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## Lesson 1: Introduction to Place through Maps and Sagebrush

### Unit: 5<sup>th</sup> Grade Ecology Unit: A Sagebrush Expedition Lesson: Introduction to Place through Maps and Sagebrush

**Overview:** This lesson aims to initiate students' thinking about place, community, and science. By creating maps of their own community and exploring maps in WyoBio, students will be introduced to the scientific process or "Science Circle". Students will be given the opportunity to (a) use their observation skills to create their own map as well and explore other maps (b) learn how observations can help inform our maps and (c) how maps can help us have a better understanding of our own community or place.

**Main Take Away:** Students will be introduced to the unit and the essential questions they will be working on answering over the next several weeks. Students will begin thinking about their local community and environment and how they impact it as humans as well as how it impacts them. They will further explore their community through the exploration of a variety of maps.

#### Learner Outcomes

*Students will be able to...*

- Understand the importance of place through mapping out their homes and community.
- Understand that the Sagebrush Ecosystem is a part of their local community and comprised of many interdependent relationships.
- Use the WyoBio website to look at local plant and animal distribution maps to better understand their local landscape and to gain a deeper understanding of what exists there.

#### Getting Ready

**Materials:** Pre-surveys, Computers to access WyoBio, large paper for map activity, pencils and colored pencils.

**Preparation:** Print out pre-surveys for each student, arrange for student access to WyoBio (classroom or computer lab), familiarize themselves with WyoBio.

**Location:** In a classroom and a computer lab where students have internet access.

#### Length of Time:

2 Lessons

Approximately 60-75 minutes each

#### NGSS Standard(s) Addressed:

- **Disciplinary Core Idea:** ESS3.C: Human impacts on earth systems
- **Science and Engineering Practices:** Developing and using models

#### Place-Based Principle(s) Addressed:

- Fostering love of one's place
- Learning is personally relevant to students

#### Unit Connections

(How specific lesson connects to overall goals and objectives of the unit)

**Transfer Goals:** *Students will be able to independently use their learning to understand that...*

- TG1- Science is a process that helps us gain a collective understanding of how the world works, it is a lifelong process, it is applicable every day, and accessible to everyone.
- TG2- Humans are an interconnected part of the natural world and can have both positive and negative impacts.
- TG3- Cultivating a sense of place, through intentional interactions, inspires curiosity about one's community and helps to develop a conservation ethic.

**Unit Essential Question:** *Students will keep considering...*

- What is special about my community and what can I learn from it?

- **How can my actions, as a human, impact my community?**

**Specific Lesson Content Objectives: *Students will be able to...***

- Understand the importance of place through mapping out their homes and community.
- Understand that the Sagebrush Ecosystem is a part of their local community and comprised of many interdependent relationships.
- Use the WyoBio website to look at local plant and animal distribution maps to better understand their local landscape and to gain a deeper understanding of what exists there.

**Specific Lesson Language Objectives: *Students will be able to...***

- Understand the meanings of map, local, and distribution in order to work with the WyoBio website.
- Point to specific parts of a map (compass rose, keys, distance measurement, etc.) when asked by instructor.

**Key Vocabulary Words:**

- **Place and Community**
- Maps (Key, Compass rose, layers)
- WyoBio
- Sagebrush Ecosystem

**Background Information for the teacher:**

**WyoBio:** The following is an excerpt from the “introduction and about sections” of the WyoBio website: **Wyoming Biodiversity Citizen Science Initiative - or WyoBio is a website created by the Biodiversity Institute at the University of Wyoming.** It is a project intended to connect all people, especially Wyoming citizens, with information about Wyoming’s biodiversity – plants, animals and fungi. We seek to bring together many or all of the different citizen science datasets collected and maintained by a variety of groups across the state, making all biodiversity data available to all interested persons. It is a place where one can research any information about a plant or animal in Wyoming. One can virtually work with scientists, input data that will be used in research projects, help survey the land for all the organisms found, and test hypotheses about why organisms exist in a certain place, change their locations or population sizes over time, and more. Additionally, we aim to create educational experiences connected with Wyoming biodiversity data so that students and citizens become more knowledgeable about and connected with organisms and ecosystems in their own state.

WyoBio can a wonderful tool to use in the classroom too. It can give students the opportunity to connect more deeply to their place by looking at and manipulating various maps. For example, students can learn how to map vegetation in their specific community as well as look at how the vegetation differs across the entire state of Wyoming. They can then use this information to think about what animals may live in certain areas depending on the vegetation that grow there. They can also begin to look at species range maps to see the distribution of animals across the state. The website also gives students the opportunity to replace background maps with satellite images and layer different maps to get an overall picture of a particular area.

The project was initiated in February 2012, with the first version of the website launched in summer 2014. We will continue to roll out enhanced versions of WyoBio (including more functionality and improved graphics) through summer 2015.

**Sagebrush Ecosystem:**

The vast sagebrush ecosystem of the western United States is a thriving landscape that sustains virtually all western wildlife for at least part of each year. This ecosystem is often referred to as the sagebrush sea because it covers approximately 166 million acres (67 hectares), an expansive landmass of semi-arid lands divided in half by the north-south-running Rocky Mountains. There are eleven western states that compose the ecosystem; Colorado, Wyoming, South Dakota, North Dakota, Montana, Idaho, Washington, Oregon, California, Nevada, and Utah.

The term, “sagebrush sea” well describes the rolling gray-green landscape, but suggests a featureless monoculture, which is an incorrect perception of the sagebrush ecosystem.

The great migrations of pronghorn, mule deer, and elk flow through valleys covered with sagebrush east of the Rockies. Greater Yellowstone’s grizzly bears, the highest concentration in the Lower 48 states, rely on the sagebrush ecosystem while roaming a large territory. In spring and fall, hundreds of bird species, a number of them biologically bound to sagebrush, migrate the Pacific Flyways and Central Flyway on the eastern flank of the Rocky Mountains. Additionally, the sagebrush ecosystem encompasses riparian areas and woodlands. In these habitats, the sagebrush ecosystem is dominated by nearly thirty species, subspecies and hybrid of sagebrush shrub (Showalter, 2015).

### **Building Background for Students: (ELL principle)**

#### **Activate Prior Experiences:**

The teacher will explain that students will do the following:

1. Brainstorm the meaning of science and how it can be considered an expedition.
2. Engage in a pre-survey to access their prior knowledge about science and the sagebrush ecosystem.
3. Brainstorm the meaning of community.
4. Brainstorm what is common in maps.
5. Share stories about experiences in the sagebrush ecosystem.

#### **Link to New Learning from Prior Learning:**

The teacher will explain to students that they will:

1. Explore different types of maps to figure out what is common throughout and how they differ.
2. Engage in the WyoBio website to explore different types of maps about Wyoming.
3. Create their own map connecting what they learned about maps and what they know about their own community.

#### **Vocabulary:**

The teacher will:

1. Create a word wall will be created in the classroom where all new and key vocabulary can be visually displayed. Words can be written, drawn or a combination of both.

### **Common Student Misconceptions/Student Challenges:**

- All maps are the same
- The natural world is not a part of our local community and our local community is not part of the natural world.

#### **Materials:**

- Pre-surveys
- Computers to access WyoBio
- Maps of Wyoming
- Large paper for map activity and pencil
- Colored pencils

#### **Set-up:**

- Have pre-surveys printed and ready
- Familiarize yourself with WyoBio
- Access to enough computers for students to work in pairs

Lesson Agenda	Suggested Procedure	ELL Rationale
<p><b>Engage:</b> Approximately 30-45min</p> <p><b>Introduction of unit and build background knowledge</b></p>	<p><b>Introduction:</b></p> <ul style="list-style-type: none"> <li>• Introduce the unit by forecasting to students: “Over the next several weeks we are going to have the opportunity to delve into the science of ecology through a sagebrush expedition. We will learn how we, as humans, can impact this ecosystem and how this ecosystem can impact us. We will also be working with several research scientists from the University of Wyoming on this expedition. First we are going to think about and discuss what science, ecology, and expedition mean.”</li> <li>• <b>Pose the following questions to students:</b> <ul style="list-style-type: none"> <li>○ What is science? Why might we think of science as a journey or expedition?</li> <li>○ If ecology, the study of the relationships that exist between organisms and their physical surrounding, is a part of science, how can it be a journey or expedition?</li> </ul> </li> <li>• Have students discuss potential answers to these questions within a small group. Have groups share out to the class. <b>(D1)</b></li> <li>• Emphasize that each lesson is a process and a journey and that we will be a part of this journey throughout the next several weeks.</li> <li>• Introduce the two essential questions that students will work on answering over the next several weeks.</li> </ul> <p><b>Pre-Survey:</b></p> <ul style="list-style-type: none"> <li>• Give out pre-surveys for students to fill out. <b>(D2)</b></li> <li>• When students are finished with the surveys, hand out naturalist journals. Explain these will be where they record all their observations, questions, data, notes, and drawings for this unit. It will be a graded piece of the unit. <i>(See attached Rubric)</i></li> </ul> <p><b>Introduction to Place:</b></p> <ul style="list-style-type: none"> <li>• Explain to students that we are going to start this journey with the observation our place and local community.</li> <li>• Write the word “<b>community</b>” on a large piece of paper. Then turn to an elbow buddy (pair students) to talk about what this word means.</li> <li>• While students are discussing, hand out 2-3 post-it notes to each student.</li> </ul> <p><b>Community Concept Map:</b></p> <ul style="list-style-type: none"> <li>○ Give the following directions, “Write or draw one thing that you think is related to the word community on each post-it note. Then silently, stick this idea on the poster, branching out from the word, “community”. <b>(D3)</b></li> <li>○ <i>Potential student responses: (people, family, buildings, home, school, trees, river, robin, sagebrush, bees, vegetables, friends, mushrooms, cats, dogs, horses, clouds, sun, etc.)</i></li> </ul>	<ul style="list-style-type: none"> <li>• Building background activities</li> <li>• Brainstorm in small groups allows students to activate prior knowledge and increase interaction.</li> <li>• Pre-surveys will help students activate prior knowledge about science and the sagebrush ecosystem.</li> <li>• Community concept map will increase comprehensibility because it will connect prior knowledge and link to new knowledge.</li> <li>• Post-it notes can be written or drawn which will increase comprehensibility by lowering affective filter.</li> </ul>

	<ul style="list-style-type: none"> <li>○ Discuss a few post-it notes that were added. Inform students that they will be adding to this throughout the unit. Students should be encouraged to add ideas as they think of them.</li> </ul>	
<p><b>Explore:</b> Approximately 30-45min</p> <p><b>Exploration of different types of Maps to help students learn more about their local community and environment.</b></p>	<p><b>Maps:</b></p> <ul style="list-style-type: none"> <li>● Pose the following question: <ul style="list-style-type: none"> <li>○ “What do you know about maps? What can we find on a map?”</li> </ul> </li> <li>● Give students a moment to think about this question and write down 1-2 ideas in their naturalist journals. Then have students turn to an elbow buddy and discuss what they know about maps.</li> <li>● Ask each pair to write 1-2 of their ideas on the board to create an overall list. <ul style="list-style-type: none"> <li>○ <i>Potential student responses: (roads, rivers, mountains, houses, directions, towns, hiking trails, etc.)</i></li> </ul> </li> <li>● Hand out various Wyoming maps to small groups of students. Inform them that we are trying to add to our list by studying what we find on these maps. <ul style="list-style-type: none"> <li>○ As students discover more things that can be found on maps they will add them to the current list.</li> </ul> </li> <li>● Discuss what has been added with the class and have students point out a few similarities between the maps and a few differences. Ask them, “What things appear on all the maps? Why do you think these are important?” <b>(F1)</b> <ul style="list-style-type: none"> <li>○ <i>Potential student responses: (compass rose, distance measurements, key) these are important because they help us to be able to read the map we are looking at.</i></li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>● Students will activate prior knowledge in pairs about maps. This will increase interaction and comprehensibility.</li> <li>● Interpreting the maps to know what is on them will increase higher order thinking by encouraging students to interpret data observed.</li> </ul>
<p><b>Following class: Explore:</b> Approximately 30 min</p> <p><b>Continuation of exploration of maps and community.</b></p>	<p>Explain to students, “Now that we have explored maps and some of the things that we can find on a map let’s explore a website created by the Biodiversity Institute at the University of Wyoming. This website allows us to explore and learn about other types of maps such as species range maps, vegetation maps, and human use maps across the state of Wyoming. Let’s learn more about our local community by exploring different maps of the area to find out what species of plants and animals live in our local landscape.”</p> <p><b>WyoBio Activity:</b> (Each student or pair of students should have access to a computer in a computer lab setting)</p> <ul style="list-style-type: none"> <li>● Explain to students that, “citizens, just like you, can help to make these observations to influence maps. This is called citizen science.” This is how many of these maps were created.</li> <li>● Introduce students to the University of Wyoming website, WyoBio. <ul style="list-style-type: none"> <li>○ Explain how to navigate to the map portion of WyoBio. Explain that maps can have different layers depending on a specific area of research. For example, someone might want to only look at water sources (lakes, rivers, streams) in Wyoming and can select that layer.</li> </ul> </li> <li>● <b>Guiding activities to be done with instructor. Have students:</b></li> </ul>	<ul style="list-style-type: none"> <li>● Hands-on exploration of WyoBio will help increase interaction as students get to manipulate the different maps. Working in pairs will also increase interaction.</li> <li>● Connecting new vocabulary to what students</li> </ul>

	<ul style="list-style-type: none"> <li>○ Find their school’s location on the map.</li> <li>○ Turn on the sage grouse layer so they can see how much land is being conserved as core areas for the sage grouse.</li> <li>○ Turn on the vegetation layer and figure out what vegetation is most abundant in or around their local community.</li> <li>○ Turn on the critical habitat layers for big game and sage grouse to what parts of Wyoming are critical for these animal species.</li> </ul> <ul style="list-style-type: none"> <li>● Give students time to explore the different map layers individually or with a partner.</li> </ul>	<p>already know</p>
<p><b>Elaborate:</b> Approximately 30min</p> <p><b>Application:</b> Students will create their own maps.</p>	<p><b>Map Activity:</b></p> <ul style="list-style-type: none"> <li>● Announce that students will have the opportunity to map out and draw their own community in small groups.</li> <li>● Each group will be given a large piece of paper and pencil and asked to draw a map of where they live. <ul style="list-style-type: none"> <li>○ Encourage them to put in as much detail as possible, including what they found to be important in the previous activities:</li> <li>○ Have students think about: <ul style="list-style-type: none"> <li>▪ Things they found that are always included in maps</li> <li>▪ What pieces can be included to help someone else understand your community better by looking at this map.</li> </ul> </li> </ul> </li> <li>● This project will be graded based on group participation, inclusion of key parts of a map (compass rose, distance measurements, key), and inclusion of at least 2 things students learned from WyoBio. <b>(S1)</b></li> </ul> <p><b>Reflection Prompts:</b> Approximately 15min</p> <ul style="list-style-type: none"> <li>● Pose the following questions: <ul style="list-style-type: none"> <li>○ “What does a map explain to us about our community and our place?”</li> <li>○ “Why are maps important and why do you think that humans use them?”</li> </ul> </li> <li>● Have students think about these questions and write 2-3 bulleted answers for each question in their naturalist journal.</li> </ul>	<ul style="list-style-type: none"> <li>● Increase thinking through application of what they have learned about maps. They will develop their own map to represent their community.</li> <li>● Small group work will increase interaction.</li> <li>● Groups will communicate knowledge learned to increase thinking.</li> <li>● Lower level ELLs can draw responses to reflection prompts.</li> </ul>
<p><b>Evaluations and Assessment</b> <b>Check ins:</b> D: Diagnostic assessment F: Formative assessment</p>	<p><b>(D1):</b> Questions and discussion will help access student’s prior knowledge about science, ecology, expedition, place and community. <b>(D2):</b> Pre-Surveys will access students’ prior knowledge about science, scientific research, and the sagebrush ecosystem. <b>(D3):</b> “Community” concept map will help discover what students’ conception of community is.</p>	<ul style="list-style-type: none"> <li>● ELLs will work in pairs or small groups.</li> <li>● Assessments will activate</li> </ul>

<p>S: Summative assessment</p>	<p><b>(F1):</b> Provides insight on (a) what students are learning from making observations about maps and (b) gives them the opportunity to point out similarities and differences among the various maps.</p> <p><b>(S1):</b> Assesses what students have learned about maps and how they can connect us better to our local community.</p>	<p>prior knowledge, increase interaction, and increase comprehensibility.</p>
<p><b>References:</b>          Wyoming Biodiversity Citizen Science Initiative (WyoBio), Biodiversity Institute, University of Wyoming.  <a href="http://www.wyomingbiodiversity.org/programs/wyobio/">http://www.wyomingbiodiversity.org/programs/wyobio/</a>. Retrieved: March 16, 2016.          Showalter, D. (2015). <i>Sage Spirit</i>. Seattle, WA: Braided River.</p>		