Lesson Objectives:

- Define biodiversity and how it relates to the longleaf pine savanna
- Describe how variety in an ecosystem's plant community impacts the animal populations that live there
- Reflect on how human activities impact ecosystem community structure

SC Science Standards:

- Grade Five: 5.S.1A.1-8, 5.L.4A.1-2, 5.L.4B.1-4
- Grade Six: 6.S.1A.1-8, 6.L.4A.1, 6.L.4B.1-3, 6.L.5B.3-5
- Grade Seven: 7.S.1A.1-8, 7.L.3B.1, 7.EC.5A.1-3, 7.EC.5B.1-4
- Grade Eight: 8.S.1A.1-8, 8.E.6B.1
- Biology 1: H.B.6A.1-6, H.B.6A.1-2, H.B.6C.1

Safety Tips:

- This activity involves exploring nearby natural spaces that could expose the participating student/child to a number of environmental hazards: weather, biting insects, plants that irritate the skin, sharp edges of litter, and others not listed here. Care must be taken to ensure the participant is in a safe space to learn.
- Similarly, if the student/child does the Sound Maps with their eyes closed, they are extra vulnerable to the hazards listed above.

Worksheet Answers:

1. Biodiversity means an ecosystem has a variety of different species that live there.
2. Fire is the major natural disturbance event impacting longleaf pine savannas. It alters the vegetative community in an uneven manner, creating a landscape mosaic composed of a wide variety of plant species.
3. Plants provide food, water (by regulating ecosystem moisture availability/retention), cover/shelter (from weather events, predators, and people), areas to safely raise their young, vantage points for hunting, and increased oxygen levels.
4. Dependent on areas surveyed.
5. Dependent on day surveys were conducted.

Assessment Ideas:

- OBSERVE: Students are asked to create Sound Maps and record visual observation of what has been caught in their Paper Bag Pitfall Traps. Students can turn in these recordings as an assessment of completing the surveys. Assessment could be expanded to ask them questions to evaluate their observations, such as:
    - How many different natural sounds did you hear? Do you think any different sounding calls were actually created by the same organism?
    - How many human influenced sounds did you hear?
    - Going by what you observed (sights and sounds); how many different insects do you think live near these sites? How many people?
    - Did you observe any (specific local organism?
    - What was the weather like when you conducted these surveys? Do you think that might

have impacted your observations?
    - Could any other external factor (besides plant diversity) be influencing what you observed at each site? (More sunshine, right by a parking lot, frequently used lawn, just mowed grass, recently fallen tree, etc.)
    - Do you think the bait you chose for your Paper Bag Pitfall Trap was smelly enough to attract a wide array of organisms? Would you have set this up differently? What would your catch-and-release trap look like? Would you use different bait?
- COMPARE: There are a lot of assessment opportunities in asking students to compare between their low and high plant diversity sites. Students could be put into small groups to have discussions on what they observed and their reasonings behind those observations specifically at their sites but also in comparison to what their classmates saw. Encouraging students to take a picture of each site can help discuss where they were in comparison with their classmates.
- ANALYZE: Students could expand upon their observations (visual and auditory) by drawing food webs based on what they found in their site communities. They could also classify what they saw into the different trophic levels exhibited in an ecosystem Food Pyramid.
- INFER: Human-influenced observations could be explored further and students could write or discuss how they feel the surrounding human community is impacting the observed natural community. This assignment could include different ways humans can mitigate or limit those impacts, potentially discussing different actions shown in the lesson videos.
- PRESENT: Students could present about their sites to their classmates. Half the class could discuss their low density sites and the other could discuss their high density sites, or each student could present an overall summary of their findings for both locations. This gives students the opportunity to create a slideshow or poster, and to practice speaking their ideas in front of peers.

How to Explore Further:

- A scavenger hunt could be done alongside these surveys. You could generate a list of local species that the students might observe and have them check off which ones they see/hear.
- Students can further this experiment by comparing between a number of different natural and human impacted ecosystems. They could create a scale of ecosystems from high to low plant diversity and see how this impacts the animal community from the lowest trophic level up. For example, an ecosystem gradient could be a natural forest, timber managed forest, agriculture field, mowed lawn, parking lot, and observe how anthropogenic influenced has altered the biotic community from the ground up.
- There's a lot of potential to expand on this lesson further by having students learn about specific organisms that live in their backyards. Field guides and online resources such as iNaturalist are incredibly helpful at identifying specific species. Adding this type of challenge could segue into these topics:
    - Taxonomic ranking of organisms
    - Evolutionary trees
    - Population dynamics (convergence/divergence, homologous vs analogous structures)
    - Food webs/trophic levels/energy transfer through an ecosystem
- Mentioned in the bullet above, there are many additions to this activity that could be enacted to

discuss food webs and energy transfer up trophic levels seen at both sites. Arrows could be added to sound maps (different color) for the student to show where they think the energy would flow through the community they have observed.