

WILD at Schools: Turtle Troubles*

By: Clare Walker, Wildlife and Heritage Service
Maryland Department of Natural Resources

*Loosely based on *Home is Where the Forest Is* from the [Flying WILD](#) curriculum

Target Audience: 3rd – 5th Grade

Time: 1 hour

Location: Classroom

Pre-material:

Students can explore the world of reptiles at:

<https://kids.nationalgeographic.com/animals/hubs/reptiles/>

Classroom resources and videos about sea turtles can be found at:

<https://www.seeturtles.org/classroom-resources/>

A worksheet to understand the threats to hatchlings: “The lifecycle of the sea turtle and hatchling maze” from Zander Srodes “Turtle Talks” Activity Book.

Background information on sea turtles and activities:

http://www.widecast.org/Resources/Docs/EDUCATORS_Turtle_Talks_ENG.pdf

Books:

- [The Life Cycle of a Sea Turtle](#) by Bobbie Kalman. Crabtree Pub. Co. (September 1, 1997).
- [Look Out for Turtles!](#) (Let's-Read-and-Find-Out Science 2) by Melvin Berger. HarperCollins (June 21, 2000).

Background Information

Reptiles are a group of vertebrate animals that are **ectothermic** (cold-blooded), have scaly skin and breathe using lungs. Most reptiles also lay leathery eggs and, with the exception of snakes, have claws. A few reptiles, such as alligators, guard their nests, while most simply lay their eggs and move on. Since their skin is covered in scales, all reptiles must periodically shed their skin as they grow. Reptiles can be carnivores, omnivores or herbivores. The oldest living group of reptiles are the turtles or Testudines.

Turtles are differentiated from other groups of reptiles by their shell and presence of a beak rather than teeth. The upper shell of a turtle is called the **carapace**, while the lower is called the **plastron**. The two are joined by bony structures called bridges. The inner layer of a turtle's shell is made up of about 60 bones including portions of the backbone and the ribs, so turtles cannot crawl out of their shells. In most turtles, the outer layer of the shell is covered by horny scales called scutes made up of fibrous keratin (that also makes up the scales of other reptiles). The term “terrapins” is sometimes used for turtles that are semi-aquatic and live near **brackish** waters or in swampy regions, such as the diamondback terrapin.

The bog turtle is the smallest turtle found in the United States. The largest bog turtle ever found measured only 4.5 inches. Bog turtles are identified by the patches of orange found along the side of

their heads. The bog turtle is one of the rarest turtles found in the United States. The current bog turtle population is unknown but estimates range from 2,500 to 10,000, a third of which are thought to live in the north-east counties of Maryland. Bog turtles are currently listed as critically endangered meaning they are considered at an extremely high risk of becoming extinct in the wild.

Bog turtles live in saturated, usually spring-fed wetlands such as bogs, fens and wet meadows preferring relatively open wetlands with slowly flowing streams or surface seeps. These wetlands are usually dominated by clumps of grasses and sedges, and have soft muddy bottoms where turtles hibernate. Bog turtle numbers have dramatically declined since 1980. The decline has been linked to the loss and degradation wetlands due to drainage, development and **invasive plant** species. Increased fragmentation of their habitat has made bog turtles more vulnerable to predation from raccoons, foxes and dogs. Development and roads also makes travel for male turtles seeking mates extremely hazardous and limit the possibility of migration to new habitat.

As more of their remaining habitat has become protected, the greatest threat to bog turtles is now illegal collection for the pet industry. Laws banning the collection of the turtles for sale have done little to stop the practice with bog turtles being a prized species in many animal black markets.

Female bog turtles build their nests and lay their clutch of 1-6 eggs in late spring and early summer. The turtle chooses a sunny spot for **incubation** and then leaves the eggs. Incubation takes 45-65 days until baby turtles less than 1-inch-long **hatch**. Bog turtles reproduce at around 5-7 years and may live for 30-40 years.

Sea turtles are marine reptiles and after hatching males will spend their entire lives at sea, coming to the surface to breathe and bask. Females however, must come to shore to lay their eggs, as they cannot be laid in the water and usually **instinctively** return to the beach on which they were born. Unlike many land turtles, sea turtles cannot hide in their shell and they have **flippers** instead of feet. All seven species of sea turtle are listed under the endangered species act and protected worldwide

The leatherback is the largest sea turtle and can reach up to 6.5 feet in length and weigh over 1,000 pounds (the largest ever recorded was nearly 9ft and over 2000 lb.). As its name suggests, the leatherback does not have a hard shell but rather a mosaic of small bones covered by firm, rubbery skin with seven longitudinal ridges. This adaptation allows the leatherback to dive to great depths to hunt for their jellyfish prey and helps insulate them in cold water. Leatherbacks are the most widely spread marine turtles and are found in the Pacific, Indian and Atlantic oceans. Leatherbacks can be seen off the coast of Maryland (and occasionally within the Chesapeake Bay) from April until October. Most of these leatherbacks nest in the Caribbean, the north coast of South America and a few areas of southern Florida and travel north to hunt jellyfish. They will swim as far north as Nova Scotia before returning to warmer waters in winter, a round trip of up to 6000 miles. They fuel these journeys by eating up to 75% of their weight in jellyfish every day. They seem to preferentially hunt lion's mane jellyfish, the world's largest, and can eat over 600 per day.

Many of the threats that leatherback turtles face impact their nesting locations, eggs and **hatchlings**. In the Caribbean (and many other areas), eggs are dug up by people for food. Both natural (birds, raccoons, foxes) and invasive (dogs, cats, rats) predator numbers tend to be higher in nesting areas

because of beach development and resulting trash. Many of the sandy beaches that leatherback turtles use for nests are popular tourist destinations resulting in beach disturbance and artificial light from houses and hotels that can both discourage females from nesting and disorientate hatchlings (turtles instinctively head towards lights as the ocean would normally be lighter at night than the land).

In the ocean the largest threat to sea turtles is now plastic pollution. In 2015 it was estimated that 50% of the world’s turtles have ingested plastic. Plastic items can ensnare, block mouths and choke turtles. If ingested, their digestive tracts can become blocked leading to starvation and death. Plastic bags and balloons which look similar to jellyfish when floating in the ocean are particularly dangerous to leatherbacks. Plastic line and materials with holes can trap or tangle turtles. Other man-made dangers include chemical pollution and oil spills, fishing nets, discarded fishing lines, hooks and ropes and boat collisions.

In this program, students will learn about both bog turtles and leatherback turtles to allow them to compare their similarities and differences. They will then explore some of the threats to these two species and write down an action which they can take to help protect turtles.

Learning Objectives

As a result of this program, students will be able to:

- Compare and contrast marine and freshwater turtles, their habitats and lifecycles.
- Describe some of the threats turtles face and personal actions which they can take to help turtles.

Curriculum Standards and Science & Engineering Practices Addressed

Grade	Standard	Detail	Program Feature
3 rd	3-LS1-1 3-LS4-4	Develop models to describe that organisms have unique and diverse life cycles but all have in common birth, growth, reproduction, and death. Make a claim about the merits of a solution to a problem caused when the environment changes and the types of plants and animals that live there may change.	Students compare and contrast the lifecycle of a freshwater and marine turtle. Students examine the problems that are causing turtle numbers to decline and suggest solutions to the problems
4 th	4-LS1-1	Construct an argument with evidence that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction.	Students learn about the internal and external structures of turtles that help them survive and reproduce.
5 th	5-ESS3-1	Obtain and combine information about ways individual communities use science ideas to protect the Earth’s resources and environment.	Students explore the threats facing turtles and ways that scientists, communities and individuals can help protect different turtle species.
Engineering and Science Practices		Use a model that represents a concrete event	Model the impacts of human development on turtle populations.

Vocabulary

Bask: to lie exposed to warmth and light, typically from the sun.

Brackish: slightly salty water such as the mixture of river water and seawater in estuaries.

Carapace: the hard upper shell of a turtle.

Ectothermic: an organism that regulates its body temperature largely by exchanging heat with its surroundings, also known as cold-blooded.

Flippers: a broad flat limb without fingers, used for swimming by various animals including sea turtles.

Habitat: the natural home of a living organism considered to have four elements: food, water, shelter and space.

Hatch/ Hatchling: emerge from its egg / a young animal that has recently emerged from its egg.

Incubate: keep eggs at a suitable temperature so that they develop. With turtles this is achieved by the location of the nest.

Instinct: an innate, typically fixed pattern of behavior in animals in response to certain stimuli.

Invasive plant: An invasive species is a plant, fungus, or animal species that is not native to a specific location, and that has a tendency to spread to a degree that it causes damage to the environment, human economy or human health.

Plastron: the underside of a turtle's shell.

Predator: an animal that naturally preys on others.

Reptile: a vertebrate animal including snakes, lizards, crocodiles, turtles that are distinguished by having a dry scaly skin and typically laying soft-shelled eggs on land.

Scutes: the scales that cover a turtle shell.

Equipment / Materials

- Examples of things to use instead of plastic: paper and metal straw, bag, ideas to use instead of balloons and bag of plastic trash
- [Habitat tiles](#), [hazard tiles](#), [habitat threats](#) and 35 small turtles or tokens (downloads)
- Leatherback hand puppet
- Model bog turtle egg, hatchling and outline of adult ([download outline](#))
- Model leatherback egg, hatchling and outline of adult ([download outline](#))
- Paper turtle shapes for student pledges and 'habitat poster' (at end of lesson)
- Picture pack of turtles ([download](#))
- Pillowcase with leatherback turtle threats: grocery bag, deflated balloon with string, 6 pack ring, plastic straw
- Small plastic tank
- Soda bottle trash jellyfish with balloon
- Turtle activities follow-up sheet and assessment sheets ([download](#))
- Venn diagram and turtle facts (at end of lesson)

Before starting program identify an area large enough to lay out the bog turtle habitat map, in the classroom or a hallway outside.

INTRODUCTION: 5 minutes

1. Ask students which animal group turtles belong in. Ask students if they can name any reptiles – a helpful way to remember the main types of reptiles is spelling out **LAST** – lizards / alligators (and crocodiles) / snakes / turtles (if students suggest frog or other amphibians, explain that reptiles have dry, scaly skin and hatch looking like miniature adults while amphibians have moist skin and juveniles often look very different to adults such as tadpoles and frogs, they usually undergo metamorphosis).
2. Explain that turtles are the oldest group of all the reptiles and have been on the planet for at least 220 million years surviving dinosaurs, meteor impact and rise of mammals. Unfortunately, most turtle species are declining so we are going to look at why and how we can help ensure they continue to survive.
3. Ask students what makes an animal a turtle. It is their shell. Explain that their shell includes their backbone (so turtles can never crawl out of their shells) and their ribs (show box turtle shell). We can often guess where a turtle lives by the shape of its shell and legs (show 3 pictures). Sea turtles have streamlined shells and flippers for swimming fast. Turtles that live on land, often known as tortoises have rounded shells and strong stubby legs (these can look a bit like miniature elephant legs), while turtles that live in freshwater ponds and rivers are usually a mix of the characteristics of the other two, legs not flippers but streamlined shells.
4. Tell students that during this program, we are going to look at 2 different turtles that are present in Maryland so we can compare a land turtle with a sea turtle. Both of the turtles are endangered, which means at risk of going extinct. We are going to look at some of the reasons why. Introduce the bog and leatherback turtles.

COMPARISON OF BOG AND LEATHERBACK TURTLES: 10 minutes

5. Tell students that they are going to work in groups to compare leatherback and bog turtles. Each group will have a set of cards with facts on them and a Venn diagram. They have to decide as a group where each fact belongs on the diagram. Either the facts apply only to bog turtles (green area representing the grassy areas where they live) or only to leatherback turtles (blue area representing the ocean) or apply to both which means the facts should be put in the overlap area.
6. Hand out the labelled Venn diagrams and fact cards and give the students a few minutes to decide where the facts should go. If they don't know, encourage students to guess.
7. Ask students which facts they put in the overlap area. Are there facts that should be moved? The facts that apply to all turtles are:
 - Breathe air with lungs
 - Lay eggs in a nest on land
 - Cold-blooded (explain that this means that they bask in the sun to raise their temperature)
 - Baby turtles take care of themselves

8. Ask a group which facts they put in the bog turtle circle. They should be:
 - Smallest turtle in North)
 - Live in wetlands and marshy areas
 - Hibernate in the winter (5th grade only). Explain that bog turtles hibernate in the mud from October to April
 - Eat plants, worms and insects
 - Travels a few feet each day (demonstrate with a two steps)
 - Lay out 3 eggs
 - Have this group hold replica egg, hatchling and outline of adult.
9. Ask a group which facts they put in the circle for leatherback turtles. Do other groups agree or disagree? The leatherback facts should be:
 - Largest turtle in the world
 - Eat jellyfish. Leatherbacks eat up to 6-700 a day
 - Live in salt water
 - Travels 1000s of miles every year
 - Lay up to 100 eggs. Females lay their eggs on sandy beaches in the Caribbean and southern Florida and cover with sand. The eggs incubate about 2 months then the baby turtles hatch, dig their way out of the sand and 'run' to the ocean as fast as they can. Ask students why. Males will spend the rest of their lives at sea, females return only to lay their eggs.
 - Have this group hold the outline of adult leatherback and hatchling.
10. Collect the fact cards and diagrams from students.

THREATS TO BOG TURTLES: 20 Minutes

11. Explain to students that we are going to look at some of the different problems that bog turtles face so we can understand why bog turtles are now endangered and at risk of extinction.
12. Place wetland habitat map on floor with turtle 'resting' zones around it.
13. Hand out numbered turtles to students and tell them that they can place their turtle on the wetland habitat map. Explain that bog turtles like to live close to wet, boggy areas so they should choose a spot where they think the turtle will be happy (indicated by the green shaded areas with grass symbol). Bog turtles can also live close together as they don't need much space.
14. Tell students that the habitat represents the number of bog turtles that used to live in Maryland 30-40 years ago. Unfortunately, the population has declined, and we are going to investigate why they are now endangered.
15. Select 2 volunteers. Have one student read the 'Meadow Brook Homes' scenario, and have the other volunteer help choose 4 of the habitat sections to cover with the housing development. Any turtles in these areas die and should be removed from the habitat and placed in the turtle 'resting' zone.
16. Ask for a second pair of volunteers to read the 'Fast Cars' scenario, add the 2 road sections and remove any turtles in those sections.

17. Ask students what they can do to help a turtle cross the road. Explain that if it is safe, they can stop and carry the turtle across the way it was going (don't turn the turtle around even if it is headed towards a bad habitat area as the turtle will just try to cross the road again when you have left.) Also, remind students to leave turtles where they find them. If you move a turtle it will try to find its way home and wander in circles crossing more roads in the process.
18. Select a third set of volunteers. Have one read the 'Trash Attracts' scenario. Explain that bog turtles are so small that their eggs, baby turtles and even the adults can be eaten by predators. Have the other volunteer remove turtles in two sections adjacent to the housing development. Place the pictures of the raccoons and dogs in these areas. Explain this is no longer suitable habitat for turtles.
19. Depending on student age and time available, the activity can be simplified by removing the 'Invasive Plants' scenario. In this case, use the alternative 'Goats to the Rescue' card.
20. Ask for another pair of volunteers. Have one read the 'Invasive Plants' scenario. Ask class if they know what an invasive plant is. An **invasive plant or animal** is one that gets introduced to a new place where it does not normally live and where it then causes harm. Tell the students the word "invasive," is like the word "invade", because the plants invade and take over. Purple loosestrife is an example of an invasive plant (show pictures). It naturally grows in Europe, but people brought it to plant in yards in America because it has pretty purple flowers. However, seeds blow from people's yards into wild places where it can take over and grows so thickly (compare with bamboo which many students know) that turtles cannot push through to find food. Have the other volunteer pick 3 of the habitat squares to cover with the invasive plant sheets. Any turtles in the affected areas have to leave their habitat and travel to an adjacent habitat area.
21. Have another volunteer read 'Goats to the Rescue'. Explain that any turtle with two dots on its back in the resting zone can return to the restored habitat. These turtles represent baby turtles that survive in the habitat.
22. Ask for a volunteer to read the 'Pet Trade' scenario. Have the students find the habitat section with the most turtles and remove all the turtles on that section. Place these turtles in the plastic tank to show they are being taken away to be pets. Explain to the students that people will pay a lot of money for bog turtles to keep them as pets because they are rare and very cute. Even though bog turtles are protected by law, people steal them from their habitat to sell. As well as threatening the survival of bog turtles as a wild species, most wild turtles die in captivity – about 9 out of 10 wild turtles usually die in their first year kept as a pet. Explain that turtles do not make great pets – they can carry salmonella, live a long time and don't show affection or come when called.
23. Ask students how many turtles survived our scenarios. In Maryland, the number of turtles has declined by half in the last 30 years, and there may be less than a 1000 left. How did the survival rate in the habitat compare? Have students collect up the remaining turtles and habitat cards and return to carpet or seats.
24. Ask students what could have been done differently to help bog turtles. Suggestions may include:
 - Protect habitats from development, keep dogs on leash, keep trash secure (to discourage raccoons) and help turtles cross roads.

- With older students, plant native plants (ones that naturally grow in that area) rather than invasive ones. Help with removing invasive plants.
- Don't buy turtles as pets, especially if you don't know where the turtle came from. Don't take wild turtles to keep as pets. Remind students that they should never release a pet turtles into the wild as can spread diseases to wild turtles and become invasive itself (take over habitat from native turtles).

THREATS TO LEATHERBACK TURTLES: 10 Minutes

25. Explain that we are going to look at the dangers that leatherback turtles face when they are in Maryland to hunt jellyfish. Leatherbacks visit Maryland when the water is warm enough, usually April until October. Then, the turtles return to warmer water near Florida and the Caribbean. Explain that you have a bag of potential threats to leatherback turtles when they are in Maryland waters. This bag is the 'sea of troubles'.
26. Ask for student volunteers to remove one item from the bag. They should then guess how that item could impact leatherback turtles. If the student doesn't know, they can ask the other students for help. Use the hand puppet to demonstrate how the objects can choke or ensnare the turtle.
- **Balloon: threat = swallowing and entanglement.** When people release helium balloons into the sky, eventually the balloons pop or deflate and land. The balloons can fall into the ocean or can be washed into streams and carried out to sea. As they start to degrade or breakdown into pieces (what happens to plastics exposed to sunlight), they shred and look more and more like a jellyfish (show demonstration bottle). If a turtle eats it thinking they are eating a jellyfish, the balloon can block their stomach or intestines so they can't absorb their food and the turtles get weak or die. Ask students how balloons get in the ocean and mention alternatives to letting balloons go such as using bubbles or pinwheels (celebrations) or lighting a candle (memorials).
 - **Plastic bag: threat = swallowing.** Plastic bags that are dropped are washed down storm drains when it rains. Storm drains take bags to the nearest stream and then float out to the ocean. Bags are also mistaken for jellyfish. They can choke a leatherback that tries to eat it or get caught in their jaws. If the turtles manage to swallow the bag, the plastic can block their stomach. An alternative is to reuse cloth bags.
 - **Plastic straw: threat = nostrils.** When the turtle comes to the surface to breathe, they can inhale floating plastic trash like the millions of plastic disposable straws that are floating around the ocean. Americans throw away 300 million plastic straws every day! Use paper or metal straws instead or just refuse a straw.
 - **Six pack holder: threat = entrapment.** Any plastic with holes can trap or entangle turtles and should be properly disposed of. Explain that turtles can't bring their flippers to their face so it is hard for them to get out of the plastic.
 - **Show the bag with the other types of marine plastic** – bottles, wrappers, plastic spoons and more. Explain that the ocean is filling up with plastic trash that we drop and it will take everyone helping to stop this.

CONCLUSION: 5 Minutes

27. Explain that if people don't learn to take better care of our world, animals like the leatherback turtle and bog turtle along with many other turtles may go extinct.
28. As the problems turtles face are caused by people, everybody needs to help if turtles are to be saved. Ask students if they can think of things they and their families can do to help turtles. Explain that they should pick a picture of either a leatherback or bog turtle and write an action that they will take to help turtles on the back. The students can glue all their pledges on to the large sheet of paper to create a class poster.

Student Assessment

Compare and Contrast Sea Turtles and Land Turtles worksheet in Follow-Up packet. ([download](#))

Follow-up Activities

Turtle Follow-up Activities Packet. ([download](#))

EXTRA INFORMATION

Answers to Common questions

Q. Can you age a turtle from its scutes?

A The scutes grow as the turtle grows but you can't tell the age exactly from the number of rings because they can grow more than one a year and the scute lines wear away in old turtles but they are used to give a reasonable idea of age.

Q. How long can a turtle hold their breath for?

A. Many turtles can hold their breath for up to 30 minutes while diving underwater. Turtles that hibernate underwater perform 'butt breathing' to allow them to stay underwater for up to 6 months.

Q. Can turtles hear you?

Turtles have no external ear flap, and have thin flaps of skin covering their ear canal. They are able to sense vibrations and low frequency sounds but their hearing is not sensitive. Their most important senses are smell and sight.

Q. How long can turtles live?

Giant Galapagos tortoises can live over 200 years, the eastern box turtle can live over 100 years and sea turtles probably live around 80 years.

Q. Can turtles feel when their shell is touched?

Turtles do not have nerve endings in their shells but touching the shell can be felt by the tissues that keep their shell attached to their bodies (compare to the fact that it doesn't hurt when your hair or nails are cut but your skin feels it when they are touched or pulled!). Most turtles do not like their shell being touched.

Q. Can turtles make you sick?

Yes, most turtles (like snakes and lizards) can carry salmonella. So if you ever touch a turtle (or snake or lizard) you should wash your hands and don't put them near your mouth (no kissing turtles!).

Q. What is a terrapin?

Terrapin, such as the diamondback terrapin, is another name for turtles, usually ones that live in brackish water (a mix of salty and fresh water found in estuaries).

Q. How does a turtle eat jellyfish without getting stung?

A leatherbacks mouth and throat is lined with backward facing spikes (they look like layers and layers of teeth) made from keratin that prevent them from being stung and cut the jellyfish into bite-sized pieces.

Q. How can you pick up a snapping turtle that is crossing a road?

Carefully! You must hold the turtle behind its rear legs (but do not pick up or pull by tail). A big turtle can be moved by letting it bite a stick and dragging it with onto a car mat and then dragging the mat.



Larry Hogan, Governor

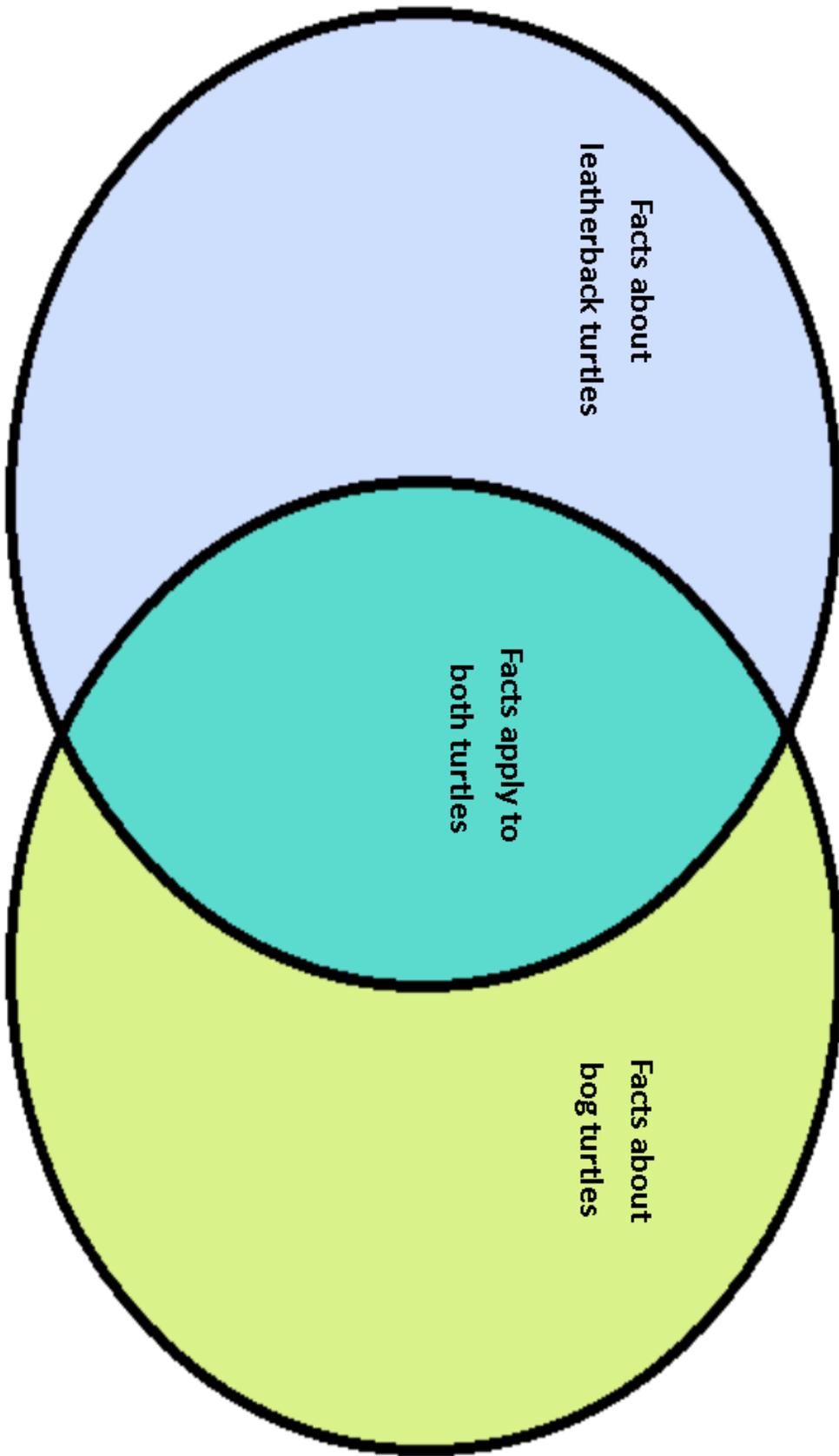
February 2019

Wildlife and Heritage Service
580 Taylor Ave, E-1
Annapolis, MD 21401
dnr.maryland.gov/wildlife



Jeannie Haddaway-Riccio, Secretary

The facilities and services of the Maryland Department of Natural Resources are available to all without regard to race, color, religion, sex, sexual orientation, age, national origin or physical or mental disability. This document is available in alternative format upon request from a qualified individual with disability.



Largest turtle
in the world

Cold-blooded

Breathe air
with lungs

Hibernate in
winter

Lay up to 100
eggs in a nest

Lay about 3
eggs in nest

Baby turtles
take care of
themselves

Live in salt
water

Lay eggs in a
nest on land

Eat jellyfish

Eat plants,
worms and
insects

Travel 1000s
of miles each
year

Travel only a
few feet each
day

Live in wetlands
and marshy
places

Smallest turtle
in North
America

Optional extra
cards or make
your own

Warm
themselves by
basking in
sunlight

Feed in
Maryland from
April-October

Foxes, raccoons
and birds try to
eat baby turtles

