Project Status

**Name and Institution:** Brian R. Shmaefsky, Lone Star College - Kingwood

**Course/Course format:** Introduction to Environmental Science/face-to-face & on-line

**Module:** Terrestrial Trophic Cascades & Population Structure

**Quantitative skill focus:** Field data analysis; quantifying vegetation biodiversity changes and population distributions.

**Botany Engagement:** Using plants as a means of measuring trophic changes in an ecosystem

**Date of implementation:** March 2018

**Title:** Oh Rats: The Impacts of Urban Development on Native Rat Populations

**Product:** Interactive PowerPoint presentation for lecture.

1. **What learning objectives (content) are you planning to address in your course using the selected materials**? Recognize, describe, and quantitatively evaluate the impacts of anthropogenic changes on earth systems, including the land, water, sea, and atmosphere, and how these function as interconnected ecological systems.
2. **Briefly describe the pedagogical techniques you plan to use to facilitate the activities and reinforce the quantitative reasoning skill.** Students were engaged in the “Terrestrial Trophic Cascades & Population Structure” PowerPoint presentation to learn the concepts of food chains, food webs, and trophic relationships. This will be followed by field observations of a nature center that has abundant wildness next to adjacent deforested areas. Students then developed their teaching model based on what the learned from “Terrestrial Trophic Cascades & Population Structure” activity.
3. **How do you plan on engaging the students with the botany aspects of the materials?** Students used various on-line resources and local experts to identify impacts of deforestation on the population distribution or population dynamic of the “roof rat.” Students isolated the principal food chain roof rat that is influenced by deforestation.
4. **Are you planning on making any adaptations to the materials? If yes, please describe them here. If no, please indicate why**. Students used the “Terrestrial Trophic Cascades & Population Structure” PowerPoint presentation as a model to investigate the cause of a native “roof rat” infestation is growing suburban areas in the Houston Metropolitan region. Students identified the local trophic levels off ecosystem similar to those in the “Terrestrial Trophic Cascades & Population Structure” case study.
5. **Do you think you will need to incorporate any supplemental materials with this module, please describe them? If you’ve found any supplemental materials, please share them here.** Students used vetted online resources and local experts to gather information about the ecosystem in the area and the current trophic interactions in this ecosystem.
6. **What assessments are you planning on using to measure student progress? If possible, describe, attach, or provide a link here.** Students were asked to design a hypothetical experiment investigating the impact of deforestation on roof rat infestations in the region. Students were assessed on the accuracy of information they collected and the pedagogical effective of the teaching activity they produced.
7. **Draft Storyboard of Project:**

* **Target environment:** Piney Woods of East Texas
* **Purpose:** Use information on deforestation trends to possibly explain increase of roof rat infestations in areas being deforested.
* **Format:** **Interactive Case study**
  + Draft case study opener written by students: Stanley Ferguson lives in a two story house in New Caney. He and his wife heard complaints about mice in the area and comes home one day to find their attic infested with mice. He calls the James the Exterminator and James said about 80% of all the houses he visited in the past 3 months has some mice related problem. Thinking about how this could be possible, he believes that a massive flood and deforestation has a part in it that happened about five months prior the infestation. Stanley Ferguson decided to do something about the mice problem in the residential area. Hearing from the homeowners there are mice within their homes as well and not just Stanley’s.

After talking to neighbors, Stanley gathers the homeowners to petition for a town meeting, which was held in the New Caney Community Center.

He invited his representative Eli Brown, and other people ranging from teachers to politicians**.** They start to discuss how this mouse boom started and why they are invading their homes. With the deforestation happening around and having new housing units being placed, the animal population has been forced out of their natural homes and forced to find new food sources that are not part of their diet. Homeowners have been reporting increase of frequent sightings of these animals. This raised concern for the safety of the people with them scavenging for their resources.

(The assumption at the meeting will be that habitat loss is leading to a reduction of roof rat predators)

* + Sequence of Case Study:
    - Investigate the trophic relationships of the roof rat in forested area:
      * Rat’s resources
        + Trophic relationships of rat food
        + Rat habitat and niche
      * Rat’s predators
        + Trophic relationships of predators
        + Predators habitats and niches
      * Calculate deforestation
        + Amount of deforestation
        + Impacts of deforestation

Habitat of rats

Habitats of predators

* + - * Predict population dynamics (as graphs) as a result of deforestation
      * Devise an experiment to model this situation.
      * Conclusion
      * References