

BE AN ANIMAL OBSERVER



WITH
BROOKHAVEN
NATIONAL LABORATORY



BROOKHAVEN NATIONAL LAB IS 5,265 ACRES!

(MOST YARDS IN THE US ARE ONLY A QUARTER OF AN ACRE)



THIS IS A PHOTO OF BROOKHAVEN LAB TAKEN FROM AN AIRPLANE.
WHAT CAN YOU OBSERVE OR NOTICE? WHAT DO YOU THINK THE GREEN
STUFF IS?

FORESTS!

BROOKHAVEN LAB IS SURROUNDED BY THE LONG ISLAND PINE BARRENS. TO LEARN MORE ABOUT THESE TREES CHECK OUT OUR GREENHOUSE LESSON.



THESE ARE ALL PICTURES OF THE FOREST AT BROOKHAVEN LAB.
CAN YOU TELL WHAT SEASON IT IS IN EACH PICTURE?

CAN YOU THINK OF WHAT MIGHT LIVE IN THESE WOODS?

BROOKHAVEN LAB IS HOME TO HUNDREDS OF DIFFERENT TYPES OF ANIMALS!



Northern Long-Eared Bat



Eastern Chipmunk

31 MAMMALS

Mammals are animals that breathe air, have a backbone, and grow fur or hair. Can you think of an example of a mammal?



White-tailed Deer



Muskrat



Eastern Tiger Salamander



Red Spotted Newt

14 AMPHIBIANS

Amphibians are animals that live in water and on land. Toads and frogs are examples of amphibians.



Bullfrog



Green Frog



Eastern Box Turtle



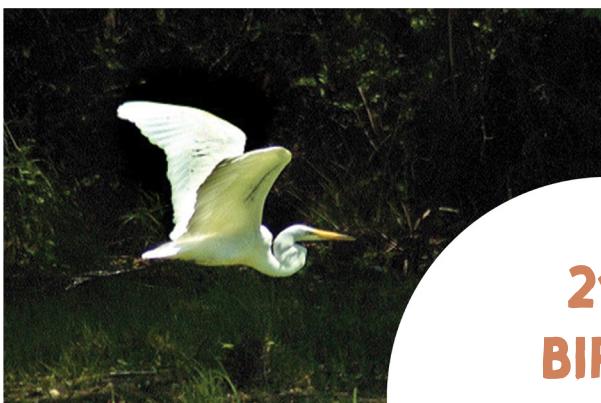
Snapping Turtle



Eastern Painted Turtle



Juvenile Black Racer



Great Egret



Kestrel



Tree Swallow



Belted King Fisher

12 REPTILES

Reptiles are animals that breathe air and have scales.



Note: these numbers are for types of animals, not the number of animals. For example if I have three dogs, there are three animals in my home, but only one type, or one species of animal.

DO ANIMALS COME UP TO YOU IN THE FOREST?

Animals usually hide from predators, or creatures that are dangerous to them. Even though we are just curious about animals, the animals don't know that and will hide from us anyway. Here are some adaptations, or ways animals have to protect themselves.



CAN YOU FIND THE ANIMAL HIDING IN THIS PICTURE?

ANIMAL ADAPTATIONS

Female Ring-necked Pheasant



Polyphemus Moth



Foxes



Swallows

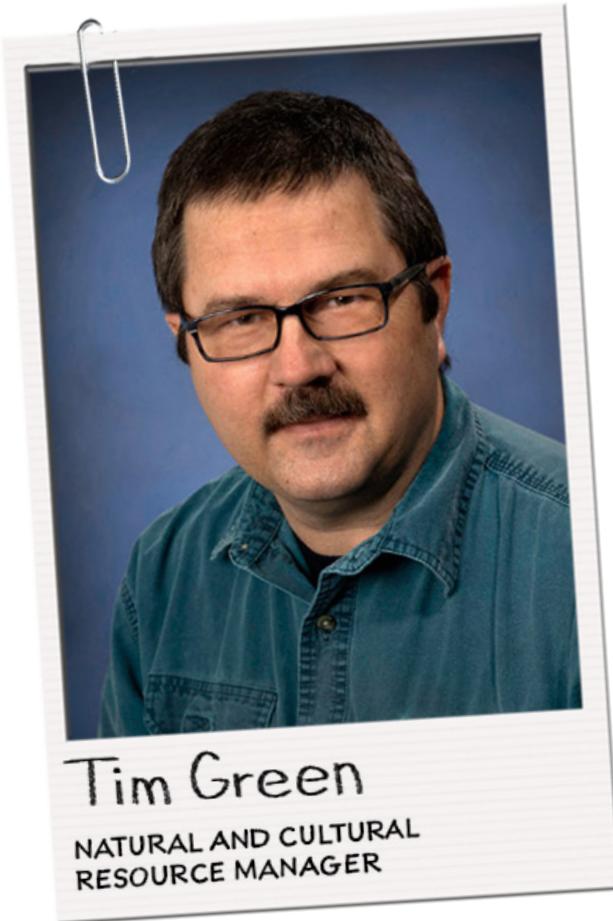
The polyphemus moth has a special adaptation (yes, bugs are considered animals too). Notice the moth's special markings. What do the markings look like? Most predators will see these markings and think they are eyeballs! This adaptation helps the moth scare away predators.

The ring-necked pheasant has a special adaptation called camouflage. You may have seen people in the army wear camouflage, or camo. Camouflage is when an animal has colors or markings similar to where it lives so it blends in, making them invisible to predators. Do you think you'd be able to see the ring-necked pheasant from far away?

Foxes are nocturnal, which means they come out at night. They do this because a lot of other animals (people included) are out in the day-time. Foxes do not have any predators, but they need to compete for food with other animals.

The swallows hide away in nests along the sides of trees or buildings. The nest protects the baby swallows that haven't learned to fly yet.

MEET THE BROOKHAVEN LAB SCIENTISTS WHO OBSERVE ANIMALS



Tim Green
NATURAL AND CULTURAL
RESOURCE MANAGER



Jennifer Higbie
ENVIRONMENTAL HEALTH
AND SAFETY ENGINEER

Here is Tim Green at the “Day in the Life of a River” event, where students from across Long Island collect data, or information, about Long Island Rivers. Tim Green is an expert animal observer so he is very helpful to Brookhaven Lab and to students on this day. Jennifer Higbie is also an animal observer and she does science experiments to learn more about animals at Brookhaven Lab.



HOW DO YOU FIND SOMETHING THAT HIDES FROM YOU?

Tim Green and Jennifer Higbie study animals by looking for animal clues and use special tools to make observations.

ANIMAL SENSING CAMERAS

Instead of playing a game of hide and seek, Tim Green and Jennifer Higbie put cameras in the forest. Then they put something that the animal likes to eat, or a smell to lure the animal in front of the camera. The camera senses a special type of light called infrared light that changes when an animal passes by the camera (to learn more about different types of light check out our spectroscopy lesson). This means every time an animal passes by a photo is captured automatically! Below is a picture of the camera set up and one of the photos taken by the camera.



Infrared camera that can detect when an animal passes by. Animals are too afraid to walk in front of us, but are not afraid to walk in front of the camera.



Photo taken by the infrared camera. Can you tell what animal this is? The animal is by one of Brookhaven Lab's solar panels. Check out our solar energy lesson to learn more.

TELEMETRY

Telemetry is a word that means being able to collect data, or information, over a wire using wifi or radio signals. To do this, a scientist will put a collar on an animal with an antenna that can send a signal. The scientist will use a receiver to receive the signal that the collar antenna gives off to find the animal. Scientists can then go into the forest and use this example of telemetry to find the same animal over and over again and figure out how the animal spends its time, where it lives, and more.



To use telemetry scientists have to capture the animal they want to study first. In this picture there is a cage that will catch the animal.



The scientist will then put the collar on the animal.



Next the animal is let go. Notice the antenna sticking out of the collar the southern flying squirrel is wearing.



These are the antennae that scientists use to help them find the animals. Notice how small they are compared to the nickel and battery next to them. Do you think the animal notices the antenna while wearing it?



Here are pictures of student scientists using the receiver to find the animals that are wearing the collars. Once the animal is found they record, or write down where the animal was.

ANIMAL TRACKS

Another way scientists can try to find animals is by looking for animal tracks. Animal tracks are footprints left by animals.

WHERE COULD YOU FIND ANIMAL TRACKS?



MUD, DIRT, SAND, AND SNOW ARE ALL GREAT PLACES TO LOOK FOR ANIMAL TRACKS

DO ALL ANIMALS HAVE THE SAME TYPE OF FOOTPRINT?



NO! DIFFERENT ANIMALS HAVE DIFFERENT FOOTPRINTS. HOWEVER, ANIMALS THAT ARE SIMILAR, OR ARE IN THE SAME "FAMILY," MAY HAVE SIMILAR FOOTPRINTS. FOR EXAMPLE, WOLVES AND DOGS ARE BOTH IN THE CANINE FAMILY. THEY AREN'T THE SAME ANIMAL BUT THEY ARE VERY SIMILAR. LET'S LEARN MORE ABOUT THE SIX ANIMALS THAT MADE THESE ANIMAL TRACKS.

ANIMAL FACT FILE: WHITE TAILED DEER



WHITE-TAILED DEER



PIEBALD DEER

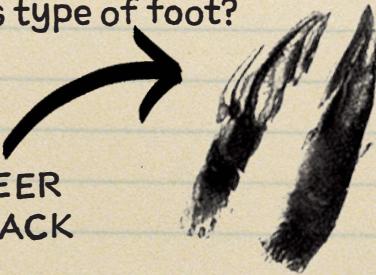


TREES EATEN BY DEER

Facts:

- White-tailed deer are in the Cervidae animal family, which includes reindeer, elk, and moose.
- Deer have antlers to protect themselves.
- There are about 30 white-tailed deer per square mile at Brookhaven Lab.
- Most white-tailed deer are a brown color with white tails. Some white-tailed deer are born with white and brown colors, this is called piebald.
- Deer eat plants like trees and weeds.
- Deer can carry ticks which are arthropods (animals without a spine including insects, spiders and crustaceans) that eat blood. Avoid going near deer and tall grass in the forest so you don't get ticks.
- Deer have a special type of foot called a hoof. What other animals have this type of foot?

DEER
TRACK



ANIMAL FACT FILE: COTTONTAIL RABBIT

Facts:

- Cottontail rabbits are a part of the leporidae family, which includes rabbits and hares.
- Cottontail rabbit are good at camouflaging.
- Cottontail rabbits live underground in burrows.
- To get around rabbits have to hop. Their back feet are long, which makes them good at hopping.



RABBIT
TRACK



COTTONTAIL RABBIT

ANIMAL FACT FILE: FOX

Facts:

- There are two fox species at Brookhaven National Lab, the red fox and the gray fox.
- Foxes are in the canidae or canine family. This is also known as the dog family, which includes wolves, dogs, coyotes, and jackals.
- Foxes can eat both meat and plants. This means they are omnivorous.
- Foxes have a very good sense of smell and hearing.



Red Fox



Gray Fox

- Red foxes can run up to 30 miles per hour and jump six feet high!
- Red foxes can vomit on command.
- Gray foxes are one of the few members of the canine family that can climb trees.
- Gray foxes will bury food to eat it later.
- It was thought that there were very few gray foxes on Long Island until we found them at Brookhaven Lab.



ANIMAL FACT FILE: RACCOON

Facts:

- Raccoons are nocturnal, which means they are awake at night.
- Raccoons are a part of the procyonidae family which includes the coatis, cacomistle, and kinkajou.
- Raccoons are known for getting into garbage that people have left out.
- Raccoons are omnivorous.



RACCOON
TRACK



JUVENILE RACCOONS

PHOTO: LAWRENCE LIVERMORE NATIONAL LAB

ANIMAL FACT FILE: GROUNDHOG

Facts:

- Groundhogs are a part of the sciuridae family, which includes squirrels, chipmunks, and prairie dogs.
- Groundhogs have their own holiday, Groundhog's Day, on February 2nd.
- Groundhogs are good at digging and live in dens they dig underground.
- In the winter groundhogs hibernate, or sleep through the cold months until they can come back up and eat in spring again.



GROUNDHOG

NOTICE THE DEN BEHIND THE GROUNDHOG



**GROUNDHOG
TRACK**

ANIMAL FACT FILE: TURKEY

Facts:

- Turkeys are in the phasianidae family, which includes chickens, pheasants, quail, and peacocks.
- Turkeys are birds but they live on the ground.
- Turkeys will roost, or sit, in trees to rest for the night.
- A group of turkeys is called a flock.
- Only male, or boy, turkeys can gobble. Males also have red skin that hangs over their beak called a snood.



LEFT: MALE TURKEY
RIGHT: FEMALE TURKEY



TURKEY ROOSTING IN A TREE

YOU CAN BE AN ANIMAL OBSERVER TOO!

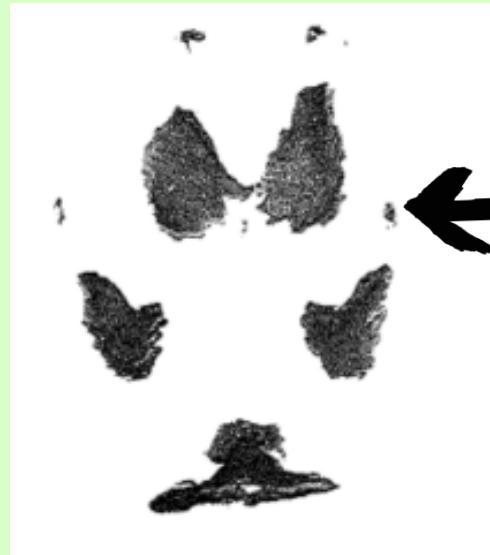
Test your animal tracking skills with the challenge on the next page! First answer the questions next to the track, then match the animal track to the animal picture (answers will be on the page after the challenge). Remember if you need help look though the animal fact files and use this footprint diagram.

FOOTPRINT DIAGRAM

DIFFERENT PARTS OF AN ANIMAL'S FOOT WILL MAKE THE TRACK LOOK DIFFERENT.

TOES

This animal has four toes. Looking at the number of toes can help you determine what animal made a track. How many toes do you have?



CLAW

Some animals have claws. They can use the claws for hunting or protecting themselves. What do humans have that are similar to claws on our fingertips?

PADS

Pads are the round or oval shaped part of an animal's foot. If you have ever looked at the bottom of a cat or dog's paw, you would have seen these round squishy parts. Humans have finger-pads, this is where you can see your fingerprint.



NUMBER OF TOES: _____
DOES IT HAVE PADS? YES NO
DOES IT HAVE CLAWS? YES NO



Red Fox



NUMBER OF TOES: _____
DOES IT HAVE PADS? YES NO
DOES IT HAVE CLAWS? YES NO



RACCOON

PHOTO: LAWRENCE LIVERMORE NATIONAL LAB



NUMBER OF TOES: _____
DOES IT HAVE PADS? YES NO
DOES IT HAVE CLAWS? YES NO



COTTONTAIL RABBIT



NUMBER OF TOES: _____
DOES IT HAVE PADS? YES NO
DOES IT HAVE CLAWS? YES NO



WHITE-TAILED DEER



NUMBER OF TOES: _____
DOES IT HAVE PADS? YES NO
DOES IT HAVE CLAWS? YES NO



TURKEY



NUMBER OF TOES: _____
DOES IT HAVE PADS? YES NO
DOES IT HAVE CLAWS? YES NO



GROUNDHOG

ANSWER KEY:



NUMBER OF TOES: 5
DOES IT HAVE PADS? YES
DOES IT HAVE CLAWS? YES



RACCOON

PHOTO: LAWRENCE LIVERMORE NATIONAL LAB



NUMBER OF TOES: 4
DOES IT HAVE PADS? YES
DOES IT HAVE CLAWS? YES



Red Fox



NUMBER OF TOES: 4
DOES IT HAVE PADS? YES
DOES IT HAVE CLAWS? YES



GROUNDHOG



NUMBER OF TOES: 4
DOES IT HAVE PADS? YES
DOES IT HAVE CLAWS? NO



TURKEY



NUMBER OF TOES: 2
DOES IT HAVE PADS? NO
DOES IT HAVE CLAWS? NO



WHITE-TAILED DEER



NUMBER OF TOES: 4
DOES IT HAVE PADS? YES
DOES IT HAVE CLAWS? YES



COTTONTAIL RABBIT

HOW TO BE AN ANIMAL OBSERVER WHERE YOU LIVE

ASK A
GROWN-UP
TO EXPLORE
NATURE

LOOK FOR
CLUES
ANIMALS
LEAVE
BEHIND

USE BOOKS,
APPS, OR THE
INTERNET TO
LEARN MORE
ABOUT WHAT
YOU FIND

WRITE DOWN YOUR
OBSERVATIONS IN A
NOTEBOOK / NATURE JOURNAL



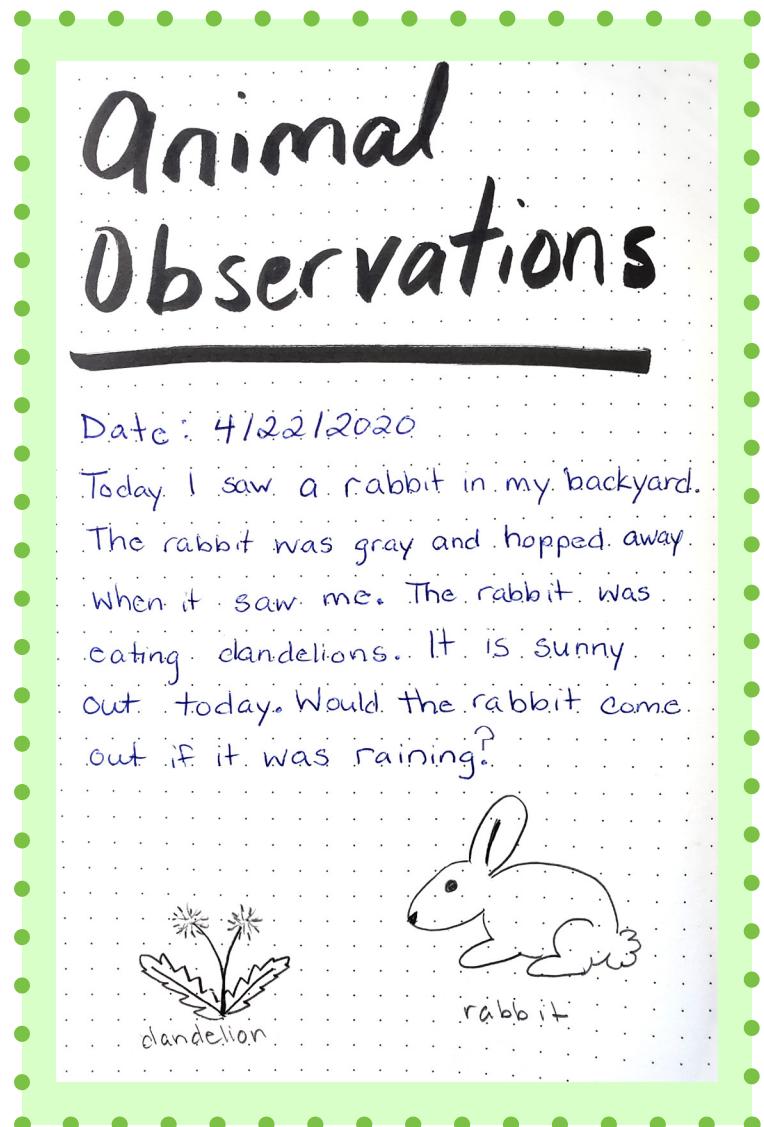
KEEP A NATURE JOURNAL!

ONE OF THE BEST WAYS TO LEARN MORE ABOUT NATURE IS TO RECORD YOUR OBSERVATIONS IN A NOTEBOOK. YOU SHOULD INCLUDE THE DATE, PLACE, TIME OF DAY, WEATHER CONDITIONS, AND ANY OTHER IMPORTANT INFORMATION. BELOW IS A SAMPLE PAGE OF WHAT YOU MIGHT WANT TO RECORD, OR WRITE DOWN.

NATURE JOURNAL PROMPTS

IF YOU ARE STUCK ON WHAT TO WRITE IN YOUR JOURNAL, TAKE A LOOK AT THESE IDEAS:

- Do you hear any birds?
- Do you see or hear any animals?
- Can you find any bugs?
- Can you smell anything?
- Draw something that you see.
- What colors can you see?
- What shape are the clouds?
Draw them.
- Can you hear cars?
- Try looking up toward the sky and down at the ground.
- Try being very quiet and very still so animals don't run away.
- Do you see any animal tracks in mud?
Try and figure out what animal made them.

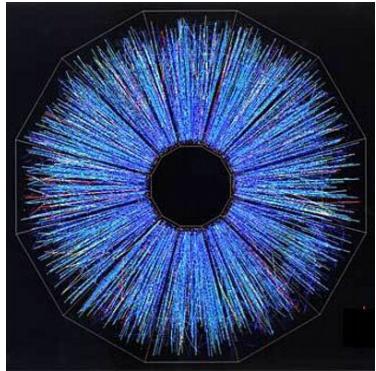


YOUR DATA CAN BE USED FOR SCIENCE!

Follow the "citizen science" links provided in the resources to see how your observations can be used for real science research!

SHOW US YOUR NATURE JOURNAL!

ASK A PARENT TO MAKE A POST



LOOK FOR US ON ALL OF
OUR SOCIAL MEDIA:



@brookhavenlab
#BrookhavenSciEd



RESOURCES

Teacher and Parent Resources:

- <https://www.fws.gov/uploadedFiles/NatureJournal.pdf>
- <https://www.youtube.com/watch?v=Xz02S-CizAU>

Identification Apps:

- <https://www.audubon.org/app>
- Google lens: https://support.google.com/assistant/answer/7539151?visit_id=637225616227488416-658672598&rd=2

Citizen Science

- <https://www.inaturalist.org/>
- <https://www.nationalgeographic.org/media/do-it-yourself-bioblitz/>
- <https://ebird.org/home>
- <https://www.usanpn.org/>
- <https://www.usanpn.org/mn/Greenwave>
- <https://www.audubon.org/conservation/about-great-backyard-bird-count>
- <https://www.bnl.gov/education/static/greeninstitutte.asp>

Animals Found at Brookhaven Lab:

- <https://www.bnl.gov/esd/wildlife/>
- <https://www.bnl.gov/esh/env/reserve/>
- <https://www.flickr.com/photos/35772386@N05/sets/72157625065992451/show/>
- <https://www.flickr.com/photos/brookhavenlab/albums/72157619490857000>
- https://www.flickr.com/photos/bnl_oep/albums/72157648724758272/with/15580541231/

Mammals of Long Island:

- <https://www.bnl.gov/esd/wildlife/mammals/>
- <https://www.cresli.org/common/12000/default.cfm?clientID=12000&ThisPage=home>
- <https://longislandnature.org/MammalsOfLI.pdf>

Birds of Long Island:

- <https://www.bnl.gov/esd/wildlife/birds/>
- <https://www.pbase.com/wwcsig/birds>
- <https://www.audubon.org/news/get-know-these-15-common-birds>