“Amphibians, Mammals, and Birds, Oh My!”

PROGRAM OVERVIEW

“Amphibians, Mammals, and Birds, Oh My!” is the title of this innovative project that incorporates animal and life cycle studies with science and math to reach learners of all ability levels. The goal of this 3-month unit is to transform first and second grade students into wildlife biologists who marvel at the wonders of the natural world, look closely at the habitat around them, and work to protect the natural environment.

Our objective is to classify, catalogue and conserve native Florida species on campus. Our students love animals! And while our students aren’t motivated to keep our campus clean just for themselves, once they realize that wildlife actually use our campus as a home, they put their trash in the trash cans and operate a school-wide recycling program just so the animals have a clean place to live. Along the way, they’ll devise ways to encourage other classrooms to keep our watershed clean and protect native species -- all so that the animals are happy.

You don’t protect something unless you care for it, and so this project meets students where they are -- by using wildlife studies to develop higher-order thinking skills, creative problem-solving skills and inquiry-based science skills. For example, during the lesson “Aquatic Amphibians and Brilliant Birds”, students learn defining characteristics of amphibians (lay eggs in water, moist skin, metamorphosis) before viewing live frogs in tanks to make observations about size, shape, color, and other data. They investigate the life cycle of a frog, and then divide into teams to act out the frog life cycle. Students complete a Venn diagram comparing Amphibians to Birds, starting with the fact that all living things need food, shelter, water and air, and moving on to specifics like feathers and eggs.

Then students use jeweler’s loupes as a magnification tool to investigate bird feathers, and Trace-a-Skull bird templates to investigate how the shape of a bird’s beak determines the type of food it eats. They discuss how bird beaks are tools that have evolved for specific types of food, and engage in a Bird Beak Bonanza experience where they engineer different kinds of bird beaks for specific types of food. To develop accurate measurement and math skills, they measure the length and wingspan of their partner, generating measurement data for a class graphing experience, then write a short story from their bird’s point of view detailing their perfect day.

At every step of the way, this project uses hands-on experiences and movement activities to anchor learning in the body.

Each lesson is designed to be completed in 1 to 3 class periods depending on how much time you have with your students.

This program is hugely successful! On-going progress monitoring shows that 52% of students improved their scores on end-of-unit assessments in both math and science. What’s more, 74% of participating students improved at least 13 points or higher on their STAR Early Literacy scores from the beginning of the year to the end of February. Student achievement motivation has improved, and discipline referrals are down. Success!

Though this project was designed to be used with classes of 1st or 2nd graders, it is easily adaptable for 6-8. For example, a middle school science class could use the following standards:

SC.7.L.17.1 Explain and illustrate the roles of and relationships among producers, consumers, and decomposers in the process of energy transfer in a food web.

SC.7.L.17.2 Compare and contrast the relationships among organisms such as mutualism, predation, parasitism, competition, and commensalism.

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2017 - 2018 IDEA CATALOG OF EXCELLENCE

~ A Returning Developer ~
Jessica Fredricks

~ A First Time Developer ~
Heather Davis
“Amphibians, Mammals, and Birds, Oh My!”

SC.7.L.17.3 Describe and investigate various limiting factors in the local ecosystem and their impact on native populations, including food, shelter, water, space, disease, parasitism, predation, and nesting sites.

SC.8.L.18.1 Describe and investigate the process of photosynthesis, such as the roles of light, carbon dioxide, water and chlorophyll production of food release of oxygen.

SC.8.L.18.3 Construct a scientific model of the carbon cycle to show how matter and energy are continuously transferred within and between organisms and their physical environment.

By using these standards as a foundation, the project would need just a bit of tweaking. For example, middle school students could begin with the same overview of vertebrates and their environment, and instead of learning the major parts of a tree, describe and investigate the process of photosynthesis in trees, which are such essential parts of our environment.

When investigating mammals, students would learn the defining traits of mammals as described in our project, and then go deeper by comparing and contrasting the predator-prey relationship of the bobcat and the rabbit to the parasitic relationship between the cowbird that lays its eggs in other birds’ nests so they don’t have to expend energy to raise them.

When learning about amphibians, middle school students can describe and investigate limiting factors in the local ecosystem and the impact on native populations -- frogs are considered an indicator species, and frog populations around the world are declining at a rapid rate. A middle school could also expand to include reptiles and fish, as gopher tortoises are a keystone species (meaning other species depend on them for survival) and there are lakes and fish hatcheries all over Polk.

Food webs and the process of how matter and energy are continuously transferred within and between organisms and their physical environment is something that can be studied using vertebrates and invertebrates alike.

**OVERALL VALUE**

Students love this program because instead of just reading about science, they actually get to do hands-on science with inquiry-based activities that help them develop their creative problem-solving skills. Environmental science is big business in Florida. Companies like Mosaic (phosphate mining) and CEMEX (sand mining) dig up the land to reach the targeted deposit, then restore and reclaim the land back to its original state. These companies either employ environmental scientists to make this happen, or contract the reclamation out to a science and engineering firm. Because our area is home to multiple phosphate and sand mining operations, this project is vitally important as it will inspire young students to pursue the wide and exciting STEM field of environmental science.

The key to developing young scientists is to provide students with lots of hands-on inquiry-based experiences. This project does just that! Students are absolutely ecstatic about this project! They look forward to “science time” and can often be heard chanting or acting out science concepts from previous activities. The movement and hands-on aspect of this project made it a hit with my students -- they are eager to learn and thrive when give the opportunity to use their hands, hearts, and minds!

The majority of our students are low-performing, as they scored below grade level on end-of-unit assessments in both math and science before beginning this project. This project has had a huge impact on the way our students view science -- though just 44% of them were interested in STEM education before beginning the project, 79% of participating students now show an increased interest in STEM education!

**LESSON PLAN TITLES**

- Vertebrates in our Environment
- Marching Mammals
- Aquatic Amphibians and Brilliant Birds

**MATERIALS**

See individual lesson plans. We were blessed to have wildlife biologists from Kleinfelder volunteer in our classroom for this project. While in our class, the biologists took students on Discovery Hikes around campus, pointing out signs of wildlife and talking to students about the importance of environmental protection, because we all live in a watershed.

We took our students to the Audubon Nature Center in Winter Haven so they could get hands-on experience identifying a greater variety of native Florida trees and plants.

We also partnered with Chain of Lakes Collegiate High School's STEM Scholars program -- they brought their underwater ROV and talked to students about microplastics.

**ABOUT THE DEVELOPERS**

Jessica Fredricks graduated from Florida Southern College with a Bachelor of Music Education degree. She has been with Polk County Public Schools for 18 years. Jessica has received numerous grants and awards and is a 7-time winner of the Disney Teacherific award, a 4-time winner of Time Warner Cable's Crystal Apple award, and a 5-time recipient of the South West Florida Water Management District's Splash grant.

Heather Davis graduated from Florida State University with a bachelor's degree in Family and Child Sciences, and went on to earn a Master's degree in Elementary Education. She has received grants from the Lake Ashton Community Foundation and AT&T. This is her 6th year teaching.

★★★
“Amphibians, Mammals, and Birds, Oh My!”  Fredricks & Davis

Lesson Plan No 1: Vertebrates in our Environment

■ SUBJECTS COVERED
Science, Math, Language Arts

■ GRADES
1st and 2nd, easily adaptable to other grades.

■ OBJECTIVES
Students will...

...master defining attributes of Amphibians, Mammals, and Birds.
...explain defining attributes of Amphibians, Mammals and Birds.
...use magnifiers to make careful observations of living and nonliving things.

■ SUNSHINE STATE STANDARDS

FSS/NGSS:
MAFS.1.G.1.1  Distinguish between defining attributes versus non-defining attributes

LAFS.2.SL.1.1  Participate in collaborative conversations with diverse partners about grade 2 topics.

LAFS.1.RF.2.2  Demonstrate understanding of spoken words, syllables, and sounds (phonemes).

SC.1.E.5.3  Investigate how magnifiers make things appear bigger and help people see things they could not see without them.

SC.1.L.14.2  Identify the major parts of plants, including stem, roots, leaves, and flowers.

SC.1.L.14.3  Differentiate between living and nonliving things.

SC.1.N.1.2  Using the five senses as tools, make careful observations, describe objects in terms of number, shape, texture, size, weight, color, and motion, and compare their observations with others.

SC.2.N.1.1  Raise questions about the natural world, investigate them in teams through free exploration and systematic observations, and generate appropriate explanations based on those explorations.

■ MATERIALS

• Growing Up Wild teacher resource book
• Animal Cards (1 card for each student)
• Loupes (1 for each student, from The Private Eye)
• Forest in a Box kit
• Tree-mendous activity kit
• Teacher-collected pictures of frogs, birds, and mammals
• Vertebrates take-home sheet

■ VOCABULARY
• Vertebrate
• Spine
• Amphibian
• Mammal
• Bird
• Environment
• Loupe
• Magnifier
• Living vs. Nonliving

■ DIRECTIONS

1. Direct every student to feel their spine, modeling feeling your own. Write the word “vertebrate” on the board, and have them echo you saying it until they own it. Tell them that humans are vertebrates because we have a spine, AND that lots of other animals are vertebrates, too.

2. Write the word “Amphibian” on the board, display a picture of a frog, and tell them that a frog is an amphibian. Tell them that a frog has a spine so we call it a ……., holding up a “V” with your fingers and pointing to the word on the board to get them all to shout out “vertebrate!”

3. Write the word “Mammal” on the board, display a picture of a bear or a lion or a cat, and tell them that these animals are mammals. Tell them that mammals have spines so we call them……., holding up a “V” with your fingers and pointing to the word on the board to get them to shout out “vertebrate!”

4. Write the word “Bird” on the board, display pictures of penguins, eagles, cardinals, and tell them that these animals are birds. Tell them that birds have spines so we call them…….etc.

5. Tell them that even though all these species are vertebrates, they live in different habitats and environments. Display the picture of the frog again, and tell them that Amphibians have moist skin (define moist) and lay their eggs in the water -- so they probably won’t be surprised when you tell them that frogs need a pond or other water source for their environment. Tell them that when they say “Amphibian” you want them to hop in place like a frog. When you say “Amphibian” they will hop, but when you raise your hand in the air, they will stop. Practice this a few times until they own it.
6. Display the picture of the birds, and tell them that Birds have feathers on their skin and lay their eggs in nests. Ask if anyone has seen a bird nest -- where was it? Guide them to the discovery that many birds place their nests in trees, and ask why they think birds would choose to do that. What protection does a tree offer a bird? Tell them that when you say “Bird” you want them to flap their wings like an eagle. When you say “Bird” they will flap, but when you raise your hand, they will stop. Practice this a few times, then throw in the word “Amphibian”. Practice with both until they own them and their stops are clean.

7. Display the picture of the mammals, and tell them that mammals have hair or fur, and instead of laying eggs they give birth to live young. Mammals also use trees -- for their homes, for food, and for shelter. Tell them that when you say “Mammal” you want them to run their hand through their hair because mammals are hairy. When you say “Mammal” they will touch their hair, but when you raise your hand, they will stop. Practice this a few times, then throw in the words “Amphibian” or “Bird”. Practice with all three until they own them and their stops are clean.

8. Say that all the animals they have looked at today have spines, so we call them……, holding up a “V” with your fingers and pointing to the word on the board to get them to shout out “vertebrate!”

9. Tell them you are going to play a game. You will say one of the traits of Amphibians, Mammals, or Birds, and they will respond with the correct movement. For example, if you say “lay their eggs in nests”, students should flap their wing until you raise your hand.

Traits to say:
- Lay their eggs in water (amphibian)
- Lay their eggs in nests (bird)
- Give birth to live young (mammal)
- Have fur or hair (mammal)
- Moist skin (amphibian)
- Feathers (bird)

10. Give each student an animal card displaying either an Amphibian, Mammal or Bird. Tell them to look at the clues on the card to figure out whether they have an Amphibian, Mammal, or Bird, and that when you say “go”, they will super-slow, silent tiptoe to the sign on the wall that their animal belongs to. Once they get there, they should move the way they’ve been taught. (Review: jump in place for Amphibian, run hand through hand for Mammal, flap wings for Bird).

11. Say “go”, and when they’ve sorted themselves, have each group hold up their cards so you can check to make sure they’re in the right group. Move any students in the wrong group to the correct group, and review again the way each group moves and the 2 traits of each group.

12. Tell them that when the music begins to play, their job is to walk slowly around the room demonstrating their movement. So all the amphibians will be jumping, all the birds will be flapping, all the mammals will be running their hands through their hair. No one should be talking -- all should be listening to the music. Because when the music stops, they must hand-up-pair-up with someone who is from a different group. Once they do this, they should do a silent happy dance while smiling at the teacher.

13. Once they all have partners, explain that they will take turns to explain to their partner WHY their animal is from that group. For example, if a student’s card says “Salamander”, they would say “My animal is a salamander, and it is an Amphibian because it has moist skin.” Or they could say “My animal is a salamander, and it is an Amphibian because it lays eggs in water.” Then the person who spoke first listens carefully while their partner goes. When all have gone, they should thank their partner with a high-five, fist bump, bow, or other.

14. For the next go-round, tell students to find a different person to pair up with, and this time challenge them to justify their answers with BOTH traits. For example, if a student’s card says “Cow”, they would say “My animal is a cow, and it is a Mammal because it has fur or hair, and gives birth to live young.”

15. Collect the cards by having all the Mammals bring you their cards, then sit in their seats. Next call the Birds, then the Amphibians. Make note of which students have properly classified their animal.

16. Tell them that all the animals need food, shelter, water, and air to live -- and that these things are part of the environment. Tell them that things in their environment can be living or nonliving, and display some items (light bulb, synthetic sponge, rock, leaf, pinecone, goldfish, etc).

17. Pass out the jeweler’s loupes from The Private Eye and demonstrate how to use the loupe as a magnifier by playing the Blurry vs. Clear game with their hand. Pass out items from the Forest in a Box kit and invite students to inspect with the loupes. Tell students that they will be going on a Discovery Hike, and their job on the hike is to investigate living and nonliving things on campus. Review prior knowledge and experiences about living vs nonliving.
18. Take students on a 10-minute Discovery Hike to a location on campus that has trees, encouraging them to investigate tree bark, leaves, and roots. Using the loupes, get close-up on tree bark. Do they see any tiny bugs crawling on the tree? What does the bark look like? Looking through their loupe, what does it remind them of? Give time for free exploration and to raise questions about the natural world.

19. Once they return to the classroom, collect the loupes and ask them to write about what we learned today in their science journals. When they are finished writing in their journals, give each student a “Vertebrates” sheet that has pictures of Amphibians, Mammals, and Birds on it so they can take it home and explain what we did today to their parents.

20. When they get done with science journals, invite each student to select a tree disc necklace from the Tree-mendous Activity kit. They should write their name on it, count the rings, and keep it in their desk.

**EVALUATION/ASSESSMENT**

Circulate as students are explaining traits of Amphibians, Mammals and Birds to their partners to spot-check for understanding. Further check when you have them return their cards by group type. Alternatively, you can challenge them to write one trait for each group type in their science journals.

**ADDL INFORMATION**

If students struggle with writing, they can draw a picture instead. Give additional time as needed. Resource pages all come from the *Growing Up Wild* teacher resource book.

★★★
SUBJECTS COVERED
Science, Math, Language Arts

GRADES
1st and 2nd, easily adapted for 6-8.

OBJECTIVES
Students will...
... use higher-order thinking questions to infer what kind of food specific mammals eat based on the type of teeth they have.
... compare and contrast the basic needs that all living things have, including water, shelter, food and air.
... identify the parts of a tree, and how mammals use trees to survive.

SUNSHINE STATE STANDARDS
SC.1.N.1.4 Ask “how do you know?” in appropriate situations.
SC.1.L.14.2 Identify the major parts of plants, including stem, roots, leaves, and flowers.
SC.1.N.1.3 Keep records as appropriate - such as pictorial and written records - of investigations conducted.
SC.2.L.17.1 Compare and contrast the basic needs that all living things, including humans, have for water, shelter, food and air.
SC.2.L.17.2 Recognize and explain that living things are found all over Earth, but each is only able to live in habitats that meet its basic needs.

MATERIALS
• Growing Up Wild teacher resource book
• Bobcat skull and teeth (or pictures of same)
• Deer skull and teeth (or pictures of same)
• Mammal family card for each student (either mama or baby)
• Marching Mammals call-and-echo sheet (for teacher)
• Mammals take-home sheet
• Mammal Trace-a-skull templates

VOCABULARY
• Mammals
• Vertebrates
• Carnivore
• Herbivore
• Trunk
• Roots
• Branches
• Leaves

DIRECTIONS
1. Review classifications of Amphibians, Mammals, and Birds -- showing movements for each while reviewing their traits. Recall that all these categories of animals are “vertebrates” and what that means anatomically. Invite students to get their Tree Discs out of their desk and compare how many rings each student has. Review the parts of a tree, and tell students to wear their Tree Discs as name tags during the lesson.

2. Have students repeat after you as you say the word “mammals” -- then decode the word as you write it on the board. Write this on the board and have students decode: “Mama mammals make milk”. Share that in addition to giving birth to live young, and having fur or hair, mama mammals make milk so they can feed their babies. This is something only mammals do. Another trait of mammals is that they take care of their young -- they take care of their families. Discuss how humans are mammals and ask students how their parents take care of their family; then ask students what they do to take care of their family.

3. Display a skull and teeth (or picture of same) from a bobcat and facilitate a discussion on the shape of the teeth. Based on the shape of the bobcat’s teeth, what do students think it eats? (Bobcats are carnivorous predators that eat meat.) Write the word “carnivore” on the board and guide them in decoding it.

4. Display a skull and teeth (or picture of same) from a deer and facilitate a discussion on the shape of the teeth. Based on the shape of the deer’s teeth, what do students think it eats? (Deer are herbivores that eat plants.) Write the word “herbivore” on the board and guide them in decoding it.
decoding it. Have students use the Mammal Trace-a-Skull templates to trace mammal skulls, paying particular attention to how the teeth affect what kind of food the mammal eats.

5. Return to the idea of mammals as families, and guide students to the discovery that plants and animals closely resemble their parents. Display pictures of a baby elephant and a mama elephant and talk about how they are similar. Then talk about how they are different.

6. Give each student a mammal family card -- either a mama or a baby. Tell students that their task today is to find their family. Tell them that in the wild, making noise and yelling are apt to get them eaten by predators, so they have to find their family by silently tiptoeing around the room. Demonstrate how to hold their animal card in front of their chests with 2 hands, so that the animals around them can see what they look like. They will tiptoe silently around the room with their card showing, all the while looking for their family. Once they find their family, hand-up-pair-up and do a silent happy dance.

7. Give a few minutes for them to find their families, then walk around the introduce each family to the class, making sure each family knows its name (possibilities: skunk, possum, squirrel, bear, armadillo, etc.)

8. Ask: how do you know these are mammals? (because they have hair or fur)

9. Tell students that today they will go on a Discovery Hike with their mammal family. Take the class outside, line them up with mamas on one side and babies on the other. Tell them that they will be the marching mammals, and demonstrate how to march in time. Use the “Marching Mammals Call-and-Echo” couplets to keep them in time. You call a line, they echo, you call the next line, they echo, all while marching in time. Once they have this, march them across campus to the trees, using the Marching Mammals Call-and-Echo to get them there while at the same time installing the knowledge in their heads.

10. Once you are to the trees, tell them that trees are important to all their mammal families. Tell them that their task is to talk about what their family uses trees for, and then act it out. Tell them that there can only be one mammal family per tree (we have at least 11 trees in our area -- if you have less, may need to change this). When you yell “Amphibians, Mammals, and Birds, Oh My”, they are to come running back to you. Release them, as mammal families, to find a tree, discuss, and act out how their family uses this natural resource. Give them 5 minutes to do this, then call them back.

11. Allow groups to share, then facilitate a discussion on how trees are critical for the health of our environment. Teach the parts of a tree through this game:
   • Point to the tree trunk, have them say “trunk”, and stand with feet together and arms at their sides.
   • Point to the roots, have them say “roots”, and lay face-down on the grass.
   • Point to the branches, have them say “branches”, and stand with feet together, arms out like branches.
   • Point to the leaves, have them say “leaves”, and stand like branches, but with fingers splayed out.
   • Call out a specific tree part and have them act it out, checking for understanding as you go.

12. Then play the game with their eyes closed to see who has internalized all the vocabulary.

13. Then call a student up to lead the game.

14. Instruct students to get back with their mammal families. Tell them you want them to return to their tree, and count how many branches their tree has. They also need to know if their tree has visible roots. (Yes or No for this question) Tell them to put the information in their heads. Give them 3 minutes to do this.

15. Line back up as mammal families and use the Marching Mammals Call-and-Echo to march them back to the classroom.

16. Call them as families to turn their cards back in, and when you do, write on the board how many branches their tree had (for example: possum 16). Have a T-chart posted on the board and ask the team to put a mark under “I can see roots” or “No roots seen”.

17. Once students have turned in their data, ask them to write at least 3 traits of mammals in their science journals. When they are finished writing in their journals, give each student a “Mammals” sheet so they can take it home and explain what we did today to their parents.

18. Once all data has been turned in, analyze the “visible roots” data. Which category of trees did we have the most of -- visible roots or underground roots? How many more? Guide the class in creating a simple bar graph to show the results of their data collection.

19. Tell students to take their Tree Discs off and put them back into the desks.
**EVALUATION / ASSESSMENT**

Read student science journals to discover if students retained at least 3 traits of mammals:

- give birth to live young
- hair or fur
- mama mammals make milk
- take care of their babies

Alternatively, have students label the parts of a tree.

**ADDL INFORMATION**

If students struggle with writing, they can draw a picture instead. Give additional time as needed. Resource pages all come from the Growing Up Wild teacher resource book.
SUBJECTS COVERED
Science, Math, Language Arts

GRADES
1st and 2nd, easily adaptable to other grades.

OBJECTIVES
Students will...
...measure the length and wingspan of their teams, generate measurement data and create a class graph.
...develop scientific thinking by using movement to demonstrate the life cycle stages of a frog (metamorphosis).
...engineer a new species of bird whose beak is used for specific food.

SUNSHINE STATE STANDARDS
MAFS.2.MD.1.1 Measure the length of an object to the nearest inch, foot, centimeter, or meter by selecting and using appropriate tools such as rulers, yardsticks, meter sticks, and measuring tapes.
MAFS.2.MD.1.4 Measure to determine how much longer one object is than another, expressing the length difference in terms of a standard length unit.
MAFS.2.MD.4.9 Generate measurement data by measuring lengths of several objects to the nearest whole unit, or by making repeated measurements of the same object
LAFS.2.W.3.8 Recall information from experiences or gather information from provided sources to answer a question.

VOCABULARY
• Amphibian
• Bird
• Metamorphosis
• Life cycle
• Length
• Wingspan
• Beaks

MATERIALS
• Growing Up Wild teacher resource book
• Bird Trace-a-skull templates
• Loupes from The Private Eye
• Frog life cycle card sets
• Measuring tapes, 1 for every 2 students
• Reptile tanks with frogs inside
• Bag ‘o Bones kit
• Frog Observation Sheet
• Amphibians take-home sheet
• Teacher-generated pictures of birds
• Engineering materials:
  - drinking straws
  - toothpicks
  - aluminum foil
  - plastic spoons
  - plastic forks
  - plastic knives
  - rubber bands
  - several different sizes of popsicle sticks.

DIRECTIONS
1. Review classifications of Amphibians, Mammals, and Birds -- showing movements for each while reviewing their traits. Recall that all these categories of animals are “vertebrates” and what that means anatomically. Review parts of a tree and tell students to take out their Tree Disc name tags and wear them during the lesson.

2. Remind students that frogs are amphibians, and that amphibians have moist skin, lay eggs in water, and have a life cycle. Recall that mammal babies look like their parents. Display the frog life cycle cards and facilitate a discussion on how each stage of a frog's life is similar, and then how it is different. Invite students to get in groups and act out the life cycle of the frog by creating movements for each stage. Ask: how do you know which one comes next? What evidence do you see that tells you this one should be next?

3. Bring in reptile tanks with a few frogs in each. Allow 5 minutes for students to talk about what they are seeing: how the frog moves, how it breathes, how many arms and legs and eyes and toes and fingers it has, etc. Ask: how are you different from the frog? How are you similar?
4. Give an Observation Sheet to complete about their frog. What it looks like, sounds like, smells like. They won’t touch it or taste it.

5. Teach the word “metamorphosis” -- tell them it means change. Have them show this word by squatting down on the ground like a frog egg, and saying “metamorphosis” as they grow tall. Practice this until they own it.

6. Metamorphosis is a trait of Amphibians -- amphibians are aquatic, because they start their life in the water, and their bodies change so that they are able to be in the water, and also be on land. When you say “aquatic”, make swimming motions with your arms.

7. Bring them back to birds -- are birds aquatic? Amphibians lay their eggs in the water, but where do Birds lay their eggs? Amphibians have moist skin, but what do Birds have on their skin? Amphibians go through metamorphosis (doing the movement as you say the word), but when birds come out of their eggs, they look tiny birds, right? As a class, complete a Venn diagram comparing Birds and Amphibians. What do all living things need to survive? (water, shelter, food and air)

8. Display pictures of a wide variety of birds -- preferably birds found on campus. Sandhill Cranes, Great Blue Herons, Northern Cardinals, Blue Jays, Northern Mockingbirds, American Crows, Turkey Vultures, Black Vultures, Osprey, Red-Shouldered Hawks, Red-bellied Woodpeckers, and Mourning Doves are all good choices. Discuss how birds are measured by their length (measuring from their head to their tails) and their wingspan (from wingtip to wingtip).

9. Have students “hand-up-pair-up” to find a partner, and assign each team a specific bird name from the pictures you displayed. (Sandhill Crane team, Black Vulture team, etc). Remind students that birds are measured by length and wingspan, and tell them that their task is to use the measuring tapes to measure the length (from head to toe) and wingspan (fingertip to fingertip with arms outstretched), in inches, writing their measurements on the board like this:

<table>
<thead>
<tr>
<th>Team Name</th>
<th>P1 Length</th>
<th>P2 Length</th>
<th>P1 Wingspan</th>
<th>P2 Wingspan</th>
</tr>
</thead>
<tbody>
<tr>
<td>Osprey</td>
<td>48</td>
<td>50</td>
<td>47</td>
<td>52</td>
</tr>
<tr>
<td>Blue Jays</td>
<td>44</td>
<td>49</td>
<td>45</td>
<td>50</td>
</tr>
</tbody>
</table>

10. Once all students have their data on the board, create a class graph using the data sets to display results of data collection.

11. Tell students that in addition to collecting data, scientists need to know how to use magnifiers to take a closer look at things they study. Hold up an Artifact tray and show them a feather from the Birds of a Feather kit, noting how delicate it is. Have a student pass out the Loupes from the Private Eye, and tell students to investigate the feather up close. What does it look like through the loupe? What else does it remind them of? Have them write their ideas down on a piece of paper, and encourage them to sketch the feather if possible while looking through the loupes. Give 5-7 minutes for this, then collect the loupes and allow students to share their ideas in small groups. They should also look at some of the replica bones from the Bag ‘o Bones kit, and note which ones they think come from mammals and which ones they think come from birds -- and WHY they think this.

12. Facilitate a discussion about how each beak shape works best for a specific type of food. For example, woodpeckers have beaks that are designed to drill into tree bark so they can eat the tiny insects that live under the bark. Great Blue Herons have long beaks that they can use to spear frogs, fish, and snakes. Hummingbirds have needle-thin beaks that are designed for sucking nectar from flowers. Owls and Hawks have hook-shaped beaks that are designed for catching small rodents and tearing the meat apart. Have them use the Bird Trace-a-skull templates to trace different skull shapes, paying particular attention to the beak and how it is used to eat specific food.

13. Ask students to use their imagination to create a bird that’s never been seen before. They will need to sketch it out, create a name for it, and tell its length, wingspan, what it eats and where it lives. Then they need to engineer a 3D-model of their bird’s beak that is suitable for the type of food they want their created bird to eat. For their engineering materials, have the following on hand: drinking straws, toothpicks, aluminum foil, plastic spoons, plastic forks, plastic knives, rubber bands, and several different sizes of popsicle sticks.

14. Give students 10-15 minutes to complete their engineering project, then have them share with the class.

15. Give each student an “Amphibians” sheet so they can take it home and explain what we did today to their parents.
**EVALUATION/ASSESSMENT**

In their science journals, have students write one way that Amphibians and Birds are similar. Then, have them write one way that Amphibians and Birds are different. Alternatively, write a short story from their engineered bird’s point of view describing their perfect day.

**ADDL INFORMATION**

If students struggle with writing, they can draw a picture instead. Give additional time as needed. Resource pages all come from the *Growing Up Wild* teacher resource book.

Resource pages all come from the *Growing Up Wild* teacher resource book.

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## Materials Budget

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The materials budget for "Amphibians, Mammals, and Birds, Oh My!" lesson plans has a total cost of $800.00.
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