A Tacoma Nature Center Field Investigation for Grades 5-6
Aligned for Common Core for Grade 5

The Tacoma Nature Center at Snake Lake
An Educational Facility of Metro Parks Tacoma
Program Overview
Directions to TNC
TNC Background Information
Plants and Animals found at TNC

Pre-Field Trip
Vocabulary
Pre-Visit Lessons

Field Trip
Guided Tour Overview

Post-Field Trip
Post-Visit Lessons
Evaluation

Appendices
Appendix A
Appendix B
Appendix C
Appendix D
Appendix E

Field Journal
Appendix F
Thank you for scheduling a guided “Water Sleuths” tour at the Tacoma Nature Center. Our 70-acre nature preserve and interpretive center provides an excellent study site right in the middle of Tacoma. Education staff and volunteers are eager to provide your students with a positive experience. Together we will learn about scientific inquiry and watersheds through explorative walks, interactive programs, hands-on lab experiences and self-guided discovery. Please see enclosed Common Core alignment information.

The $6.00 per child fee includes 2 hours of activities led by staff and/or volunteers. Our tours will go rain or shine, so please advise your group to dress for the weather. In case of inclement weather, there is a designated area inside the building to eat lunch. Otherwise, there are many picnic tables to enjoy an outdoor lunch. Restroom facilities are available inside.

We accept checks, cash or credit cards as well as purchase orders. If possible, please provide a single form of payment for the entire group. We require payment at the time of the program. Groups that arrive more than twenty minutes late cannot be guaranteed a program. If the program is cancelled due to tardiness, you may still be charged for your program.

We hope you enjoy your upcoming field trip to the Tacoma Nature Center.

Please remember:

- Common Core aligned pre-visit vocabulary words and activities and post-visit activities are included in this packet in order to prepare your students for the field trip, and to continue the application of field trip discovery.
- Have at least one chaperone per every 7 children. Our field trips work best when chaperones are prepared to participate in activities and be in charge of necessary discipline.
- Be prepared to divide your class into small groups. Each small group of no more than 15 will be led by a staff and/or volunteer in order to provide the best experience for the students.
- Dress for the weather; we will go outside even if it rains.
- Bring special medications/allergy treatments your child may need.

Each student participating in this program will need a field journal. See Handout Pages 16-21-Appendix F for journal. Please print and prepare enough copies for each student. We will provide a small clipboard and pencil for students to use while they are here.

Your input is important. Please complete the enclosed evaluation after the field trip and help us improve. An evaluation is also included in the field journals for your students. This is especially important if your program was supported by grant money as it is required for us to provide evaluation data to the granting organization.
1919 South Tyler Street
Tacoma, WA 98405
(253) 591-6439
Hours: Mon-Sat 9-4; Closed Sundays
tnc@tacomaparks.com

From Northbound or Southbound I-5, take the Gig Harbor/Bremerton exit – Highway 16 West

Exit Highway 16 West at 19th St. East, which is just past Cheney Stadium.

Go to the first light which is Tyler/Stevens Street.

Turn right onto Tyler Street.

The Nature Center driveway is immediately on the left-hand side.
The Tacoma Nature Center and preserve is a remnant of the habitats that once existed more abundantly in the Tacoma area. Within this 70 acre preserve is an emerging Douglas fir forest, which reflects historical influences by humans, logging and fire. The wetland is the dominant feature in the lower area of the park. Snake Lake, a long serpent-shaped body of water, is part of both a swamp and a marsh habitat.

Located geographically in the center of Tacoma, The Tacoma Nature Center preserve is a refuge for many species of wildlife. Although the wetland around Snake Lake is important for urban wildlife, it is the combination of several habitats and the edge areas between them, which is vital to their survival. For example, the red fox may find small mammals, amphibians, and other prey species in the wetlands but the terrain and plant cover in the forest habitat provide better shelter, protection from humans, and cooler temperatures during the summer months. Thus, the Tacoma Nature Center should be viewed as an ecosystem providing all the requirements to sustain life rather than 70 acres of different habitats.

Over 20 different species of mammals live within the boundaries of the preserve. Including both migrants and residents, over 100 species of birds have been identified here. In addition, several species of reptiles and amphibians live in the area. While most species are native, a number of exotics also inhabit the preserve.

The Tacoma Nature Center is open to the public year round. Pets, bicycles and motorized vehicles are not allowed in the park. The Visitor Center offers hands on displays and exhibits that focus on wetlands, watersheds and wildlife. The center is open 9am to 4pm Monday through Saturday. Membership opportunities are also available.
Plants and Animals Seen at Tacoma Nature Center

**Trees**
- Sitka Alder
- Oregon Ash
- Cascara Buckthorn
- Black Cottonwood
- Douglas Fir
- Pacific Madrone
- Scouler Willow
- Garry Oak

**Amphibians/Reptiles**
- Pacific Tree Frog (Chorus Frog)
- Bullfrog
- Long-toed Salamander
- Northwest Salamander
- Rough-skinned Newt
- Western Painted Turtle
- Common Garter Snake
- Northwester Garter Snake
- Northern Alligator Lizard

**Shrubs/Groundcovers**
- Red Elderberry
- Clustered Wildrose
- Indian Plum
- Oceanspray
- Tall Oregon Grape
- Douglas Spirea
- Black Twinberry
- Evergreen Huckleberry
- Orange Honeysuckle
- Baldhip Rose
- Beaked Hazelnut
- Common Snowberry
- Red Huckleberry
- False Lily-of-the-Valley
- Salal
- Trailing Blackberry
- Dwarf Oregon Grape
- Sword Fern
- Creeping Snowberry
- Bracken Fern

**Birds**
- Canada Goose
- Wood Duck
- Gadwall
- American Wigeon
- Mallard Northern Shoveler
- Bufflehead
- Common Goldeneye
- Hooded Merganser
- Pied-billed Grebe
- Great Blue Heron
- Osprey
- Bald Eagle
- Cooper’s Hawk
- Sharp-shinned Hawk
- Red-tailed hawk
- Glaucous-winged Gull
- Rock Pigeon Barn Owl
- Barred Owl
- Anna’s Hummingbird
- Belted Kingfisher
- Downy Woodpecker
- Northern Flicker
- Olive-sided Flycatcher
- Western Wood-Pewee
- Pacific-slope Flycatcher
- Warbling Vireo
- Cassin’s Vireo
- Hutton’s Vireo
- Steller’s Jay
- American Crow
- Common Raven
- Violet-green Swallow
- Barn Swallow
- Cliff Swallow

**Mammals**
- Red fox
- Coyote
- Raccoon
- Virginia Opossum
- Eastern Cottontail
- Douglas Squirrel
- Eastern Gray Squirrel
- Townsend’s Chipmunk
- Norway Rat
- Deer Mouse
- Vagrant Shrew
- Townsend’s Mole
- Black-tailed Deer

- Black-capped Chickadee
- Chestnut-backed Chickadee
- Bushtit
- Red-breasted Nuthatch
- Brown Creeper
- Bewick's Wren
- Pacific Wren
- Golden-crowned Kinglet
- Ruby-crowned Kinglet
- Swainson’s Thrush
- Hermit Thrush
- American Robin
- Varied Thrush
- European Starling
- Cedar Waxwing
- Yellow-rumped Warbler
- Black-throated Gray Warbler
- Wilson’s Warbler
- Yellow Warbler
- Spotted Towhee
- Fox Sparrow
- Song Sparrow
- White-crowned Sparrow
- Golden-crowned Sparrow
- Dark-eyed Junco
- Western Tanager
- Black-headed Grosbeak
- Red-winged Blackbird
- Brown-headed Cowbird
- Purple Finch
- House Finch
- Pine Siskin
- American Goldfinch
- House Sparrow
Data - information

**Secchi disk** - disk used to measure how clear water is (pictured below)

**Clarity** - how clear something is

**Observe** - use your senses (sight, hearing, smell, touch) to gather information. We generally will not use our sense of taste to observe and gather information in nature.

**Wildlife** - wild animals

**Species** - a specific kind of animal

**Acidic** - acid like, a measure in chemistry of a solution; sour-taste

**Alkaline** - base like, a measure in chemistry of a solution; bitter or soapy taste

**Tolerance level** - level a living organism can experience and still live and thrive

**Nature preserve** - protected natural area
To be sure your students get the most out of their visit to the Tacoma Nature Center, we suggest you prepare them with the lessons below. Each is designed to compliment 5th grade Common Core Standards. 45-60 minutes (or more) each lesson.

**Science**

<table>
<thead>
<tr>
<th>Learning Target</th>
<th>I can explain good science habits.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Next Generation Science Standards</strong></td>
<td>Science Models, Laws, Mechanisms, and Theories; Explain Natural Phenomena</td>
</tr>
<tr>
<td></td>
<td>Science explanations describe the mechanisms for natural events (5-LS2-1)</td>
</tr>
<tr>
<td><strong>Do Now/ Warm Up</strong></td>
<td>Make a “wordle” for the word SCIENTIFIC. Use science-related words for each letter in the word.</td>
</tr>
<tr>
<td></td>
<td>You can provide the example below to get students started thinking or have them work on their own. Provide a reasonable time frame for them to think of scientific words before having them share with their elbow partner. When each pair feels they have a good list, create a class list on the board or large paper.</td>
</tr>
<tr>
<td></td>
<td>As you discuss each scientific word, emphasize any words or phrases that relate to the scientific method. You may want to circle them to discuss later.</td>
</tr>
<tr>
<td></td>
<td>Example: Specimen Control group</td>
</tr>
<tr>
<td></td>
<td>Specimen Control group</td>
</tr>
<tr>
<td></td>
<td>I E N T I F I C</td>
</tr>
<tr>
<td><strong>Tools</strong></td>
<td>11x17 paper for each team</td>
</tr>
<tr>
<td></td>
<td>Markers, colored pencils or crayons</td>
</tr>
</tbody>
</table>
### Activities

Students will discuss the traits of scientific inquiry and the scientific method. They will collaborate to show their understanding of good science habits on a poster to hang in the classroom prior to the field trip to the Tacoma Nature Center.

Write on the board or review the idea that science is about asking lots of questions. Discuss science habits of **observing, communicating, comparing, organizing and relating**. Observing means using all your senses to gather information. Communicating means sharing thinking with others and can be written, oral or other methods. Comparing means finding similarities and differences with what you discover and with what others discover. Organizing means showing data in a way that will be easy for others to understand. Relating means making sense of new information and using it to understand the world around you.

Have students work in pairs or threes. Assign each group one of the 5 science habits listed above so that groups nearby aren’t next to a similar group. Assign each group to make a poster that explains the science habit in words and pictures and provides an example.

At the end of class student groups may share their poster with the class, or post them in class or the hallway as a reminder of the science habits they will need to use on the field trip.

### Assessment

- **Summative**: Completed assignment
- **Formative**: metacognitive exit task: Which science habit do you think will be the most difficult for you? Which will be the easiest for you? Why do you think so? Explain.

### Practice/ Homework

Differentiated-choose one of the following:
- Find an internet site about the scientific method. Print 1 page from the website and be prepared to share about it in class.
- What other subjects would the good science habits help with? Write a 5 sentence paragraph explaining your thinking.
- Use good science habits to discover something new in your neighborhood or playground. Write a paragraph explaining how you used the habits and how they helped you.
### Science/Language Arts

<table>
<thead>
<tr>
<th>Learning Target</th>
<th>I can explain the meaning of important ecology vocabulary.</th>
</tr>
</thead>
</table>
| Common Core Standards | 5.RI.4 Determine the meaning of general academic and domain-specific words and phrases in a text relevant to a grade 5 topic or subject area.  
5.RI.2 Determine two or more main ideas of a text and explain how they are supported by key details; summarize the text. |
| Do Now/ Warm Up | Have students read the document (Handout Page 2-Appendix A). Tell them to circle any key words or words you don’t understand and underline the main ideas. Once students have finished, have them compare their circled words and main ideas with their elbow partner. Finally, compile a list of key words on the board or chart paper. |
| Tools | Copies of document for each student  
Copies of Personal Wetland Dictionary pages for each student, or have students copy into their journal. |
| Activities | Reading, Thinking Time, Turn and Talk, Whole Class Discussion, vocabulary pages in journal or handout |

To prepare for the field trip, understanding some key vocabulary words will help all students get more out of the experience. From your class list, or the words provided, students will create a Personal Wetland Dictionary of key terms. They may do this in their journals or on the handouts provided (Handout Pages 3-8-Appendix B). You may want to pair students as appropriate to work on their dictionary pages, and alter the number of words assigned as manageable for your students.

Suggested key words are:
- nature preserve
- habitat
- species
- clarity
- pH
- acidic
- alkaline
- nitrates
- phosphates
- biodiversity
- watershed

The following websites have great information about water quality that may help students make sense of the terms:
- [http://water.usgs.gov/edu/waterquality.html](http://water.usgs.gov/edu/waterquality.html)
- [http://water.epa.gov/learn/kids/waterforkids.cfm](http://water.epa.gov/learn/kids/waterforkids.cfm)
### Assessment

<table>
<thead>
<tr>
<th>Summative: Completed vocabulary pages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Formative: metacognitive exit task: Rate yourself 1-5 on how well you think you understand the vocabulary words learned in class. Why do you think so? Explain.</td>
</tr>
</tbody>
</table>

### Practice/ Homework

Differentiated—choose one of the following:

- Find an article in print or online that is related to the article you read in class. Identify any words in common with the ones you learned in class.
- Write an 8 line poem using the vocabulary words learned in class.
- Explain the meaning of your vocabulary words to a parent or guardian at home. Have them send a note with their signature showing you understood the words.

### Science/ Math

<table>
<thead>
<tr>
<th>Learning Target</th>
<th>I can explain how I find the mean of a set of numbers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Common Core Standards</td>
<td>5.NBT.7 Add, subtract, multiply and divide decimals to hundredths, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method and explain the reasoning used.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Do Now/ Warm Up</th>
<th>If you got an 80% on your first math test, a 90% on your second math test and an 85% on your third math test, what would be your overall grade in math? Would this meet standard? Explain your thinking.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Allow 5 minutes for students to think and work the problem on their own before sharing and discussing their answer with their elbow partner. Walk around the class to find students to share their thinking with the class. Especially look for misconceptions to highlight and students thinking about the overall grade being something in the “middle” or “center” of the other scores. Have selected students share their thinking and discuss with the class.</td>
<td></td>
</tr>
</tbody>
</table>

| Tools | Copies of the handout for each student |
Activities | Think Time, Turn and Talk, Partner Work, Whole Class Discussion
---|---
Discuss the idea of “mean” as a measure of center or a “leveling out” of data points. Provide examples of sports scores, prices of soda, grades, and the like. Emphasize that scientists often use the mean, or average, of a set of numbers when collecting data and discuss why this may be true.

You may want students to derive their own method for finding the mean, or explain why we add the numbers in a data set and divide by the number of numbers. Explain that they will be finding the mean of a set of numbers while on the field trip to the Tacoma Nature Center. Distribute the handout “What do you MEAN?” to provide opportunities for students to practice finding the mean before the field trip (Handout Pages 9-10-Appendix C).

Assessment | Summative: class observation
Formative: exit task- Explain how to find the mean of a set of numbers.

Practice/ Homework | Differentiated-choose one of the following:
- Find the mean ages of the people living in your home.
- Write a paragraph explaining why you think baseball players use “averages” or “means” when describing their stats
- Calculate the Mean- handout
Objectives
Discover how earth systems connect as students investigate a local wetland habitat. Search out the threads linking human activity and watershed quality.

Schedule of Activities
1. Upon arrival, students gather on the wooden seats in the center of the building. Children are encouraged to find a seat quickly and quietly so that we can begin. A Naturalist will then spend a few minutes providing an orientation to the Tacoma Nature Center. Information will include:
   - Rules, etiquette and expected behavior
   - General outline of the day’s activities
   - An introduction to being a Water Sleuth

   We will spend approximately 10 minutes discussing the above. After this, we will split in to groups for the rest of the tour. We ask teachers to assign the groups as they are familiar with the number of kids per chaperone, students’ names and the like. Groups will contain no more than 15 students. Use the following as a guide to the number of groups you should assign prior to the trip:
   - If you make a reservation for 10-15 students, you will have 1 group.
   - If you make a reservation for 16-30 students, you will have 2 groups.

2. Once the students are divided in to groups, each leader will rotate their groups through the various activities. Students will collect data about the health of Snake Lake.

   Watching the Wildlife- Students will record the number and variety of animals they see or hear and record this information on the appropriate page in the journal. This will help determine species diversity, an indicator of habitat health.

   Watching the Water- Additionally, students will use Secchi disks at the bridge to determine water clarity. Clear water lets light penetrate more deeply into the lake than does murky water. This light allows photosynthesis to occur and oxygen to be produced. Light can penetrate to a depth of 1.7 times the Secchi disk depth. Also along the way, a naturalist will point out animals and plants of a wetland and the role they play in the ecosystem, and will also discuss where the water in Snake Lake comes from and the value of Snake Lake for flood control.
Lab - Wonder About Watersheds. Student will learn about watersheds using maps of the Snake Lake watershed and the watershed model. They will also discuss the effects of pollution in the watershed. As time allows, students can take turns with the watershed model.

Lab - Water Quality Questions. Students will test samples of Snake Lake water for pH levels using test strips. The Naturalist will discuss how pH affects animal life in a lake. Nitrate and phosphate levels will also be recorded. As time allows, students will observe plankton under microscopes.

A sample schedule for a two class group may look like this:
Small group sizes will allow for hands-on opportunities at each station.

<table>
<thead>
<tr>
<th>First Hour</th>
<th>Second Hour</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group A</td>
<td>Walking tour</td>
</tr>
<tr>
<td>Group B</td>
<td>Lab</td>
</tr>
</tbody>
</table>

Preparing the field journal

Each student must have one!

See Handout Pages 16-21-Appendix F for field journal
- Print the journal single-sided.
- Then match up the pages so that the numbers are in consecutive order.
- Print enough copies for your whole class double-sided.
- Fold and staple in the middle.

If you have any difficulty with preparing the journals, you can pick up a master at the Nature Center. Just contact the program coordinator so a copy can be left for you in Will Call.
To be sure your students get the most out of their visit to the Tacoma Nature Center, we suggest you follow up your field trip experience with the lessons below. Each is designed to compliment 5th grade Common Core Standards. 45-60 minutes (or more) each lesson.

**Science**

<table>
<thead>
<tr>
<th>Learning Target</th>
<th>I can explain good science habits.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Next Generation Science Standards</td>
<td>Science Models, Laws, Mechanisms, and Theories; Explain Natural Phenomena Science explanations describe the mechanisms for natural events (5-LS2-1)</td>
</tr>
<tr>
<td>Do Now/ Warm Up</td>
<td>In journals or on a piece of paper, students are to write 3 things they learned on the field trip to the Tacoma Nature Center, 2 things they enjoyed about the field trip and 1 question they still have. Allow 5-10 minutes for students to think and write independently before asking for students to share.</td>
</tr>
<tr>
<td>Tools</td>
<td>Completed field journals from the field trip. Paper Colored pencils (optional)</td>
</tr>
<tr>
<td>Activities</td>
<td>Discussion, Collaboration, Inquiry, Engineering design</td>
</tr>
</tbody>
</table>

Discuss the field trip and the importance of water quality for the health of the watershed. Explain that now that they know about the water quality at the Tacoma Nature Center, they are going to design something to improve it!

Discuss the steps in the engineering design process:
- **Define the Problem**
- **Do Background Research**
- **Specify Requirements**
- **Brainstorm Solutions**
- **Choose the Best Solution**
- **Do Development Work**
- **Build a Prototype**
- **Test and Redesign**

You will likely work through the first five or six as time allows, but building model prototypes, testing them and revising as necessary are excellent extensions.
## Water Sleuths Post-Visit Lessons Cont.

| Activities | Work through the first few steps together. You may define the problem as, “The water in Snake Lake is too silty from stormwater runoff” or “The water in Snake Lake has too many nitrates in it”. It is up to you and your class, and may depend on the data you collect on your field trip. The background research was essentially the field trip itself. Discuss with the class what requirements are needed for their invention and brainstorm solutions on the board or chart paper.

Allow students time to work independently on their device to solve the water quality problem. Students can present their work to the class or even send their ideas to the Tacoma Nature Center. |
| Assessment | Summative: Completed assignment Formative: Walk around and evaluate designs. Are they meeting the needs of the project? |
| Practice/ Homework | Differentiated-choose one of the following:
   - What do you think is the most important invention of all time? Write a paragraph explaining what it is and why you think it is so important.
   - Research an invention that you admire. Find out about the scientist or inventor who created it. Be prepared to teach the class what you learned.
   - Visit another wetland in the city. Do you think it is a healthy habitat? Why or why not? Take photos of your trip to share with the class. |
### Science/ Language Arts

<table>
<thead>
<tr>
<th>Learning Target</th>
<th>I can explain an environmental issue in my city.</th>
</tr>
</thead>
</table>
| Common Core Standards | 5.RI.7 Draw on information from multiple print or digital sources, demonstrating the ability to locate an answer to a question quickly or to solve a problem efficiently.  
5.RI.9 Integrate information from several texts on the same topic in order to write or speak about the subject knowledgably.  
5.W.7 Conduce short research projects that use several sources to build knowledge through investigation of different aspects of a topic. |
| Do Now/ Warm Up | Quick Write- write for two minutes about what you think may be an environmental issue in our city. You may write complete sentences or a list but you must write for the entire time. |
| Tools | Student access to the internet and written resources  
Optional poster-making supplies |
| Activities | Writing, reading, inquiry, research  
Tacoma is a wonderful city, but even here there are environmental issues that impact us all. What are they? What can we do about them? That is what this research project is about.  
Students are to research an environmental issue in our city. They can use the research template provided (“Troubleshooting Tacoma”) or another way of being sure they find all the information needed (Handout Page 11-Appendix D). Once they have researched their issue, they are to offer a possible solution or solutions. Their research, solution and call to action will be put together on a Call to Action Poster to be hung in the school hallways. |
| Assessment | Summative: Completed research project  
Formative: exit task-explain your research topic and why it is a problem for our city. |
| Practice/ Homework | Continue working on research project in order to finish by the required deadline. |
### Science/ Math

<table>
<thead>
<tr>
<th>Learning Target</th>
<th>I can explain how I make sense of my data using a line plot</th>
</tr>
</thead>
<tbody>
<tr>
<td>Common Core Standards</td>
<td>5.MD.2 Make a line plot to display a data set of measurements in fractions of a unit (1/2, 1/4, 1/8). Use operations on fractions for this grade to solve problems involving information presented in line plots.</td>
</tr>
<tr>
<td>Do Now/ Warm Up</td>
<td>Review your data from your field journal. On each chart paper, write the pH, clarity, nitrate level and phosphate level from your journal. (Note: this is a movement activity. Class procedures apply.)</td>
</tr>
<tr>
<td>Tools</td>
<td>Chart paper, student journals from the field trip, graph paper, copies of handout for each student</td>
</tr>
<tr>
<td>Activities</td>
<td>Inquiry, Whole Class Discussion, Think Time</td>
</tr>
</tbody>
</table>

It will probably be pretty clear to students when they see their data on the chart papers that this is not a very clear or organized way to show data. The data is all accurate, but it doesn’t mean very much without an organized way of displaying it. This is one reason scientists use graphs to display and interpret their data.

On each chart paper, number the “trials” so that all graphs will look the same at the end. For example, the first student’s number will be trial 1, the second will be trial 2, and so on.

For each set of data (pH, clarity, nitrate level, phosphate level) have students make a line plot. You may use the handout provided (“And the Data Says…”) or graph paper or journals (Handout Pages 12-15-Appendix E). Start with pH, where the intervals on the graph are given, and have students determine the intervals for clarity, nitrate and phosphate. You may need to draw in additional length on the x-axis depending on the number of trials your class has.

The impact of the graph is in the interpretation of the graph. Have students answer the questions at the bottom of the handout or answer and discuss similar questions in their journals.

| Assessment | Summative: completed handout  
Formative: exit task- using your line plot, find the mean value of the class’ pH values |
| Practice/ Homework | Find a line plot in the newspaper, a magazine or on the internet. Interpret what it means and write 2-3 sentences about it. Bring the line plot and your sentences to share with the class. |
School___________________________________________________
Grade level_______________________________________________
Date of visit ______________________________________________
How did you hear about us? _________________________________

Please rate the following by circling the appropriate number from 1 (lowest) to 5 (highest).

The packet contains clear and useful information. 1 2 3 4 5
The field trip met my expectations. 1 2 3 4 5
The Pre-Visit Lessons helped prepare students for program concepts. 1 2 3 4 5
The Post-Visit Lessons helped reinforce concepts students learned. 1 2 3 4 5
The Common Core aligned material met my curriculum goals. 1 2 3 4 5
My students were able to relate to and understand the Common Core aligned material. 1 2 3 4 5
My students had a learning experience. 1 2 3 4 5
My students had fun. 1 2 3 4 5
I am likely to recommend this program. 1 2 3 4 5
The presenter was knowledgeable and fun. 1 2 3 4 5

Presenter name _______________________________________

Comments:
Appendices
Read the passage below. Circle key words or any words you don’t know and underline the main idea.

Last week my aunt took me to visit a wetland nature preserve. I couldn’t believe the biodiversity there! There were so many different species of plants and animals living in this habitat. We went for a short walk along the water’s edge and I peered in to the water to see if I could spot a fish or amphibian. The clarity of the water made me wonder about the water quality. I know that many amphibians are sensitive to pH, a liquid’s acidity or alkalinity. I noticed that there were several houses nearby, and I wondered if nitrates or phosphates were possibly getting into the wetland. I live in the same watershed, and want to keep it healthy.
## Personal Wetland Dictionary

<table>
<thead>
<tr>
<th>Definition in your own words</th>
<th>Facts / characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>nature preserve</strong></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Examples</th>
<th>Non– examples</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Illustration</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

---

<table>
<thead>
<tr>
<th>Definition in your own words</th>
<th>Facts / characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>habitat</strong></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Examples</th>
<th>Non– examples</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Illustration</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>
# Appendix B

## Personal Wetland Dictionary

**Name:** ___________________________

**Date:** __________________________

<table>
<thead>
<tr>
<th>Word</th>
<th>Definition in your own words</th>
<th>Facts / characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td>species</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Examples**

**Non-examples**

**Illustration**

<table>
<thead>
<tr>
<th>Word</th>
<th>Definition in your own words</th>
<th>Facts / characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td>clarity</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Examples**

**Non-examples**

**Illustration**
Personal Wetland Dictionary

Name: ___________________________
Date: ____________________________

<table>
<thead>
<tr>
<th>Word</th>
<th>Definition in your own words</th>
<th>Facts / characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td>pH</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Word</th>
<th>Definition in your own words</th>
<th>Facts / characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td>acidic</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Examples

Illustration

Non-examples
### Personal Wetland Dictionary

**Word:** alkaline

<table>
<thead>
<tr>
<th>Definition in your own words</th>
<th>Facts / characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Examples</th>
<th>Non– examples</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Illustration</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
</tbody>
</table>

### Personal Wetland Dictionary

**Word:** nitrates

<table>
<thead>
<tr>
<th>Definition in your own words</th>
<th>Facts / characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Examples</th>
<th>Non– examples</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Illustration</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
</tbody>
</table>
Appendix B

Personal Wetland Dictionary

Name: ___________________________
Date: ____________________________

<table>
<thead>
<tr>
<th>Word</th>
<th>Definition in your own words</th>
<th>Facts / characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td>phosphates</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Examples</th>
<th>Non– examples</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Word</th>
<th>Definition in your own words</th>
<th>Facts / characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td>biodiversity</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Examples</th>
<th>Non– examples</th>
</tr>
</thead>
</table>

Illustration
## Personal Wetland Dictionary

Name: ___________________________
Date: __________________________

<table>
<thead>
<tr>
<th>Word</th>
<th>Definition in your own words</th>
<th>Facts / characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td>watershed</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Examples**

<table>
<thead>
<tr>
<th>Illustration</th>
</tr>
</thead>
</table>

**Non-examples**
What do you MEAN?

What is the mean of this set of numbers?

1 2 3 4 5 6 7 8 9

What is the mean of this set of numbers?

1 2 3 4 5 6 7 8 9 10

Juan says the number in the mathematical middle of the set below is 4, but Pamela says the number in the mathematical middle is 5. Who is right? Prove your answer with words or pictures.

3 4 5 6

Scientists use the mean, or mathematical middle, to represent large amounts of data. We can think about “leveling off” all the numbers to find one that represents the whole set.

Dr. Science was measuring the lengths of fish she caught near her study site before she let them go. She caught 5 fish with the following lengths:

12 inches 13 inches 11 inches 14 inches 10 inches

What is the mean length of the fish near her study site? __________________________

Show your strategy and prove you are right.
Calculate the MEAN

The frogs at the Tacoma Nature Center lay hundreds of eggs each year. Scientists studying the frogs found 332 eggs near the bridge, 452 eggs near the north shore, 378 eggs on the south side of the lake, 102 eggs at the mouth of the lake and 200 eggs near post marker 10. What is the mean number of frog eggs found at the Tacoma Nature Center? ________________

Show your strategy and prove you are right.

In a newly planted patch of forest, students visiting the Tacoma Nature Center decided to measure the heights of the trees. They organized their results in the table below:

<table>
<thead>
<tr>
<th>Species of tree planted</th>
<th>Height</th>
</tr>
</thead>
<tbody>
<tr>
<td>Douglas fir</td>
<td>4 feet</td>
</tr>
<tr>
<td>Western red cedar</td>
<td>3 feet</td>
</tr>
<tr>
<td>Pacific madrone</td>
<td>2 feet</td>
</tr>
<tr>
<td>Bigleaf maple</td>
<td>3 feet</td>
</tr>
<tr>
<td>Vine maple</td>
<td>2 feet</td>
</tr>
<tr>
<td>Red alder</td>
<td>3 feet</td>
</tr>
<tr>
<td>Cottonwood</td>
<td>4 feet</td>
</tr>
</tbody>
</table>

What is the mean height of the newly planted trees? ________________________________

How do you know you are right?

What questions do you have? _______________________________________________________
Troubleshooting Tacoma

Tacoma is a great city, but there are still environmental issues that impact us all. Your job is to research one of these issues and help others learn more about it. The more people know, the more they can help with the solution!

Environmental issue I will research: ______________________________________________________________

___________________________________________________________________________________________

Where is it a problem? ____________________________________________________________

___________________________________________________________________________________________

Who does it impact? _________________________________________________________________

___________________________________________________________________________________________

How does it affect Tacoma? ________________________________________________________________

___________________________________________________________________________________________

Why is it important? _________________________________________________________________

___________________________________________________________________________________________

Other interesting information about this issue: ________________________________________________

___________________________________________________________________________________________

Here are my ideas to solve this problem:

___________________________________________________________________________________________

Sources

This is where I got my information: (list below)
Appendix E

And the Data Says...

Plot your class pH data below.

<table>
<thead>
<tr>
<th>Trial</th>
<th>pH</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>7</td>
</tr>
<tr>
<td></td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>9</td>
</tr>
<tr>
<td></td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>11</td>
</tr>
<tr>
<td></td>
<td>12</td>
</tr>
<tr>
<td></td>
<td>13</td>
</tr>
<tr>
<td></td>
<td>14</td>
</tr>
<tr>
<td></td>
<td>15</td>
</tr>
<tr>
<td></td>
<td>16</td>
</tr>
<tr>
<td></td>
<td>17</td>
</tr>
<tr>
<td></td>
<td>18</td>
</tr>
<tr>
<td></td>
<td>19</td>
</tr>
</tbody>
</table>

What does your line plot show? Summarize what your graph means.
Plot your class clarity data below.

What does your line plot show? Summarize what your graph means.

_________________________________________________________________
_________________________________________________________________
_________________________________________________________________

Tacoma Nature Center– Water Sleuths
And the Data Says...

Plot your class phosphate data below.

Trial

What does your line plot show? Summarize what your graph means.

Name: ___________________________
Date: ____________________________
And the Data Says...

Plot your class nitrate data below.

What does your line plot show? Summarize what your graph means.

__________________________

__________________________

__________________________
Introduction

Welcome to the Tacoma Nature Center and the nature preserve around Snake Lake. This area is a habitat for many animals and people enjoy visiting this preserve too. Is this a healthy habitat? We want you to find out. Collect data about the quality of the water and habitat. Then use the data to decide if this is a healthy habitat. If it is, tell us why. If it isn’t, tell us how it can be improved.

Remember, science is about asking lots of questions. Use good science habits by:

- observing with all your senses,
- communicating with other students,
- comparing what you learn with what you know and with what others find,
- organizing your data in a way that makes sense to you and others, and
- relating what you learn to the world around you.

It is important to follow all the rules of the Tacoma Nature Center, stay together with your group and pay attention. Don’t forget to have fun while learning!

Event Evaluation

So, how was your day? We want to know how you liked your field trip to the Tacoma Nature Center. Circle the face below that answers each question. When you are done, tear off this page and give it to your teacher or Naturalist. Thanks!

Today I had fun. ☻ ☻ ☼

Today I learned something new. ☻ ☻ ☼

I know how scientists study water. ☻ ☻ ☼

I know why scientists study water. ☻ ☻ ☼

I understand what a watershed is. ☻ ☻ ☻

I know why clean water is important. ☻ ☻ ☻

I know what I can do to help keep streams and lakes clean. ☻ ☻ ☻

I want to make a difference in my watershed. ☻ ☻ ☼

My age. _____________________
What is a watershed? Find out from your Naturalist, and then draw an example of a watershed below.

Where does the water in Snake Lake come from? ______________________________________
_______________________________________
_______________________________________

Water quality can also be measured by how many organisms live in it. Did you find anything alive in the water? Draw it here.
**Watching the Water**

One way to determine if water is clean is to use a *Secchi Disk* to measure the *clarity*.

Your Naturalist will show you how to use the *Secchi Disk*. Record your measurements below. *Note: This test may not be possible if the water depth of Snake Lake is too low.*

<table>
<thead>
<tr>
<th>Depth</th>
<th>Sample 1 =</th>
<th>Sample 2 =</th>
<th>Sample 3 =</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(add all Samples together)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Average</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(divide the total by 3)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Think About It!*

What do you think these results tell you about Snake Lake?

---

**Class Conclusions**

OK, now we put all your data together. For each category, circle the box that shows the data YOU collected.

### Health of Snake Lake

<table>
<thead>
<tr>
<th></th>
<th>Great!</th>
<th>O.K.</th>
<th>Not healthy</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>pH</strong></td>
<td>6.5 to 8.0</td>
<td>6.0 to 6.4</td>
<td>less than 6</td>
</tr>
<tr>
<td></td>
<td>Or 8.1 to 8.9</td>
<td>Or more than 9</td>
<td></td>
</tr>
<tr>
<td><strong>Nitrates</strong></td>
<td>0 to 4</td>
<td>5 to 15</td>
<td>more than 15</td>
</tr>
<tr>
<td><strong>Phosphates</strong></td>
<td>0 to 2</td>
<td>3 to 4</td>
<td>more than 4</td>
</tr>
<tr>
<td><strong>Animal Species</strong></td>
<td>Observed</td>
<td>Observed</td>
<td>Observed</td>
</tr>
<tr>
<td>(Kinds)</td>
<td>10 or more species</td>
<td>4 to 9 animal species</td>
<td>less than 4 species</td>
</tr>
<tr>
<td><strong>Observed Outside</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Numbers of Animals</strong></td>
<td>Observed</td>
<td>Observed</td>
<td>Observed</td>
</tr>
<tr>
<td><strong>Observed Outside</strong></td>
<td>25 or more total animals</td>
<td>15 to 24 total animals</td>
<td>fewer than 15 total animals</td>
</tr>
</tbody>
</table>

Which column has the most boxes circled?

*That’s the level of health of Snake Lake!*
Did your data show that Snake Lake is healthy? If so, write or draw why it is healthy. If not, write or draw 2 things that can be done to improve it or make it healthy again.

While outside, keep alert to observe any wildlife that may be living here. List any animals you see or hear below.

<table>
<thead>
<tr>
<th>Animal</th>
<th>Saw?</th>
<th>Heard?</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

How many animals did you observe? _____
How many different species (kinds of animals) did you observe? ______________
There are several ways to measure water quality. Here are two kinds of measurements that scientists often use to determine water quality. High levels of nitrates or phosphates in the water can negatively affect water quality. Animals cannot survive in waters with high levels of these substances.

Since the chemicals needed to test these aspects of water quality can be expensive, staff at the Nature Center will perform the test once and display the results for each group to record here. **Put a point on each number line that best matches the reading you find in the lab.**

### Nitrate Level

<table>
<thead>
<tr>
<th>0</th>
<th>0.5</th>
<th>1.0</th>
<th>1.5</th>
<th>2.0</th>
<th>2.5</th>
<th>3.0</th>
<th>3.5</th>
<th>4.0</th>
</tr>
</thead>
</table>

### Phosphate Level

<table>
<thead>
<tr>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
</table>

Another indicator of water quality is pH. This is the measure of how **acidic** or **alkaline (basic)** the water is. Scientists can test pH using test strips. Your Naturalist will show you how to test your water sample. **Put a point on the number line that best matches your sample’s pH.**

<table>
<thead>
<tr>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
<th>11</th>
<th>12</th>
<th>13</th>
<th>14</th>
</tr>
</thead>
</table>

### Average pH of some common household liquids:
- Coca-cola: 2.5
- Lemonade: 3.8
- Drinking water: 6.5
- Ammonia: 11.0
- Bleach: 12.0