

## Slater Museum of Natural History

### Nature in the Classroom Teaching Script

#### Lesson 1: Naturalists-in-Training

*Note: (Teacher actions in parentheses and italics throughout.) Before you begin, refer to the Classroom Management Strategy in the Lesson Overview Notebook for tips on helping students succeed during group tasks and managing the use of museum specimens.*

#### **(5 mins.) Intro**

Today we get to practice being scientists. We have a whole box of Wild Things from the Slater Museum of Natural History at the University Puget Sound here in Tacoma. The Slater has one of the best collections of Pacific Northwest bird, mammal, reptile, amphibian and plant species. And today we get to take a close look at some objects from these collections.

We're going to use the important scientific skill of observation and keep records in a journal, just like a scientist does.

Scientists who study nature and natural history—relationships between plants and animals, where they come from, their behaviors, population numbers, and how they evolve over time—are called naturalists. We're going to think like naturalists in our work today.

Keeping a nature journal is one way to practice being a naturalist. It's a notebook where you record observations so you can study and keep track of what is happening where you live and in places that you visit. You can do this anywhere, at home or in the school yard or even in the classroom like we're doing today. Things in nature are always changing—plants may be in flower, have berries or may be getting new leaves. Some birds are around all year; others come and go in a fairly regular annual procession. With a little practice, you can explore a place you've been many times before and still learn something new.

Nature journals have been kept for centuries—from writings on cave walls to detailed ships' logs—they help us learn about other places and times, as well as other times in the places we live now. For example, Lewis and Clark's nature journals are the best record of their important journey. The Slater Museum's collection is made up of the nature collections and observations of naturalists who studied nature in the Pacific Northwest in the late 1800s and 1900s.

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We're going to use nature journals to keep a record of our work today.

How do you learn to notice nature? Just like anything you want to get better at, you practice. In this lesson you'll use your senses to take a closer look at an object—a Wild Thing—that was found somewhere in Tacoma. You'll try to answer questions about it and draw it with as much detail as you can. Next we'll get together in small groups to compare and contrast similar objects. These are all skills used by scientists and they're all based on careful observation.

### **First, let's practice observing together.**

Can someone choose a common object from around the classroom? Okay, a water bottle. I'll record your observations on the board. Raise your hand when you have a detailed descriptive word or phrase about this object.

Pretend like you're describing it over the phone to someone in another world and you don't know its purpose. What color and shape is it? I'll pass it around so you can smell it, listen to it and touch it (no tasting, please!). What is its texture, weight, size, temperature? Is it hollow or solid? What's your best guess about where it came from? Why? What could it be used for and why?

*(Record observations on the board.)*

### **Careful observation is key to being a good scientist.**

Now you have a chance to practice observation skills on your own Wild Thing from the museum. *(Pass out the nature journals.)* Scientists use journals to record their observations, and this nature journal will be your own "scientist notebook" for these lessons—where you will keep your notes and drawings.

### **Before I pass out the Wild Things, I want to remind you to handle them carefully.**

Pick them up gently and put your object on your desk while observing it to avoid dropping it. These belong to the Slater Museum and are not for role-playing or games. So, please treat them respectfully so lots of students will have a chance to use them. And none of these things were killed for museum use; they died and were preserved to be used in programs like this one.

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**(5 mins.)** Starting with this row, come up to the table and choose a Wild Thing from the box. And, don't worry, you'll have a chance to look at all of the Wild Things before the lesson is over!

**(10 mins.)** Now let's put your observation skills to work. Take ten minutes to make some detailed notes about your object. Just like we did with the water bottle, use your senses to observe, and then make notes in your nature journals. If you get stuck, refer to the list we made together (on the board) and the questions in your journal.

*(Questions from nature journal: What color is it? What does it smell like? Does it make any sound? Close your eyes and touch it—describe what you feel. Look at it closely from all angles—does its shape remind you of any other object? Have you seen anything like it before? How does its shape serve the animal/plant? (Some examples: feathers are shaped to help birds fly, a snail shell protects the vulnerable soft animal within, seed pods hold and protect seeds.) Short phrases will do; use descriptive words: Feels light as a pencil, smooth like the top of my desk, purple like a grape Popsicle. Useful sentence starters: I noticed..., I wonder about...)*

*(If a student is working with a Wild Thing that they are already familiar with, they have an extra challenge. Have them try to find and describe details that they never noticed before. Scientists often have to take a fresh look at "known" material in order to make new discoveries.)*

**(5 mins.)** Now that you've got a good list of observations, it's time to make a prediction (or hypothesis) about your Wild Thing. This is what naturalists and other scientists do when they are trying to answer a question—they make an educated guess and then try to prove it to be true. Look on page 6 of your nature journal. In the "My prediction" area write a full sentence about your object. What is it and where do you think it could be found in Tacoma? How did it get there? Think like a detective and go beyond the obvious: What was it used for? Was it part of an animal or plant—if so, what kind, and how did it "lose" this part of itself? What did it eat and/or what ate it?

*(Sample prediction (or hypothesis): I think this is a sea creature because it has a shell like ones I have found at the beach before. I also found some sand on the shell. I think the shell protects the creature from being eaten. I think it was found because the creature that lived inside died and the shell washed up on the sand.)*

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*(When you have reached your time limit, have a helper distribute Naturalist Kits containing magnifying glasses, colored pencils, rulers.)*

**(20 mins.) We're passing around a Naturalist Kit for each of you to use for our next round of observation.**

Now you'll have a chance to look even more closely at your Wild Thing by drawing it and using a magnifying glass. Turn to page 5 of your nature journal. You're going to draw your Wild Thing in the boxes shown here. In the top box, draw the whole object. Remember to try to fill up the whole box so it's easier to draw in (and see) the details. In the lower box, draw your object (or one part of it) how it looks when magnified, or from a different angle (the opposite side or one small part of it). And again, fill the whole box with your drawing. Start with regular pencils and trace or draw your object. Then fill in more detail with the colored pencils, which aren't erasable.

*(Give students a five minute warning before the time is up.)*

**(10 mins.) Now we are going to have a chance to see all of the other Wild Things.**

Your goal is to find two others in the class who have similar objects to yours. Leave your Wild Thing out on your desk so it's easy for your classmates to see. Now let's all quietly walk around the room looking at the other objects. You are looking for two objects similar to your Wild Thing. When you find the like objects, meet up with their "owners" and find a place at a table or on the floor to work together. You will need your Wild Thing, nature journal and a pencil. If you can't find your partners, raise your hand and I will help you.

*(Some of the similarities are difficult to distinguish. Refer to the Wild Thing group listing (inside the Wild Things box lid) to help all of the students find their partners.) Refer to the "Classroom Management Strategy" in the Lesson Overview Notebook for tips on helping students work well in groups.*

**(15 mins.) We are going to use a Venn diagram to compare and contrast different elements of your objects and understand relationships between the objects.**

Let's try a practice diagram together first. What are three objects in the room? Okay, we'll go with a desk, a pencil and a book. Now we'll label each circle with one of these objects. Each circle represents one of the objects, with any like information written into

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each of the overlapping parts of the circles. Anything that the desk and pencil have in common will go in this space (*etc.*). So they are both wooden, both smooth... Things that all three objects have in common go in this central overlapped area, like they are all used at school, they are all found in this classroom, they are using for learning. Things that are unique to a pencil, like it's used to write with, go here.

Now work on your group's Venn diagram. Before you start comparing, label the circles with the numbers on your three objects.

**(5 mins.) Now you'll get a chance to find out what your Wild Thing is!**

*(Pass out the Wild Things key.)*

Use this key to learn some facts about your object. You can also see a photo of the living animal or plant. Then label the Venn diagram circles with the names of the three objects from your group.

**(5 mins.) Take a minute to look back at your hypothesis (prediction) on page 6 of your nature journal to see if it was correct.** Now write down three facts about your object in the space provided on your worksheet.

**(10 mins.) Now I'd like some volunteers to share an interesting fact about their Wild Thing.**

When I call you, stand up and hold your object up high so all of us can see it and tell us something you learned about it.

That's the lesson for today, but you can continue honing your observation skills. This is your own nature journal. You can add drawings and observations to it at any time in the pages at the back of your journal.

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### Lesson 2: Urban Bird Diversity—Birdiversity!

#### (5 mins.) Intro

In our last lesson we practiced observation skills using Wild Things found in Tacoma. Today we're going to use those skills to look closely at Tacoma birds. We will discover how different beaks and feet allow birds to get different foods and live in different habitats. And because birds show up almost everywhere we go, they provide a good way to start learning the natural history of our home.

Did you know that **more than 250 kinds of birds have been recorded in Tacoma**, and more than 175 make their home here for all or part of the year? From the tiny Rufous Hummingbird weighing as much as a ping-pong ball (!), to the Bald Eagle with a seven-foot wingspan, Tacoma is a great place to learn about birds.

We will be studying birds that live the whole year or part of the year in Tacoma, to learn how their beaks and feet are adapted to help them get different foods. Some of you are probably wondering how these birds died. None of these bird specimens were killed for the museum to use—they were found dead mainly after being hit by cars, flying into windows or being attacked by cats.

#### **Can anyone tell me why you would want to watch birds?**

They're interesting. They're pretty and pretty easy to watch. And—that's right. Birds are also important to a healthy, balanced ecosystem. What would happen to the insect population if suddenly all the birds disappeared? And what would happen to us if there were no birds to eat the insects? How would plants with berries spread their seeds? Bird population records also provide important information about changes to our environment that can help us make decisions about how we use land.

Tacoma's variety of bird life can help us learn how birds are adapted to their own special environments. In different parts of the city you can watch a Great Blue Heron use its spear-like bill to nab fish, a Red-breasted Nuthatch spiral down a tree trunk in search of small insects and spiders, or a Surf Scoter pull mussels from pilings. Each is using its own specially adapted beak and feet to get and eat its favorite foods.

*(Note: What people usually call a bird's foot are actually its toes—a bird's ankle bone is located about halfway up its leg. For ease of reading, we refer to feet rather than toes in this lesson.)*

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Using close observation, we will learn about some of the characteristics that help birds live in different habitats. Looking closely at individual birds and learning about their differences will help you begin to notice differences between birds, which will then help you begin to identify different species. If you want to keep records about birds and tell others about what you see it's important to be able to identify different bird species.

### **(10 mins.)**

*(With the class, go over the Beaks and Feet Background sheet to teach how different body structures serve birds.)*

Birds use their beaks and sometimes their feet as tools to get their food. Each bird's body is adapted to help it get food in different ways allowing birds to live in many different habitats.

Here are some of the tool-like uses of beaks and feet. Beaks and feet are not actual tools, they only work like tools. Not all beaks and feet fit neatly into the tool categories shown here. Some look like one tool but are used like another, and many beaks and feet have multiple uses. The best way to find out how a bird uses its beak and feet is to watch it closely.

**(5 mins.)** Now we're going to work in groups of three. We'll be measuring and observing a bird specimen, and looking for clues about how the bird "makes its living." What I mean by this is how it's beak and feet help it get the food it needs to survive.

*(Break class into groups and pass out the Beaks and Feet Background sheet for them to use.)*

**Before I pass out the bird specimens, I want to remind you to handle them carefully.**

Pick your bird up gently and put it on your desk while observing it to avoid dropping it. These belong to the Slater Museum and are not for role-playing or games. So, please treat them respectfully so lots of students will have a chance to use them.

When I call up your group, come to the table and I will give you each a bird specimen.

*(Bird tags are color-coded in groups of three to provide good contrast within each group—see the Bird Specimen List in the lid of the specimen box.)*

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**Remember that all of these birds are species found in Tacoma. And don't worry, you will have a chance to look at all of the birds before the lesson is over.**

*(Pass out a Naturalist Kit to each student.)*

**(10 mins.)** Now use your rulers to measure the beak, feet and length of your bird in centimeters. Fill in the information on Worksheet 1 found on page 10 in your nature journals.

*(Depending on their math skills, ask the students to round to the nearest centimeter, or to write a decimal.)*

**(20 mins.)** Now you're going to trace or sketch your bird's beak and one of its feet in the spaces provided on the worksheet. Use the magnifying glass to include as much detail as you can and label any parts that you can.

*(There is a measuring guide in the nature journal that shows how to measure beaks and feet. If students finish early, have them draw the whole bird in the space on the bottom of page 11.)*

**(10 mins.)** Next, you're going to make a prediction (hypothesis) about what food your bird eats and what habitat it might be found in based on its beak and feet. On the bottom of the worksheet on page 10 in your nature journal, write a few sentences with details to support your prediction.

**(10 mins.)** Now you'll each have a turn to share your observations to the others in your group. Pass around your bird if it is small enough to easily pass around, otherwise, leave it in the middle of your desks so everyone can see it. Now tell the other students in your group where you think your bird lives and why. Point out the characteristics of the beak and feet that led to your prediction.

**(5 mins.)** Has everyone had a chance to share their bird with their group? Okay, next you'll have a chance to take a look at all of the other birds in the room. Leave your bird out on your desk, and we'll slowly walk around the room to see the other birds. You can touch the birds, but don't have them pick them up so everyone will have a chance to see all of them.

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**(10 mins.) Now return to your group so you can find out if your predictions were correct.**

*(Pass out the bird field guide cards—laminated bird photos with details about each bird—and the Birds of the Puget Sound Region field guides.)*

**Looking at your bird card, see if your predictions about what your bird eats and where it lives are correct.**

**Write down the name of your bird in the space provided at the top of Worksheet 2 on page 11.**

You can look up your bird in the field guide to find out more facts about it.

*(The birds are listed alphabetically in the index under the type of bird: e.g. hawk, hummingbird and duck.)*

This is your chance to make any corrections about what your bird eats and where it lives. And on Worksheet 2, **write down at least three interesting facts about your bird** in the space provided.

**(5 mins.) Now I'd like any volunteers to share one thing they learned about how their bird's beak or feet help the bird get food.**

That's the lesson for today, but you can continue practicing your observation skills. See if you notice any new birds on your way home from school or at home. Watch what they are doing. Can you pick up any clues about why they are where they are? Can you identify the bird? Make notes and draw pictures in the back of your nature journal if you'd like.

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### Lesson 3: Tooth Sleuth—Tacoma Mammal Puzzler

#### (5 mins.) Intro

In our last lesson we continued to practice our observation skills using bird specimens found in Tacoma. Did anyone notice anything new about birds after our lesson?

**Today we're going to use those skills to look closely at Tacoma mammal skulls.** We're going to learn about the four different kinds of teeth that mammals have and use a special key to identify mammal skulls. We'll also learn how teeth provide information on whether the animal is a carnivore or herbivore.

Teeth, skulls and bones provide a surprising number of clues about the living animals they were once part of—so many, in fact, that some scientists can correctly guess an animal by looking at just one of its bones. In the late 1700s, a French paleontologist named Georges Cuvier was known for his skill at this. In his groundbreaking work known as “Cuvier's principle of correlation of parts,” he wrote, “...*Because the number, direction, and shape of the bones that compose each part of an animal's body are always in a necessary relation to all the other parts, in such a way that— up to a point—one can infer the whole from any one of them and vice versa.*”

Even without Cuvier's knack, we can identify different animals based on their teeth. And you're going to get a chance to do just that in a few minutes.

**(10 mins.)** *(Use the PowerPoint presentation (Part 1) to teach the students characteristics of the four main different types of teeth (canines, incisors, premolars and molars), and teach what the different types of teeth are used for. You can access the Tooth Sleuth PowerPoint online at:*

[http://www.pugetsound.edu/files/resources/6498\\_L3\\_Tooth%20Sleuth%20Powerpoint\\_2\\_8\\_10.pdf](http://www.pugetsound.edu/files/resources/6498_L3_Tooth%20Sleuth%20Powerpoint_2_8_10.pdf)

***(In this lesson, we have grouped premolars and molars together as “molars” to make it easier for students to count the teeth.)***

These slides show that teeth can help us tell whether an animal is a carnivore (eats meat) or an herbivore (eats plants). For example, deer and elk have many large flat molars for grinding, indicating plants as their main food source. A coyote's large canine teeth are used to tear meat. (Note: Some animals are omnivores—they eat both animals and plants. It's not easy to determine this by observing only teeth, so in this lesson we will

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focus on whether the animal is *mainly* a carnivore or an herbivore. The teeth of omnivores look most similar to those of carnivores.)

***(Stop when you get to the slide that reads, “Part 2.” You will present Part 2 of the PowerPoint at the end of this lesson.)***

**Before you use the skulls, I want to remind you to handle them carefully.**

Pick each skull up gently and put it on your desk while observing it to avoid dropping it. Don't clack the teeth together or try to move the teeth because they will fall out. These belong to the Slater Museum and are not for role-playing or games. Please treat them respectfully so lots of students will have a chance to use them.

**(15 mins.) Now we're going to break up into groups of three. Each group's task is to look closely at their skull to find out how many distinctly different teeth are in the skull. Refer students to the Tooth Type Diagram on page 13 of their nature journal for help in remembering the names of the types of teeth.**

*(Pass out one skull to each group. Remind the students that all of the skulls are from mammals found in Tacoma. Also pass out a Naturalist Kit to each student.)*

Your group will work together to make a prediction (hypothesis) both about what types of food the animal eats based on its teeth, and what kind of an animal it might be. Then each of you will sketch each of the different teeth and the whole skull in your nature journal on page 13. You should be able to find two to three different types of teeth in the skull. Remember that your animal may not have all of the different types of teeth, or it may have a certain type in the upper jaw that is not found in the lower jaw.

**(5 mins.) Now you will have a chance to figure out which mammal your skull is from.** Using a ruler to make measurements and your knowledge about tooth types, we will use a dichotomous key to help us find the correct mammal.

*(Pass out the dichotomous keys.)*

**A dichotomous key is a pathway of paired facts used to identify something.** As you match your skull to the correct fact, you are directed to another pair of facts, with the facts eventually leading to one conclusion. In this case, we will use facts about skull size and teeth to identify each animal.

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Now let's go through the first pair of facts together, then you try it on your own and I can help if you need it.

**(25 mins.) Now it's your turn to work with your group to try and identify your skull using the dichotomous key.** After you have identified it, write the skull number and animal name in the space provided in your nature journal on page 15. Also include whether you think it is an herbivore or a carnivore based on what you know about mammal teeth.

After you have identified a skull, raise your hands and I will check to make sure you have correctly identified the skull.

*(A key is located in the back of this notebook and inside the skull box lid.)*

**If you are correct, I will bring you a new skull.**

*(Return the identified skull to the box for another group to use.)*

**If not, I'll help you go through the key and we can find the right answer together.**

**When you get a new skull, use the key to find which animal it belongs to.** Your group can identify as many skulls as possible over the next 20 minutes *(or amount of time left)*. For each skull you identify, fill in the name of the animal and whether it is an herbivore or a carnivore (and why you think so) on your worksheet (page 15).

**(15 mins.)** Okay, now finish up with the skull you are working on and we will move to the next step.

**Now two groups will work together. Your job will be to compare two skulls,** fill in the the skull comparison worksheet T-chart in your nature journal on page 16. Make notes about things that are the same (similarities) in the box above the chart, and write differences in the T-chart below. You can use the characteristics listed to make your comparisons, but try to add one or two of your own at the bottom of the left column.

*(Assign groups based on the color of the skull numbers: a group holding a skull with a red number will be paired up with a group with a skull with a blue number (to ensure an*

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*interesting comparison session examining the differences between herbivores and carnivores).*

**(10 mins.) Wrap up your comparisons and have one person return the skulls to the boxes on the table, and then return to your seats, please.**

*(Have the class reconvene as a whole and show the PowerPoint (Part 2). The PowerPoint slides show each skull, identify it with brief notes on foods and how the teeth function to feed on different foods, and include a photo and facts about each of the animals. The slide also includes the scientific name of each animal—the universal name used by scientists around the world when they refer to a particular organism. The first word in the scientific name is the genus of the animal and the second word is the species. For example, the scientific name for coyote is *Canis latrans* (*Canis* is the genus and *latrans* is the species).)*

**(5 mins.) That's it for our lesson for today and our Slater Museum lessons.** I'd like you to share one thing you learned today or during one of the other lessons on Tacoma Wild Things and birds.

**Don't forget—you can continue to add to your nature journals** at home and see what kind of discoveries you can make by paying closer attention to Tacoma's natural treasures.