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	Suggested Procedure

Lesson 8: Sage Grouse: An Umbrella Species

Unit: 5th Grade Ecology Unit: A Sagebrush Expedition Lesson: Sage Grouse: An Umbrella Species

Overview: Through role play as conservation biologists, students will discover what an umbrella species is and how the protection of an umbrella species can indirectly protect many other species who also rely and use the same habitat. Students will work in small groups to make a decision on which species to protect using evidence to back up their choice. This will lead to the discovery of what an umbrella species is and how it can be useful for wildlife managers in making conservation decisions. Students will then have the opportunity to learn more about how the Greater Sage Grouse is considered an umbrella species in the sagebrush ecosystem through the research of UW student Jason Carlisle.

Main Take Away: The protection of one species can indirectly protect many other species who use and rely on the same habitat as the species being protected. Identifying these “Umbrella Species” can help wildlife managers protect a wider array of species when they are dealing with limited resources.

Learner Outcomes

Students will be able to...

- Discover the meaning and importance of an umbrella species.
- Argue, using evidence, why sage grouse can be considered an umbrella species for the sagebrush ecosystem.
- Explain what might happen to plants and animals in the sagebrush ecosystem if the sage grouse went extinct.

Getting Ready

Materials: 3-4 sets of species fact cards, Jason Carlisle’s video, umbrella, baseball cap, “The Sagebrush Sea” PBS documentary.

Preparation: Print out 3-4 copies of the species fact cards, make sure that the link for Jason’s video works and there is a place to play it, bring in an umbrella and baseball cap, cue “The Sagebrush Sea” to a clip about the Greater Sage Grouse.

Location: Classroom

Length of Time:

1-2 Lessons

Approximately 60-75 minutes

NGSS Standard(s) Addressed: 5th grade Life Science 2: Ecosystems: Interactions, Energy, and Dynamics

NGSS Nature of Science: 5th Grade Level Understandings

- Scientific knowledge is based on empirical evidence
 - Scientific findings are based on recognizing patterns.
 - Scientists use tools and technologies to make accurate measurements and observations.

Place-Based Principle(s) Addressed:

- Focusing on local issues and local experts
- Learning is personally relevant to students
- Engaging students in investigation, inquiry, and problem-solving

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 Questions: *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?**

Students will be able to...

- Discover the meaning and importance of an umbrella species.
- Argue, using evidence, why sage grouse can be considered an umbrella species for the sagebrush ecosystem.

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

- Understand the meaning of umbrella species and be able to use it orally or in a written form.

Key Vocabulary Words:

- Umbrella Species
- Sage Grouse
- Extinct
- Interdependent relationships

Background Information for the Teacher:

Umbrella Species:

Are species selected for making conversation-related decisions, typically because protecting these species indirectly protects the many other species that make up the ecological community of its habitat. Species conservation can be subjective because it is hard to determine the status of many species. There are millions of species of concern which is why the identification of selected keystone species, flagship species, or umbrella species makes conservation decisions easier.

Umbrella species can be used to help select the locations of potential reserves, find the minimum size of these conservations areas, often referred to as core areas, and to determine the composition, structure and processes of ecosystems.

Building Background for Students: (ELL Principle)

Activate Prior Experiences:

The teacher will explain that students will do the following:

1. Play Abiotic Simon says to review components of the landscape equation, but will focus mostly on the biotic factors. Students will be asked to connect to prior knowledge and experiences when thinking of biotic components of the sagebrush landscape.
2. Students will step into the shoes of a conservation biologist and role play what it would be like to make decisions on which species to protect. Through this inquiry-based activity, students will discover the meaning of an umbrella species.
3. Use real pictures and objects for the different species.
4. Watch a video about the research being done by a local scientist about sage grouse being considered an umbrella species.

Link to New Learning from Prior Learning:

The teacher will explain to students that they will:

1. Use knowledge learned throughout the unit and prior experiences to determine which species will be best to protect. Students will think about their field trip to the sagebrush ecosystem.

- Engage in an inquiry-based activity where they will become the conservation biologists and have to make management decisions based on their knowledge and understanding of the sagebrush landscape as a whole.
- Visuals such as pictures, video, and the documentary, “The Sagebrush Sea” will be used to help link new learning from prior learning.

Vocabulary:

The teacher will:

- Let students discover the meaning of umbrella species on their own, but after the activity can visually demonstrate its meaning using a real umbrella and baseball hat.
- Have students draw the meaning of this new vocabulary word and add it to the word wall.

Common Student Misconceptions/Student Challenges:

- Each species in the sagebrush ecosystem must be managed separately and no overlap exists
- Umbrella species are the same as a keystone species

Materials:

- 3-4 sets of species fact cards
- Jason Carlisle’s video
- Umbrella
- Baseball cap
- “The Sagebrush Sea” PBS documentary.

Set-up:

- Print out 3-4 copies of the species fact cards
- Make sure that the link for Jason’s video works and there is a place to play it
- Bring in an umbrella and baseball cap
- Cue “The Sagebrush Sea” to a clip about the Greater Sage Grouse.

Lesson Agenda	Suggested Procedure	ELL Rationale
<p>Review: Approximately 5min</p> <p>Students will review biotic factors in the sagebrush ecosystem through an interactive game.</p>	<p>Biotic Simon Says: Approximately 5 min</p> <ul style="list-style-type: none"> Same as abiotic Simon says but focusing on biotic factors. Spend about five minutes playing to have students review what are biotic examples in the sagebrush ecosystem. (D1) 	<ul style="list-style-type: none"> Repetition and review through an interactive and fun game helps increase comprehensibility. Allowing students to be “Simon” gives them the opportunity to step into the teacher’s shoes and increase interaction.
<p>Engage/Explore: Approximately 30-45min</p> <p>Students will discover the meaning of an umbrella species through exploration as a</p>	<p>Stepping into the shoes of a Conservation Biologist: Approximately 30-45min</p> <ul style="list-style-type: none"> Students will need to be split into groups with at least four students in each group Explain to students that they are going to practice being a conservation biologist and will need to make an important decision in regards to protecting species in the sagebrush ecosystem. <ul style="list-style-type: none"> Make sure students know what a conservation biologist is: A person whose job is to help protect 	<ul style="list-style-type: none"> Working in small groups will increase interaction. These groups should be strategically chosen based on proficiency levels. Review of what a conservation biologist does and

conservation biologist.

species in an ecosystem by conserving and protecting their habitat and resources they need to survive.

- Each group will receive a package of species fact cards.
 - Each card will have a picture of the species with some facts about what it needs to survive and where it can be found.
- Explain the following to each group:
 - “As conservation biologists you have been given the task of figuring out the best species to protect that relies on the sagebrush ecosystem. You have limited funding, or money, which is why you can only choose one species to protect. As a biologist you want to protect the most species as possible. This is why you must think about which choice would help the most species overall.”
 - Emphasize that students need to have evidence to back up their choice. Each group must come to a unanimous decision but it is ok if each group is making different decisions.
- After about 10 minutes have each group share out the decision that they came to and have them give reasons for why they are choosing to protect this species. **(F1)**
 - *Potential Student Responses:*
 - *We chose to protect the sagebrush sparrow because it needs the sagebrush to make its nests.*
 - *We chose to protect the sage grouse because it can only live in the sage brush ecosystem and we noticed that many of the other species need the same things as the sage grouse in order to survive. This means that if we protect the sage grouse, we can also help these other species.*
- After each group has expressed who they would protect and why, give students two more minutes to make any final decisions based on what they have just heard from their peers.
- Then have each group write their final decision on the board.
- Ask the following: “Why do you think the same species was chosen to be protected? Or why do you think groups chose different species to protect?”
 - *Potential Student Responses:*
 - *We all chose the same species because we feel that protecting this species can help the majority of the other species based on what they need to survive.*
 - *We chose different species to protect because some species seem to rely more on the sagebrush habitat than others.*

means will help increase vocabulary.

- Using real pictures and objects will increase comprehensibility.
- Using role play and an inquiry-based activity where students discover the meaning of an umbrella species will increase comprehensibility, interaction, and help link new learning to prior learning as they use what they have learned.
- Engaging in argument within their small groups using evidence will increase higher order thinking.
- Having groups share out their decisions will increase higher order thinking because it will encourage them to explain why they came to that decision.
- Questions at the end of the activity will encourage students to think further and synthesize their learning thus far which will

		increase higher order thinking.
<p>Explain: Approximately 15min</p> <p>Analogies will be used to help students grasp the concept of an umbrella species.</p>	<p>Umbrella Species: Approximately 15min</p> <ul style="list-style-type: none"> • Ask students the following: “How do you think the protection of one species might be able to help protect other species who use the same habitat or rely on similar things to survive?” (D2) <ul style="list-style-type: none"> ○ <i>Potential Student Responses:</i> <ul style="list-style-type: none"> ▪ <i>If we protect the sage grouse we are going to protect many of the other species, such as the sagebrush sparrow, because it also need the sagebrush and this ecosystem to survive.</i> ▪ <i>If we only protect the greater short horned lizard, we might not conserve enough of the sagebrush habitat to protect the sage grouse.</i> • Explain to students that this idea of one species being able to protect other species is called an umbrella species. <ul style="list-style-type: none"> ○ Have one student come up and hold an umbrella and ask a few students to join them under the umbrella. ○ Have one student put on a baseball cap and see how many, if any other students can have protection under the baseball hat. ○ Ask students which one provides more protection from the rain? (The Umbrella) 	<ul style="list-style-type: none"> • Explanation of umbrella species using real objects and a demonstration will increase comprehensibility. • Involving students in modeling the concept of an umbrella species will increase interaction.
<p>Elaborate: Approximately 20-30min</p> <p>Now that students have a basic understanding of what an umbrella species is they will learn more from a local biologist and reflect on their learnings.</p>	<p>Jason Carlisle’s Video: Approximately 10min</p> <ul style="list-style-type: none"> • Now play Jason Carlisle’s video about his research on whether or not sage grouse can be determined an umbrella species, meaning does the protection of sage grouse and their habitat actually help protect many other species who also rely on the same habitat. <p>Reflection Prompt: Approximately 10min</p> <ul style="list-style-type: none"> • After watching the video have students take out their naturalist journals and reflect on the following prompts: <ul style="list-style-type: none"> ○ Describe what an umbrella species is using both words and pictures. ○ How do you think identifying the sage grouse as an umbrella species can help conservation biologists protect other species who also live in the sagebrush ecosystem? <i>Students need to use evidence or examples to support what they say. (S1)</i> <p><i>If time can watch a clip from “The Sagebrush Sea” about sage grouse</i></p>	<ul style="list-style-type: none"> • Using video to help further explain the idea of an umbrella species using research done by a local scientist will increase comprehensibility. • Reflection prompt will increase higher order thinking by having students synthesize what they have learned. This can be done using both words and drawings depending on student’s proficiency level.

<p>Evaluations and Assessment Check ins: D: Diagnostic assessment F: Formative assessment S: Summative assessment</p>	<p>Evaluation and Assessment Check ins” (D1): A quick and fun review for students to think and access their prior knowledge about what are biotic factors in the sagebrush ecosystem. (F1): Assesses students’ ability to make claims and decisions by using evidence and reasoning to support these claims and decisions. (D2): This questions will help teacher gauge what students took away from the previous activity in terms of trying to guide students towards the idea of an umbrella species. (S1): Reflection on what students learned about the concept of an umbrella species and how this can help biologists make the best decisions possible when dealing with limited resources. This can be one of the students’ graded reflections for the naturalist journal.</p>	<ul style="list-style-type: none"> • Using interactive games helps increase comprehensibility and interaction. • Assessments where students are encouraged to form an argument using evidence and prior knowledge increases higher order thinking. • Reflection time on what students have learned also increase higher order thinking as they are asked to generalize understanding and apply what they have learned.
<p>References:</p> <ul style="list-style-type: none"> • PBS documentary “The Sagebrush Sea” • Jason Carlisle’s video about his research on sage grouse being an example of an umbrella species in the sagebrush ecosystem. 		

Species Fact Cards

Greater Sage Grouse:

- **Obligate residents of sagebrush habitat, meaning they can only be found in the sagebrush ecosystem.**
- **Rely on open areas with low vegetation for their leks, the dance the males perform to attract a female.**
- **Make their nests under sagebrush because they provide a protected shelter for their young.**
- **Eat sagebrush all year round.**



Greater Short Horned Lizard:

- **Can be found in a wide range of habitats such as shortgrass prairies, sagebrush habitat, and juniper, pine forests.**
- **Feed primarily on ants**
- **Camouflage in order to hide from predators**



Columbian Sharp- Tailed Grouse

- **In Wyoming, only found near Baggs**
- **Obligate residents of sagebrush habitat, meaning they can only be found in the sagebrush ecosystem.**
- **Make their nests under sagebrush because they provide a shelter for their young.**
- **Eat sagebrush all year round.**



Pygmy Rabbit:

- **Primarily found in big sagebrush and rabbit brush dominated communities.**
- **Like to dig their burrows in areas of deep soil and dense sagebrush for protection.**
- **Only live in areas with heavy shrub cover.**
- **Their main food is big sagebrush.**



Sagebrush Sparrow:

- **Often found in sagebrush habitats but can be found in other shrub communities in the West.**
- **Eat mostly insects and seeds found on the ground.**
- **Males sing from the shrub tops to attract a female.**
- **Rely on intact, undisturbed sagebrush habitat for breeding.**



Bighorn Sheep:

- **Like to live in alpine meadows high in the mountains, grassy and sagebrush mountain slopes, and near rugged, rocky cliffs.**
- **Graze on grasses but will browse on shrubs in the winter.**
- **Female sheep like to give birth in the high mountains to protect their lambs.**

