Green Glacier- Bane or Salvation Lesson Plan

Standard: NGSS HS-LS-2-6: Evaluate the claims, evidence, and reasoning that the complex interactions in ecosystems maintain relatively consistent numbers and types of organisms in stable conditions, but changing conditions may result in a new ecosystem.

Time: 4-5 60 min class periods

Learning objectives:

- ☐ Students will be able to describe woody plant encroachment and the effect on rangeland ecosystems
- ☐ Students will be able to explain how cedar encroachment impacts plant diversity, wildlife habitats, livestock production, water availability, carbon sequestration, and wildfire risk.
- ☐ Students will be able to evaluate potential management strategies for addressing tree encroachment.
- ☐ Students will able to identify climate smart management strategies.

Materials:

- Red and green index cards or cardstock paper
- Printed station materials
- Projector or whiteboard

Lesson summary:
Student will investigate the effect of encroaching trees on rangelands in regards to biodiversity (plant, wildlife) and ecosystem services.

<u>5E Lesson Plan:</u>

•Engage (10-15 min) and: introduction:

1.Myth or Fact Game: Students will receive an answer sheet, colored paper (by group or individually).

-Go through directions aloud
-Read question, students record on their sheet and determine if it's myth or fact
-Count down from 5 and have students show answer (color) card
-Show answer slide, discuss. Have students record answer and summary on their sheet

2. Proceed to GIF slide, have students think about what they think is happening. Discuss briefly
3. Proceed to introduce the Green Glacier and woody plant encroachment introduction.
4. Present the research question and transition to the explore activity

•*Explore (60-80 min, time varies)*

1.Students explore topics at 8 stations: can spread out across the room or make available in a slideshow.
2. Students answer on the same answer sheet as they Engage activity
3. Students complete CER at the end of the stations. Be prepared to share at conclusion/next class.

•*Explain (time varies based on your knowledge/student discussion)*

1.Presentation: begin with the research question/station discussion
2.Proceed to explain what Rangelands are and where tress are the most problematic
3. Reconsidering Cedar video: serves as a case study we will watch and discuss in segments. Slide notes explain what will be viewed/discusses at each point.
-students should see that cedars may have seemed like a good idea but are not worth it in the end
-trees have some value as shelter, but not trees like cedar that are so fast growing
-costly, time consuming, and devastating to production, habitat and ecosystem services
4 Slides work their way through this information: the problem and ways to combat it

•*Evaluation (30min, time may vary)*

Students will work on data literacy using the I2 Strategy, "What I see, What it means". If you are not familiar with this be sure to read over the steps.

1. Students will make draw 3 different arrows to trends etc in each graph and make observations (pencil is best).
2. IN A DIFFERENT COLOR pencil or pen, students will then write what each observation means (infer) beside the observation.
3. Students will combine the observation and inference to write a citation (3-4 sentences) for each graph and connect to the graphic as instructed in the directions.

Four areas of land were chosen and the Range Analysis Platform was used to generate information for percent cover graphs (plant growth and tree growth).
Areas differed in land management and type of coverage as a result.
-one area was grazed, one was not managed, one was grazed and burned and managed for optimum grass productivity, one was grazed and burned and managed for a savannah (more trees but plenty of grass).

•*Elaborate (10-20 min, time may vary)*

Students answer several conclusion questions over the unit.

•Optional *Extension (time may vary)*

Students can create an infographic, short Public Service Announcement video or land management plan for an area based on what they have learned.