable' cycle (i.e. always the same for a particular animal). Note that the various stages in the cycle may not necessarily look like the adult.

   - Draw a generic life cycle on the whiteboard (or provide a handout—many are available on the Internet). A good example is the life cycle for an insect, such as a moth or butterfly, that undergoes an abrupt metamorphosis:
     - egg—unborn stage
     - larvae—young stage, when most feeding is done e.g. caterpillar (looks different from the adult)
     - pupa—inactive, no feeding, often in a cocoon
     - adult—metamorphoses into a final breeding stage, leaves the cocoon, has wings.

     There are also some insects, such as grasshoppers, cockroaches and dragonflies, that undergo gradual metamorphosis:

     - egg—unborn stage
     - nymph—young stage, where most of the feeding occurs (often looks like a mini adult)
     - adult—final breeding stage, has wings.
   - Discuss how the environment can affect reproduction and the life cycle. This can be due to the availability of habitat. Animals need somewhere safe and protected to have their young and many of these places are hidden.
     - Ask students to list what animals need to keep these places safe from. Write their suggestions on the whiteboard (e.g. predators, rain, cold, heat, flooding, competition from other animals looking for nesting sites).
     - Ask students to call out places in the environment where it might be good for animals to have their young. Write their suggestions on the whiteboard (e.g. hollows in old gum trees, burrows in the ground, nests high up in trees, floating

on water, in caves or under rocks, in old hollow logs).

- The environment can also influence the life cycle of an animal due the availability of resources like food and water—for both the parents and the young. The young of some animals eat different food from the adult—for example, a caterpillar is a leaf-eating machine, while butterflies 'drink' nectar from flowers). In harsh years, when there is drought and not much water or food, an animal might not breed, for example the Quokka (p. 84). In years when there is a lot of food and water, an animal might produce many more young or breed more often, resulting in a much larger than usual population size. This can sometimes lead to a 'boom-and-bust' phenomenon, because when the food is gone the population dies off—i.e. it BUSTS!.

  In some reptiles, such as crocodiles, turtles and dragons, the environmental temperature can affect the gender of the offspring. Certain temperatures will lead to more male hatchlings, while others will lead to more female hatchlings.

  - Discuss with the class the meaning of 'predator' and 'prey'. Write the definitions on the whiteboard.

    Explain that predators are higher up in a food chain and often have an significant ecological role in keeping the numbers of a prey's population in check. This is important as a particular habitat will have only a limited amount of resources like food, water and shelter. If the population of a prey species gets too large then they may use up all the resources—which is not good for all the other types of animals that live there. Also explain that, sometimes, predators can also be the prey of something else.

    Discuss the meaning of 'apex predator' and 'ambush predator'. Write the definitions on the whiteboard. Discuss the different strategies that predators use to catch prey (i.e. speed and strength rather than strategy).

  - Discuss with the class how some animals complete with each other for resources in the environment. For example, hollows in old growth gum trees (usually 100 or more years old) are very important as nesting sites for some species of birds and marsupials. Ask students what other resources animals compete for and write them on the whiteboard (e.g. food, water, shelter, nesting sites). In competitive relationships, if one animal is the better competitor, it may drive away the other species from a particular habitat.

  - Discuss with the class how some living things, animals or plants, evolve to develop mutually beneficial relationships. Use the example of how animals and plants can benefit each other—usually the animals get food and the plants benefit by pollination (which leads to reproducing more plants). Plants may also benefit from dispersal of their seeds and young into other areas (so that the parent plants are not crowded out).

3. Investigating, Recording & Presenting

(Students could do this task in small groups of 2–4 or individually.)

- Life cycles and environmental influences
    - Students use the book and complete Table 1 of the life cycle stages of each animal.
    - Students choose three different animals from Table 1 and draw their life cycles. (Students also refer to the information and photos in the book.)
    - Students use Table 1 to identify two different animals of the same type that have different life cycles (HINT: it will be an insect, fish or frog) and draw the two different life cycles.
    - Students investigate 'boom-and-bust' cycles by looking up the Australian Barn Owl (p. 24), the Budgerigar (p. 79) and the Spinifex Hopping Mouse (p. 86). Students describe in a few sentences the driving factors that make these boom-and-bust cycles happen for each animal (HINT: rain, water, grass, seeds, mice).
    - Investigate the Freshwater Crocodile on p. 105 and answer these questions:

      Where are the eggs laid?

      Temperature is important for a part of the Freshwater Crocodile's life cycle. Which part?

      At what temperatures are more males hatched?

      At what temperatures are more females hatched?
    - Using the Wetlands & Waterways and the Coasts, Oceans & Islands habitat sections of the book, list three other reptiles for which temperature would determine the gender of their young (HINT: it will be a crocodile, turtle or dragon).
- Shelter
    - Students choose two animals from the Woodlands, Forests or Rainforests habitat sections of the book and/or from the Little Critters section. For each of the two animals, have students draw an A4-sized poster of the animal's habitat showing how it uses the plants for shelter, protection and food.

      (Some examples of the plants used might be trees (or parts of trees: leaves, bark, roots, canopy, trunk, hollows), bushes, grasses, water reeds, and old logs or leaf litter on the ground. Use the photos of the national parks and the habitat descriptions at the start of each section to help with your ideas.)

- Predator and prey relationships
    - Students look through each habitat section in the book and find two examples of a predator and a prey for each. List them in Table 2.

      Discuss the ecological role that predators serve.
    - Students identify three 'apex predators' (HINT: look it up in the glossary for page numbers of example animals). Explain in one or two sentences what an apex predator is and where it might be in the food chain.
    - Students identify two 'ambush predators' (HINT: look it up in the glossary for page numbers of example animals). Explain how an ambush predator operates. How might it behave differently from other predators?
    - There are two important predators of Australian wildlife that were introduced to Australia at the time of European settlement. In some places they are threatening the survival of some species. What are these two invasive species? (HINT: they are both commonly listed as a predator of native wildlife throughout the book.)
- Competitive or mutually beneficial interactions
    - Table 3 lists all the marsupials in the book that live in trees (i.e. they are arboreal) and that use tree hollows as nesting sites. It also lists all the birds in the book that might make a nest in a tree hollow.

      In Table 3, make a list of at least five pairs of species (either marsupials, or birds, or a marsupial and a bird) that might compete for nesting sites in tree hollows.

      (If the distribution of any of these marsupial or bird species overlap, then those species could potentially compete for nesting sites in tree hollows. Remember that the size of the hollow will also be important. For example, a large marsupial may not fit into a small hollow that a budgerigar might need and use, so they would be unlikely to compete. It may also be important to consider that some species, such as Sugar Gliders, are territorial, so only one would use a particular tree.)
    - Students investigate the Honey Possum (p. 29) and the Southern Cassowary (p. 60)—two animals that have mutually beneficial relationships with plants.

      Explain how each one's relationship with plants works.

      List the benefits of the relationship for the animal and the plants.

      Explain how this mutually beneficial relationship helps the broader habitat that the animals live in.

4. Making Connections

- Discuss with the class how different types of animals can have different life cycles. Point out that stages in a life cycle are in a sequence, so we know which one will come next.
    - Discussion how the Turtle Frog (p. 18) is unlike the other frogs in the book (it does not have tadpoles in its life cycle). Ask the students why they think this might be? What are the advantages of not having a tadpole stage?
- Students share their findings about the three species that sometimes have boom-and-bust population cycles (see activity under 'Life cycles and environmental influences' in Section 3 above). What were the common factors in making a 'boom' in population numbers for these animals? Ask the students what they think might happen in times of drought to these three species?
- With the temperature-dependent-sex effects that occur for some reptile species, discuss with students what they think about climate change and global warming. What effect could rising temperature have on these reptile species?
- Students share their findings about how important plants in the habitat can be to animals (see activity under 'Shelter' in Section 3 above). They could 'show and tell' their posters to the class. Ask what the different plants and different parts of plants provided to the animals? What do the students think would happen if some of the plants were removed from the habitat?
- Students share their findings about apex and ambush predators (see activity under 'Predator and prey relationships' in Section 3 above). Write a list for each type on the whiteboard. Discuss the following with the students:
    - why predators play an important ecological role in the environment
    - how native predators are important—as the Australian environment and its wildlife have evolved and adapted to have these predators
    - what problems they think introduced predators (e.g. fox, cat, wild dogs) (with which Australia's wildlife has not evolved) cause our native wildlife and why
    - what animals might prey on the invasive predators.
- Students share their findings about the animals and birds that use nesting hollows in trees (see activity under 'Competitive or mutually beneficial interactions' in Section 3 above).
    - Make a list on the whiteboard of different pairs of animals that might compete.

      Be mindful of the size of hollow they need and if they are territorial. Point out that often hollows might be in very old, but dead, gum trees.
    - Discuss whether it is important to save these old dead trees (called stags) or whether they should be cut down.

Remember good hollows can often take over 100 years to form in a gum tree.

- Students share their findings with the class about the endangered Southern Cassowary and its important ecological role in the tropical rainforest (see activity under 'Competitive or mutually beneficial interactions' in Section 3 above).

  Discuss what might happen to the rainforest if the Southern Cassowary were to disappear from an area or become extinct.

5. Extension Activity

- Ask students to find one animal in the book that is both predator and prey. Have them draw and label a diagram with the animal in the middle of the page, its predators towards the top of the page, and its prey towards the bottom of the page.
- As a class, students call out which animals they have found that are both predator and prey. The teacher lists them on the whiteboard.
- As a class, the students also call out the apex predators and ambush predators they have found in the book. The teacher lists them on the whiteboard.

Funtivity

Build an Insect Hotel for the Little Critters (pp. 135–139)

With the class, build an Insect Hotel in the school ground. An Insect Hotel is a place that attracts insects into the local environment—so it increases insect biodiversity, which increases habitat health. It provides micro-habitats that give shelter to the insects, especially in winter. Some species of insects undergo a dormant-like state over winter (a bit like hibernation) and need safe, dry and warm places to shelter in (e.g. some species of lady bugs, bees, bumblebees, wasps, flies, beetles, butterflies, moths). Some species might lay their eggs in them too—like native stingless bees and wasps (Note: these insects like smooth small cylindrical spaces).

Insect Hotels can be made from found and recycled materials that have lots of small holes, crevices and structure (e.g. bricks, pipes, small logs, bamboo, off-cuts of wood, pine cones, seed pods, glass bits, tile bits, non-toxic plastic). Make sure the roof hangs over the entrance. There are websites where you can find out how to build an Insect Hotel and what materials to use.

Predatory Snap

Make a pack of 30 large cards of the same size out of thick cartridge paper. Colour photocopy or draw 15 predators and 15 prey animals from the book. Cut them out and glue each onto a card. Write in thick black texta a large P (for predators) or a small p (for prey) in the top right-hand corners. You may like to laminate the cards. Two people take turns to turn over a card. If two predators or prey are drawn you keep playing. However, if a predator card and a prey card are drawn, the player who yells SNAP picks up the pile of cards. The person with all the cards is the winner.