SAN DIEGO ZOO KIDS®

AUSTRALIAN OUTBACK

Teacher Resources & Activities

GRADES PRE-K TO 3

echidna

Table of Contents

The activities in this booklet follow the 5E Instructional Model developed through the Biological Sciences Curriculum Study (BSCS). The phases of the BSCS 5E teaching sequence are Engage, Explore, Explain, Elaborate, and Evaluate. Generally, activity steps 1 through 5 align with these phases.

Like this activity guide? Go to sandiegozoo.org/teachersurvey for a quick, online feedback form. We appreciate your comments.

Welcome from Zookeeper Rick Schwartz

G'DAY MATE!

I invite you to come along as we explore the unique animals and diverse habitats found on the continent of Australia. The "Land Down Under" is home to koalas, kookaburras, and Tasmanian devils; just a few of the more than 760 bird and mammal species found nowhere else in the world. Also widespread across Australia are the eucalypt forests that flourish along the hillsides. These gum trees provide food and shelter for koalas, wallabies, echidnas, and many more animals.

In 2012, I was lucky enough to visit koalas living on a small Australian island called St. Bees. Memories of my adventure still stay with me today. I was thrilled to be able to work with staff from San Diego Zoo Global Wildlife Conservancy, along with researchers from Queensland University, on a wild koala study. In early October, I flew from San Diego to Brisbane, a large city on Australia's eastern coast, and then on to Keswick Island. Our final destination was St. Bees to study the resident population of koalas.

The goal of our weeklong trip was to gather medical and behavioral information on the koalas. We weighed and measured a total of 23 koalas! We took their temperature and pulse, plus used an X-ray to get a radiograph of their hips. We also used an ultrasound machine to see images of their internal organs. After the medical checkup, we applied an ear tag and a radio collar on each koala. Information gathered from our expedition will help koalas stay healthy in Australia and here at the San Diego Zoo.

About Australia

Australia is the world's sixth largest country and close to the same size as the continental United States. It has six states and two territories. The capital is Canberra. About 22 million people live in Australia. In comparison, about 312 million people live in the United States. In Australia, 86 percent of the people live in cities. In addition to Canberra, the biggest cities are Melbourne, Sydney, Brisbane, and Perth. Australia is famous for its coral reefs, marsupial wildlife, Aboriginal art and culture, and the Outback.

The activities in this book will help you explore Australia's habitats and animals with your students. There are two activities per grade level: one at an introductory level and another at a content-application level. You can use them independently or pair them with a visit to the Zoo to see the Conrad Prebys Australian Outback exhibit. Here, you'll watch kookaburras, wallabies, and Tasmanian devils, along with seeing the largest breeding colony of koalas outside Australia.

SIZE
Adult koalas can weigh from 9 to 33 pounds (4 to 15 kilograms) with males about 50 percent heavier than females. They are about 2 to 3 feet (60 to 85 centimeters) long. A baby, called a joey, is the size of a Tic Tac® when born and must crawl up to the mother's pouch. Mammals with pouches are called marsupials.

HABITAT
Koalas live in eucalypt forests. They depend on the gum trees for food and shelter. Koalas rest or sleep in the trees and are most active between 5 p.m. and midnight. Sharp, curved claws on their forefeet help them climb up and down trees.

DIET
Koalas are vegetarians. They eat young leaves from the branches of eucalypt trees. Koalas have big jaws with powerful muscles. They also have sharp teeth to tear and chew the tough leaves.

COMMUNICATION
Mostly quiet, koalas can have a big voice. Males bellow to attract a mate. When a koala encounters another, the two may squawk, snarl, or scream. When in distress, females or young may wail.

Koala
Phascolarctos cinereus

SIZE
This crocodile is the world's largest reptile; reaching up to 20 feet (6 meters) long and around 2,600 pounds (1,200 kilograms). Females are smaller, often reaching 10 feet (3 meters).

HABITAT
Saltwater crocodiles live along the coastal regions of northern and northeastern Australia. They often swim up rivers or inhabit brackish swamps. Unique to Australia, they are seen in billabongs, pools of isolated water that form when a river changes course.

DIET
Most active at night, this crocodile hunts fish, reptiles, birds, and mammals. Its heavyset jaw has anywhere between 64 and 68 teeth. Generally, larger prey is torn into chunks that are swallowed whole.

COMMUNICATION
Crocodiles are generally solitary and quiet, but they can hiss, grunt, and growl. When hatching from their eggs, young crocodiles chirp, which signals the female to dig them out of the nest.

Saltwater Crocodile
Crocodylus porosus

SIZE
These possums are 12 to 14 inches (30 to 35 centimeters) from head to rump. Their prehensile tail is almost as long as the body. They weigh about 2 pounds (1 kilogram).

HABITAT
Native to eastern Australia, common ringtail possums live in rain forests, shrubby woodlands, eucalypt forests, and coastal shrub habitats. They are often at home in suburban gardens, too.

DIET
When foraging, ringtail possums prefer the young leaves on eucalypt trees, but will also eat flowers, fruits, and leaves from other trees and shrubs lower in the rain forest canopy. Like most possums, ringtails are nocturnal, resting during the day and searching for food at night.

COMMUNICATION
Ringtail possums are generally quiet. Occasionally, they use a soft, high-pitched twittering chirrup or a chattering alarm call and make harsh grunts when fighting. The young sometimes make a repetitive shrill chirruping call, which sounds almost birdlike.

Common Ringtail Possum

Pseudocheirus peregrinus

SIZE
Laughing kookaburras are the largest members of the kingfisher family. They are also the largest of four species of kookaburras, about 7 to 16 ounces (190 to 460 grams) and about 17 inches (43 centimeters) from head to tail.

HABITAT
The laughing kookaburra is native to the eastern part of the Australian continent. Eucalypt forests and woodlands provide homes for laughing kookaburras. Just as the song says, it's typical to see a kookaburra "on an old gum tree."

DIET
Laughing kookaburras eat small animals—both vertebrates and invertebrates—living on or near the ground. They typically eat millipedes, grasshoppers, other insects, spiders, and small reptiles. Worms, crabs, crayfish, frogs, fish, snakes, small mammals, and birds are less common prey. Sometimes a kookaburra beats its prey against its perch to stun, immobilize, or kill the animal before swallowing it whole.

COMMUNICATION
The kookaburra's famous "laugh" is a social call that's typically done by more than one bird. Each day before dawn, a group of kookaburras starts the day with a loud chorus of "laughter," and they often say goodnight the same way at dusk. Young kookaburras begin to laugh when they are about six weeks old, and by the time they reach three months, they sound like adults.

Laughing Kookaburra

Dacelo novaeguineae

SIZE
Tasmanian devils can be 23 to 26 inches (57 to 65 centimeters) long with a tail that's about 10 inches (26 centimeters) long. They weigh between 11 and 31 pounds (5 to 14 kilograms). Males are typically heavier than females.

HABITAT
Tasmanian devils live in the island state of Tasmania, which is part of Australia. They can be found in forests, woodlands, and agricultural areas that have coastal scrub and eucalypt forests.

DIET
A meat-eater with powerful jaws and sharp teeth, the Tasmanian devil searches at night for dead animals to eat. They make the most of their meals, able to crush and eat bones too. They also hunt live prey such as small mammals and birds.

COMMUNICATION
Usually solitary, Tasmanian devils sometimes come together over a carcass. While feeding, they scream and snarl, fighting for a position.

Tasmanian Devil

Sarcophilus harrisii

SIZE
Short and stocky, the southern hairy-nosed wombat stands about 15 inches (40 centimeters) tall at the shoulder. Adults weigh between 39 and 80 pounds (18 to 36 kilograms) and are 33 to 43 inches (84 to 111 centimeters) long.

HABITAT
These wombats live in dry or semi-dry grasslands and woodlands found in South Australia and the southern part of Western Australia.

DIET
An herbivore, wombats graze on perennial grasses, especially spear grass. Wombats don't travel far to eat. They forage close to their burrow openings. Their feeding habits may create a "lawn" or grazing halo around the openings of their burrows.

COMMUNICATION
Generally solitary unless raising young, the wombat communicates through scent and scratch marks in addition to vocals. They may mark territory by leaving droppings or drops of liquid from scent glands. When defending territory or under attack, individuals may make growls or even a high-pitched scream. Mother and young may keep in touch by grunting.

Southern Hairy-nosed Wombat

Lasiorhinus latifrons

SIZE
One of the larger pythons in Australia, womas usually grow to 6.5 feet (2 meters) but individuals have been seen as large as 10 feet (3 meters).

HABITAT
Womas live in dry, sandy areas around sand dunes and sand hills in central Australia. If nearby woodlands or shrublands have sandy areas, womas can survive there too. These snakes seek shelter in rock crevices and empty fallen logs, but also may dig burrows.

DIET
Womas eat reptiles such as lizards and other snakes, along with small mammals, especially young rabbits. They usually hunt at night. Unlike most pythons, the woma does not have heat-sensing pits on its face.

COMMUNICATION
This snake communicates primarily through smell and touch, although it may occasionally hiss. Womas are solitary, meeting only to mate.

Woma
Aspidites ramsayi

SIZE
A smaller relative of kangaroos, Parma wallabies are 17 to 20 inches (44 to 53 centimeters) long and weigh about 7 to 13 pounds (3.2 to 5.9 kilograms). Females are generally shorter and weigh less than males.

HABITAT
These wallabies are found in dense, shrubby understory in the high-rainfall areas of eastern Australia's New South Wales. They generally hide and rest during the day and forage at night.

DIET
Parma wallabies feed among the grasslands, grassy woodlands, heathlands, and sedge swamps bordering dense forests. They graze mostly on grasses such as tussock grass and blady grass. They also eat various herbs and fungi.

COMMUNICATION
Mostly quiet, these wallabies may make noises during courtship; males produce soft clucks while females hiss. Different postures may also communicate intent. For example, an aggressive wallaby may rush forward with its head stretched out.

Parma Wallaby
Macropus parma

SIZE
Palm cockatoos are the heaviest of all 21 species of cockatoos. As adults, they weigh between 19 and 35 ounces (550 to 1,000 grams). They can grow to be 24 inches (60 centimeters) long.

HABITAT
This cockatoo lives in the rain forests of far northern Queensland, Australia. It can also be found on the island of New Guinea.

DIET
Cockatoos gather in large, noisy flocks—which sometimes include two or three different cockatoo species—to feed on berries, seeds, nuts, and roots.

COMMUNICATION
Cockatoos are noisy. They are arguably the loudest of all the parrots and squawk loudly to communicate with one another. In addition, this cockatoo has a special talent. Palm cockatoos break off a small branch and strike it against a hollow tree. The drumming may alert others of the their territory, or it may be a bonding activity between mates. No one knows for sure.

Palm Cockatoo

Probosciger aterrimus

SIZE
Adult short-beaked echidnas are about 14 to 21 inches (35 to 53 centimeters) long, with a 3.5-inch (9-centimeter) tail and weigh 5.5 to 15 pounds (2.5 to 7 kilograms). The echidna and the platypus are monotremes, the only two egg-laying mammals.

HABITAT
Short-beaked echidnas can be found in forests, rocky areas, hilly ground, and sandy plains of mainland Australia and Tasmania. They also can live in central and southern New Guinea. They burrow for shelter or hide among rocks.

DIET
Echidnas like ants and termites. They forage in the late afternoon or at night, resting during most of the day.

COMMUNICATION
When threatened, echidnas roll up into a ball, tucking in their snout and feet, and raising their spines. Most communication is through scent; echidnas don't vocalize very often.

Short-beaked Echidna

Tachyglossus aculeatus

SIZE
Adults reach about 17 inches (45 centimeters) with a tail as long as 6 inches (15 centimeters). These creatures weigh about 4 pounds (2 kilograms). The echidna and the platypus are monotremes, the only two egg-laying mammals.

HABITAT
These unusual animals live in and around freshwater streams, lakes, and lagoons of eastern Australia. When swimming underwater, the platypus is blind and deaf; skin folds protect and cover its eyes and ears. It uses its sensitive bill to explore the river bottom.

DIET
A bottom feeder, the platypus forages during the early morning and late afternoon. It probes the gravelly river bottoms for animals like crayfish, shrimp, worms, snails, and tadpoles.

COMMUNICATION
Mostly silent and solitary, the platypus can growl. Adults usually meet once a year to mate.

Duck-billed Platypus

Ornithorhynchus anatinus

SIZE
One of the largest of all birds, the emu stands 5 feet (1.5 meters tall) and weighs between 66 and 121 pounds (30 to 55 kilograms). Emu eggs are also large, as big as 1.5 pounds (650 grams). Females lay between 5 and 15 eggs.

HABITAT
Emus live in coastal and inland areas, inhabiting grasslands, woodlands, and open areas. They avoid dry land that has an annual rainfall of less than 20 inches (51 centimeters).

DIET
These large birds eat a variety of items, from plants, seeds, and fruits to various insects. Emus spend most of the day searching for food. They may eat items from the ground or pluck leaves from trees such as the acacia. Like most birds, they also need to drink water.

COMMUNICATION
Emus have many different calls, but generally females “boom” while males “grunt.” Females and males make their calls during courtship and mating. Both sounds may also be used to defend territory or nesting sites.

Emu

Dromaius novaehollandiae

GRADE PRE-K & K
Gumdrop Koala

TEACHER RESOURCES
Visit sandiegozoo.org/teacherresources to find additional resources and a teacher's key to this curriculum.

LEARNING OUTCOME
Students recognize that a koala needs food, water, air (oxygen), and shelter to survive. *NGSS performance expectation: K-LS1-1*

INTRODUCTION
Koalas make their home in the eucalypt forests growing in eastern Australia. They eat the young leaves of various kinds of gum trees and nothing else. They rarely drink water and get most of the moisture they need from the leaves that they eat. They breathe air (oxygen). A koala may rest or sleep up to 20 hours each day, nestled into a fork in the branches of a tree for shelter.

MATERIALS
- Map of Australia
- Picture of a koala. You can find a picture on page 33
- Copy of the *Gumdrop Koala* activity sheet, one for each student
- Crayons
- Fresh eucalypt leaves. If you don't have these trees in your area, you can get a sprig at your local flower shop. As with handling any plant or flower, check with your students about allergies.

ACTIVITY
Before beginning this activity, post the map of Australia in your classroom.

Step 1: Start a class discussion by posting the picture of the koala so that all students can see it. Ask the students to identify the animal. After correctly naming it as a koala, ask the students if they know where this animal lives, what it eats and drinks, and where it might find shelter. Widen the discussion to include the survival needs of students. Where do they live, what do they eat?

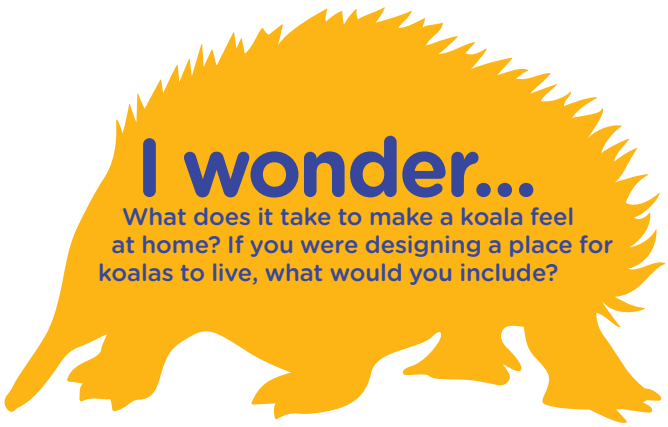
Step 2: Read the Gumdrop Koala story. Assess students' listening skills by asking, "Where does Gumdrop make his shelter?" "What does he eat?" "What does he breathe?" "Where does Gumdrop get the water he needs?"

Distribute the fresh eucalypt leaves. What do they feel like? What do they smell like? Could people eat them? (NO!)

Step 3: On the map of Australia, show students the area where koalas live, in the ecualypt forests of Queensland, New South Wales, and Victoria in eastern Australia. Tell them that koalas eat only eucalypt leaves and rarely drink water. Discuss why koalas have these survival traits. Ask the students if people could survive living like a koala does. Why not?

Step 4: Distribute the *Gumdrop Koala* activity sheets. Ask the students to identify the food items in the tree, and draw a line to those items that koalas eat.

Step 5: Ask the students to share their completed activity sheets, expressing the reasons or showing the evidence for their choice(s). Encourage a class discussion, and explore student opinions. After the discussion, post the completed activity sheets in the classroom so students can view and compare.



GRADE PRE-K & K

Gumdrop Koala activity

Instructions:
Gumdrop koala is hungry. Help Gumdrop climb the tree to find his favorite food. Draw a line to what koalas eat.

G'Day Mate! My name is Gumdrop, and I'm a koala. I make my home in the eucalypt forests of eastern Australia.

I like to rest and sleep most of the day. My bed is comfortable to me, it's a eucalypt branch! I hang on with my feet and sit in the space between the trunk and branch for shelter. I also like to eat. Not fruit, bugs, popcorn, pizza, or ice cream, but eucalypt leaves! They are close to me in the trees; I can just reach out and nibble on them. I rarely drink water, as I get most of the moisture that I need from the leaves that I eat. I breathe air, just like you.

GRADE PRE-K & K
Home Sweet Habitat

TEACHER RESOURCES
Visit sandiegozoo.org/teacherresources to find additional resources and a teacher's key to this curriculum.

LEARNING OUTCOME
Students identify where animals are able to find shelter in different Australian habitats. *NGSS performance expectation: K-ESS3-1*

INTRODUCTION
In order to survive, all animals need to find food, water, air, and shelter within their habitat. Animals need shelter to hide from predators, to rest, or to raise their young safely. Some animals find shelter in woodland trees, like koalas, kookaburras, and palm cockatoos. Some animals burrow in the grasslands, like wombats. Womas live in sandy areas near dunes and hide in rocky crevices, saltwater crocodiles find shelter in water, and wallabies live in and near forests, hiding in the shrubby understory.

MATERIALS
- Pictures of habitats: river, forest, grassland, woodland, and sandy plain. These pictures start on page 45.
- Pictures of animals: wallaby, koala, palm cockatoo, kookaburra, echidna, woma, saltwater crocodile, Tasmanian devil, and wombat. These pictures start on page 33.
- Copy of the *Home Sweet Habitat* activity sheet, one for each student

ACTIVITY
Step 1: Begin activity by reviewing what an animal needs to survive: food, water, air, and shelter. Then, ask the students to name some habitats (places) where animals live. Examples are: river, forest, desert, and grassland. Ask these probing questions, "Do all animals live in all places?" "If not, why not?" Ask the students to think about the relationship between what an animal needs to survive and the place where it lives.

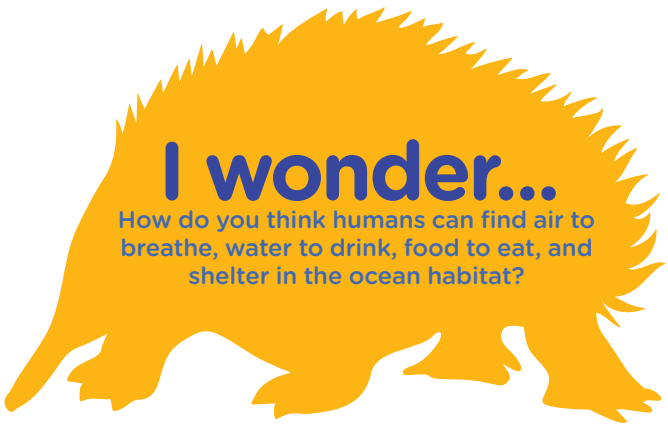
Step 2: Either in student groups or as a class, introduce the pictures of the habitats. Discuss each one, looking for places to find shelter, food, and water.

Next, introduce the animal pictures. Work together to identify the animals and the places where they might live, and give reasons why that might be.

Step 3: After discussing the possibilities, either in groups or as a class, correctly match the animal to its habitat. Answers are wallaby (forest), koala (forest), palm cockatoo (forest), kookaburra (woodland), echidna (woodland), woma (sandy plain), saltwater crocodile (river), Tasmanian devil (woodland), and wombat (grassland).

Step 4: Distribute the Home Sweet Habitat activity sheet. Ask the students to use their knowledge to match animals to habitats.

Step 5: As a class, ask the students to share their work and explain why they made their choices.



GRADE PRE-K & K

Home Sweet Habitat activity

Instructions:
Draw a line from the animal to the correct habitat.

GRADE 1
Aussie Animals

LEARNING OUTCOME
Students identify the inherited traits of reptiles, birds, and mammals. *NGSS performance expectation: 1-LS3-1*

INTRODUCTION
Australia is home to many interesting reptiles, birds, and mammals. Reptiles are cold-blooded animals covered with scales. Young reptiles are born either alive or by hatching from eggs. Reptile eggs are soft and leathery. The young are usually independent at birth. Birds are warm blooded and covered with feathers. All birds hatch from hard-shelled eggs that must be incubated to promote the growth of the embryo. All young birds require care after hatching. Mammals are warm blooded and covered with hair. Most mammals are born alive, with two exceptions; both the echidna and platypus, found in Australia, hatch from leathery eggs. The young of all mammals receive parental care before they become independent. Mammal mothers provide milk to nourish their babies.

MATERIALS
- Map of the world
- Map of Australia
- Whiteboard or large writing surface
- Pictures of a koala, kookaburra, wombat, wallaby, palm cockatoo, Tasmanian devil, saltwater crocodile, and woma. You can find these pictures starting on page 33
- Copy of *Aussie Animals* activity sheet, one for each student
- Crayons or colored pencils.

ACTIVITY
Before beginning this activity, write the headings "reptile," "bird," and "mammal" on a whiteboard or large writing surface. Attach a picture of a woma under the reptile heading, a picture of a kookaburra under the bird heading, and a picture of a koala under the mammal heading.

Step 1: Begin the activity by identifying the types of animals on the board. Point to the woma and ask, "What are reptiles covered with?" (Scales.) Point to the kookaburra and ask, "What are birds covered with?"(Feathers.) Point to the koala and ask, "What are mammals covered with?" (Hair.)

Invite students to name other reptiles, birds, and mammals. Ask them, "What are the common traits of each animal?" "Why are we able to identify them as a reptile, bird, or mammal?" Create a list of the student suggestions by spelling the names of, or drawing pictures of, the animals under each correct heading. Students might suggest animals, such as a spider or a crab, that don't fit into these categories. If this happens, list these to the side of the three headings.

Step 2: Using the animals listed on the board, ask the students to analyze and find patterns to suggestions. Use the following questions to guide the conversation: How are reptiles and birds the same, how are they different; how are reptiles and mammals the same, how are they different; how are birds and mammals the same, how are they different; how are you like reptiles, how are you different; how are you like birds, how are you different; and how are you like mammals, how are you different.

Step 3: Next, show students a map of the world, and ask a volunteer to find Australia. When located on the world map, switch to the continent map of Australia. Explain to the students that they are going to learn about some of the reptiles, birds, and mammals that live in Australia.

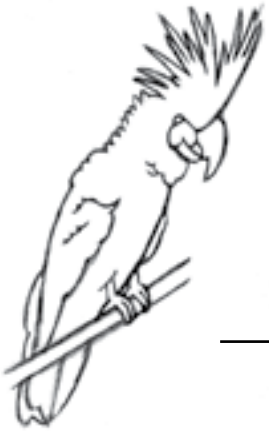
Step 4: Show the pictures of the Australian animals—koala, kookaburra, wombat, wallaby, palm cockatoo, Tasmanian devil, saltwater crocodile, and woma—to the students one at a time. With each picture, ask the students if the animal is a reptile, bird, or mammal; then ask why they think it is so. Post the pictures under the correct heading on the board. Also ask students, "If these animals had babies, would the babies go under the same category too?"

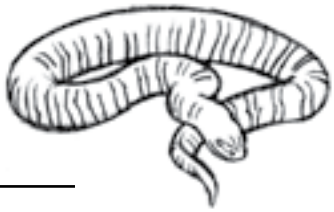
Step 5: Distribute the *Aussie Animals* activity sheets. Have the students follow your directions to color the animals. Ask the students to share their work with the class.

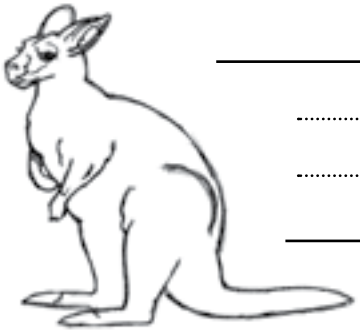
TEACHER RESOURCES
Visit sandiegozoo.org/teacherresources to find additional resources and a teacher's key to this curriculum.

GRADE 1
Aussie Animals ▶ activity

Instructions:
Color the reptiles red, the birds blue, and the mammals yellow. On the line beside each picture, write why you made this choice.







GRADE 1
Hello World!

TEACHER RESOURCES
Visit sandiegozoo.org/teacherresources to find additional resources and a teacher's key to this curriculum.

LEARNING OUTCOME
Students recognize a pattern in birthing strategies for a variety of Australian animals.
NGSS performance expectation: 1-LS3-1

INTRODUCTION
Birthing strategies can be used to determine a pattern between different animals, and how young resemble their parents. Birds always hatch from eggs. Some reptiles hatch from eggs and some hatch from eggs inside the female's body and then appear to be born alive. Once young are born, reptiles are usually on their own. Most mammals are born alive, with the exception of the echidna and the platypus that hatch from leathery eggs. Egg-laying mammals are in a group called monotremes. Australia is also home to marsupials—mammals (such as the koalas) that are raised in a pouch. One characteristic that makes mammal babies (especially humans) different from all other animals is that they require a lot of parental care as they grow and change.

MATERIALS
- Pictures of a koala, kookaburra, wombat, wallaby, palm cockatoo, Tasmanian devil, saltwater crocodile, and woma. You can find these pictures starting on page 33
- Copy of *Hello World!* activity sheet, one for each student
- Colored pencils or crayons
- Whiteboard or large writing surface.

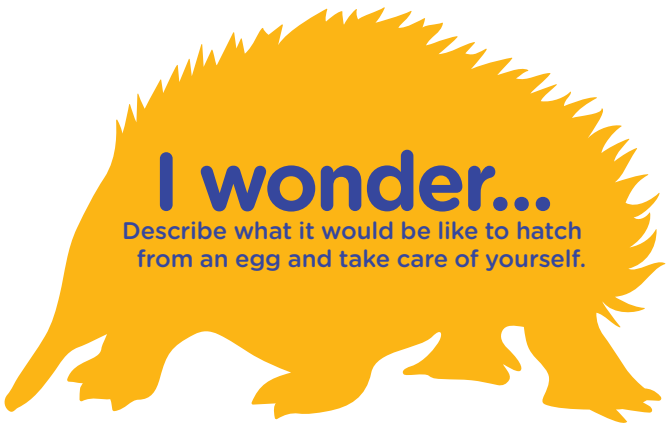
ACTIVITY
Step 1: To begin activity, ask the students to think about how animals are born. Use these questions as prompts if needed: How are birds born? How are reptiles born? How are mammals born? How were you born?

Step 2: On a whiteboard or writing surface, write the headings: "hatch from egg" and "live birth." Have students name some animals that hatch from eggs and some animals that are born alive. Where do people belong? Write student suggestions or draw simple pictures under each category. Ask the students to look at the list again to identify the birds, the reptiles, and the mammals. Which column has the most of each kind? Can they see a pattern?

Step 3: Tell students they will be shown pictures of animals that they may not know. Then, show each picture of the Australian animals and have students decide if they hatch from eggs, or if they are born alive. Post the pictures under the headings. Show the echidna last. If students guess that echidnas are born alive, explain that while most mammals are born alive, there are two species of mammals that hatch from eggs—the echidna and the platypus. Both of these animals live in Australia.

Step 4: Distribute the *Hello World!* activity sheets and colored pencils or crayons to each student. Ask the students to match the young to its parent and note with an "E" which animals hatched from eggs.

Step 5: After students complete the sheet, invite them to share their work and give reasons for their selections.



GRADE 1
Hello World! activity

Instructions:
Match each young animal on the outside to its parent on the inside.
Put an "E" next to those animals that hatched from eggs.

GRADE 2

Compare, Contrast, and Classify

TEACHER RESOURCES
Visit sandiegozoo.org/teacherresources to find additional resources and a teacher's key to this curriculum.

LEARNING OUTCOME

To explore animal diversity, students compare and contrast 12 Australian animals. *NGSS performance expectation: 2-LS4-1*

INTRODUCTION

Scientists who study animals often look for a unique or special characteristic that sets one animal apart from another. They may sort animals with feathers, fur, or scales into different groups. They may sort animals by what they eat—carnivore, herbivore, omnivore. Some animals may be sorted by the way they move—walk, swim, climb, or fly. Scientists may also sort animals by location—desert, ocean, forest, grasslands, or lake. There are many ways to look at animals and explore animal diversity.

MATERIALS

- One copy of the Australian animal cards (pages 20 and 21) for each student pair. Cut cards apart, and collate into sets; keep one set for yourself.
- Pencils or pens
- Pictures of a koala, kookaburra, and woma. You can find these pictures starting on page 33.

ACTIVITY

Step 1: To begin this activity, lead the students in a review of the characteristics of birds (feathers, wings), reptiles (scales, cold-blooded), and mammals (hair, live birth, nurse young). Ask the students if they can give an example of each. Show the photos of the koala, kookaburra, and woma. Ask the students to name the characteristics of each.

Step 2: Next, divide students into pairs and distribute a set of Australian animal cards. Ask the students to identify and write the name of the animal on each card. Tell each student pair to sort their cards into bird, reptile, or mammal categories.

Step 3: As a class, review the cards and the categories. Discuss the characteristic(s) of each animal that led to placing it into a category. Ask the students to record how many cards are in each category.

Step 4: Ask the students to sort their cards by the way the animal moves. Does it hop, fly, swim, climb, dig, walk, or slither? Ask the students to share their process criteria for sorting, and record the number of cards in each category. Repeat again for two more categories: by habitat and by a characteristic of choice determined by the students. Record the number of cards in each category.

Step 5: As a class, review the students' results. Discuss similarities and differences between sorting methods and the results. Can students identify any patterns? If so, what are they?

koala

kookaburra

Tasmanian devil

woma

wallaby

wombat

saltwater crocodile

palm cockatoo

ringtail possum

echidna

duck-billed platypus

emu

GRADE 2
Australian Animal Diversity

TEACHER RESOURCES
Visit sandiegozoo.org/teacherresources to find additional resources and a teacher's key to this curriculum.

LEARNING OUTCOME
Students learn that many different animals survive in the varied habitats found in Australia.
NGSS performance standard: 2-LS4-1

INTRODUCTION
The Australian continent, the smallest of the seven continents, is home to more than 5,000 different animal species, most (80 percent) living nowhere else on Earth. Each animal has its own strategy for survival, relying on physical characteristics and learned or instinctual behavior to gather food and water, to find a mate, and seek shelter. Unique to Australia is the number of marsupials, mammals that don't have a placenta; they carry their developing young in an external pouch.

MATERIALS
- Map of Australia
- Pictures of a koala, kookaburra, palm cockatoo, echidna, saltwater crocodile, wallaby, wombat, woma, ringtail possum, and Tasmanian devil. You can find these pictures starting on page 33
- Copy of *Animal Profiles*, pages 5 to 10
- Copy of *Australian Animal Diversity* activity, one for each student
- Pencils, crayons, colored pencils, or pens
- Journal book or blank paper.

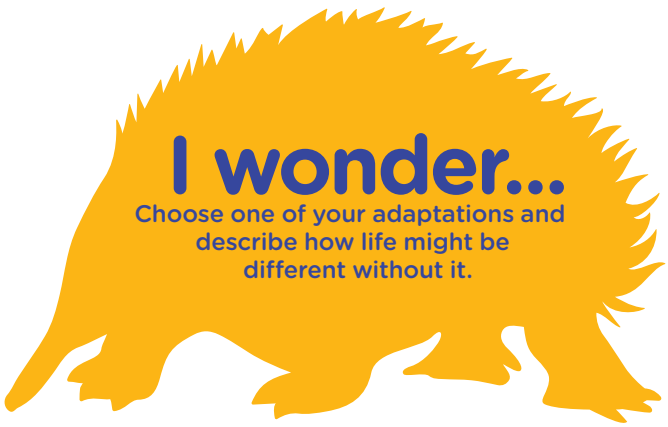
ACTIVITY
Step 1: Post the map of Australia in the classroom so all the students can see it. Draw the students' attention to the map, and ask if anyone knows what it is. After identifying the map as Australia, ask the students if they can name some animals that live there. Where might each animal live? (Forest, grassland, sand dunes, river, or woodland.)

Step 2: Divide students into working groups, and distribute animal pictures. Ask the students if they can guess where these animals live, and how they survive. Use these questions as prompts, if needed: "How do they eat and find water?" "Where do the animals find shelter?" "Do any of them live together?" Have the groups record their answers in a journal, or on a blank piece of paper.

Step 3: After students have recorded their answers, distribute the *Animal Profile* cards. Ask the students to read each card, check their guesses, and make corrections if necessary.

Step 4: Distribute the *Australian Animal Diversity* activity sheet, one to each student. Follow the directions on the activity sheet. Student groups may work together, but each student must create a unique animal.

Step 5: When finished, ask the students to share their work with the class, explaining their animal and their creative process. After every student has shared, examine the unique animals for any shared characteristics.



GRADE 2

Australian Animal Diversity activity

My animal is .....

Draw your animal in this box

Tell where and how your animal lives in Australia.

.....

.....

.....

.....

GRADE 3
Life Cycle Match-Up

TEACHER RESOURCES
Visit sandiegozoo.org/teacherresources to find additional resources and a teacher's key to this curriculum.

LEARNING OUTCOME
Students examine the traits inherited from parents by chronologically sequencing the growth stages of a plant, bird, reptile, and marsupial mammal. *NGSS performance standard: 3-LS3-1*

INTRODUCTION
Newborn animals inherit traits from their parents. When first born or hatched, some animals look just like their parents. This pattern of development is known as precocial; that is, already prepared to live alone. Other animals don't look like their parents at all, and need many months or years of growth. This pattern is known as altricial. Studying the stages of an animal's birth and growth helps scientists determine the best way to help animals that are in danger of extinction.

MATERIALS
- Pictures of a koala, kookaburra, saltwater crocodile, and eucalypt tree. You can find these pictures starting on page 33
- Single-sided copies of the animal cards on page 25 and 26, one for each student pair
- One sheet of construction paper for each student pair
- Glue or glue sticks
- Scissors.

ACTIVITY
To prepare for this activity, ask the students to bring in pictures of themselves when they were between one and five years old. Post pictures on a bulletin board or wall in the classroom without naming the student in the picture.

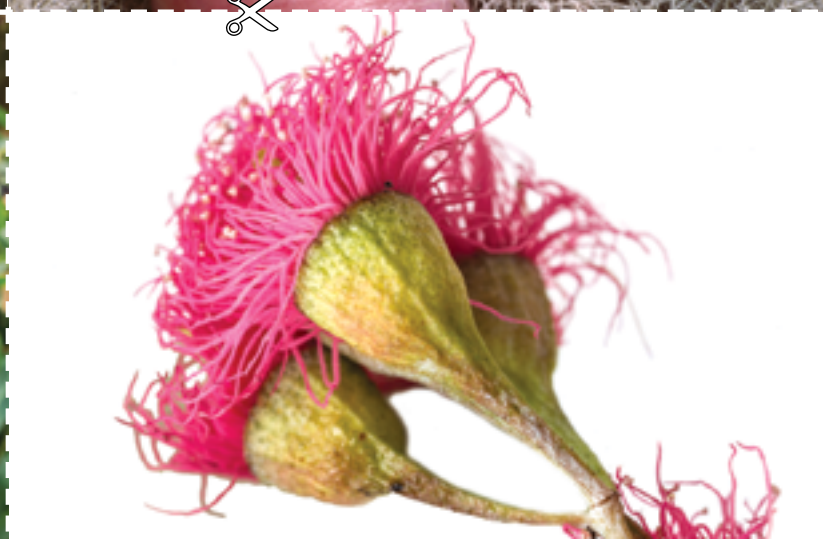
Step 1: To begin, ask the students if they were able to match any of the pictures to their classmates. Were some pictures easier to match than others? Why is this? What characteristics did the students look for? Discuss how some students have changed a lot since they were younger, and now are more difficult to match.

Step 2: Create student pairs, and distribute the scissors and copies of the animal cards. Tell students to cut the cards apart and arrange the pictures in order, from birth to adult.

Step 3: Review the results as a class. Did all students get the same answers? Why or why not? Ask the students to explain their selection criteria. What were they looking for?

Step 4: After students have made modifications so that all of the life sequences are correct, distribute the construction paper and glue or glue sticks. Tell students to glue their sequences to the front and back of the construction paper, adding their observations and reasoning.

Step 5: Ask student pairs to share their results. Can students create a life sequence for a new animal of their choice?



GRADE 3
Neat Feet

TEACHER RESOURCES
Visit sandiegozoo.org/teacherresources to find additional resources and a teacher's key to this curriculum.

LEARNING OUTCOME
Students match different animal feet to their functions. *NGSS performance expectation: 3-LS4-3*

INTRODUCTION
To find food, animals may dig, paddle, crawl, fly, or do other behaviors to catch prey or gather edible plants. Depending on the different environments that the animal inhabits, its feet may have webbed toes for swimming, claws for scratching or burrowing, talons for grabbing, or soft pads for sticking to surfaces. Looking at an animal's feet can tell you about its lifestyle and where it lives. Some animals are able to thrive in some habitats, while other animals don't survive at all.

MATERIALS
- Pictures of a koala, wallaby, kookaburra, wombat, and crocodile. You can find these pictures starting on page 33
- Copy of *Neat Feet* activity sheet, one for each student
- Pencils with erasers.

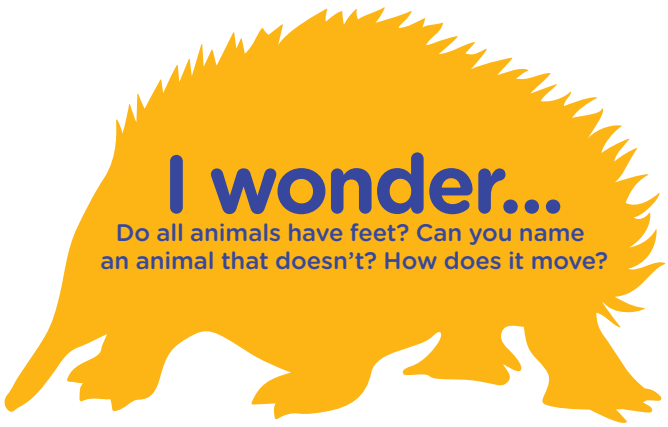
ACTIVITY
Step 1: Ask the students to think about their feet. How do we use our feet? What can we do? What about an animal's feet? Ask the students to describe an animal and its feet. How do these different feet help the animal thrive in its home?

Step 2: Distribute the *Neat Feet* activity sheet. Tell students that these are the footprints of animals that live in Australia. Challenge the students to identify each foot in the middle to an animal's name in the left column and an action in the right column.

Step 3: When the students have completed the matching, show pictures of the koala, wallaby, kookaburra, wombat, and crocodile. With each, discuss what kind of feet it has, and how it uses its feet.

Step 4: After this discussion, ask the students to work in groups to correct any matches that are not correct. Encourage discussions as to why students are making a change.

Step 5: When the revisions are completed and students are ready, double check answers as a class. Review each animal, encouraging the students to roleplay the action that the animal's feet perform. Can human feet do just as well?



GRADE 3

Neat Feet activity

Instructions:
Match the animal name to the foot. Match the foot to the action word.

wombat		climb
wallaby		dig
kookaburra		swim
crocodile		hop
koala		grab
human		walk

Resources

To learn more about the Australian Outback exhibit at the San Diego Zoo
sandiegozoo.org/koalafornia

To watch koalas live on "Koala Cam"
sandiegozoo.org/koalafornia/koalacam.html

To learn more about koalas and other animals at the San Diego Zoo
animals.sandiegozoo.org
ielc.libguides.com/sdzg/factsheets/index/

To have fun exploring the San Diego Zoo Kids website
kids.sandiegozoo.org

To learn more about the San Diego Zoo Safari Park
sdzsafaripark.org

To learn more about research and conservation
sandiegozooglobal.org

To download the *Wildlife Learning Adventures* teacher brochure
zoo.sandiegozoo.org/content/overview

Current conservation efforts in Australia
koalaland.com.au

Connections to the Next Generation Science Standards

The materials and activities presented in this guide are just one step toward reaching the standards and performance expectations listed below.

STANDARDS

- LS1: From Molecules to Organisms: Structures and Processes
- LS2: Ecosystems: Interactions, Energy, and Dynamics
- LS3: Heredity: Inheritance and Variation of Traits
- LS4: Biological Evolution: Unity and Diversity
- ESS3: Earth and Human Activity

PERFORMANCE EXPECTATIONS

Continued on next page

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Kindergarten: *K-LS1-1: Use observations to describe patterns of what plants and animals (including humans) need to survive.*

Dimension	*Name or NGSS Citation*	*Student task(s) in activity*
Science and Engineering Practices	Analyzing and Interpreting Data	Students identify and select survival items for a koala.
Disciplinary Core Ideas	LS1.C Organization for Matter and Energy Flow in Organisms	Students recognize that koalas eat only eucaplyt leaves.
Cross-cutting Concepts	Patterns	Students discuss the similar needs (food, water, shelter) between koalas and themselves.

Kindergarten: *K-ESS3-1 performance expectation: Use a model to represent the relationship between the needs of different plants or animals (including humans) and the places they live.*

Dimension	*Name or NGSS Citation*	*Student task(s) in activity*
Science and Engineering Practices	Developing and Using Models	Students create diagrams of relationships between animals and the places where they live.
Disciplinary Core Ideas	ESS3.A Natural Resources	Students identify an animal's food, shelter, and source of water in various habitats.
Cross-cutting Concepts	Systems and System Models	Students recognize that animals, plants, and the environment have parts that work together.

Grade 1: *1-LS3-1 performance expectation: Make observations to construct an evidence-based account that young plants and animals are alike, but not exactly alike, their parents.*

Dimension	*Name or NGSS Citation*	*Student task(s) in activity*
Science and Engineering Practices	Constructing Explanations and Designing Solutions	Students examine and analyze the common traits of three groups of animals.
Disciplinary Core Ideas	LS3.A Inheritance of Traits	Students recognize young inherit traits from parents by matching common animals together.
Cross-cutting Concepts	Patterns	Students identify repeating patterns and similar characteristics among the groups of animals.

Grade 2: *2-LS4-1 performance expectation: Make observations of plants and animals to compare the diversity of life in different habitats.*

Dimension	*Name or NGSS Citation*	*Student task(s) in activity*
Science and Engineering Practices	Planning and Carrying Out Investigations	Students compare and analyze the variety of animals in Australia.
Disciplinary Core Ideas	LS4.D Biodiversity and Humans	Students identify the needs of animals as a criteria for diversity.
Cross-cutting Concepts	None	None

Grade 3: *3-LS4-3 performance expectation: Construct an argument with evidence that in a particular habitat some organisms can survive well, some survive less well, and some cannot survive at all.*

Dimension	*Name or NGSS Citation*	*Student task(s) in activity*
Science and Engineering Practices	Analyzing and Interpreting Data	Students examine the feet of various animals to infer their lifestyle and habitat.
Disciplinary Core Ideas	LS4.C Adaptation	Students realize that animal body parts and behavior help them live in their environment.
Cross-cutting Concepts	Cause and Effect	Students describe how animals use their body and behaviors to gather what they need to survive.

Grade 3: *3-LS3-1 performance expectation: Analyze and interpret data to provide evidence that plants and animals have traits inherited from parents and that variations of these traits exist in a group of similar organisms.*

Dimension	*Name or NGSS Citation*	*Student task(s) in activity*
Science and Engineering Practices	Analyzing and Interpreting Data	Students examine images of adult and young animals, recognizing similar traits between related species.
Disciplinary Core Ideas	LS3.A Inheritance of Traits	Students construct the life sequences of four animals, using the inheritance of similar traits as criteria.
Cross-cutting Concepts	Patterns	Students identify repeating patterns and similar characteristics among the groups of animals.

Glossary

aboriginal. People, animals, or plants native to Australia.

adaptation. A characteristic of a living thing that helps it survive in its environment.

altricial. Helpless at birth, requiring a great amount of parental care.

arboreal. Describing an animal that lives in trees.

Australia. A country and continent in the southern hemisphere, in the southwestern pacific ocean.

billabong. Pool of isolated water that forms when a river changes course.

carnivore. An animal that eats other animals.

characteristic. A typical quality or feature.

endangered species. A plant or animal that is seriously at risk of becoming extinct.

environment. The natural world of the land, sea, and air.

eucalypt. (Yoo-kuh-lipt) any of the several trees in the genera eucalyptus, corymbia, and angophora, also called gum trees.

habitat. The place and natural conditions in which a plant or animal lives.

herbivore. An animal that eats only plants.

joey. A baby marsupial.

life cycle. The development stages a living thing goes through from birth to death—birth, sprouting, or hatching; growing and changing; adulthood; and reproducing.

mammal. Warm-blooded, vertebrate animals that have hair or fur on their bodies and feed milk to their young.

marsupial. Several orders of mammals characterized by the presence of marsupial bones. In most species, females carry newborn offspring in a pouch (such as the koala).

monotreme. An order of mammals that includes the echidna and platypus, which hatch from eggs.

nocturnal. Most active at night.

omnivore. An animal that feeds on plants and animals.

precocial. Prepared for life immediately upon hatching or being born, but usually still requiring at least some parental care.

oviparous. Reproduction by producing eggs that hatch outside the female's body. Young are nourished by yolk sacs.

ovoviviparous. Reproduction by producing eggs that hatch inside the female's body. After hatching, young are born alive. Young are nourished by yolk sacs, not through a placenta.

pouch. Folds of skin or a pocket-like opening on the underbelly of female marsupials that covers the teats, where young are raised and nurtured.

predator. An animal that hunts other animals for food.

prey. An animal that is hunted by another animal for food.

viviparous. Reproduction by giving live birth. Embyros are nourished by a connection to the female's placenta.