



Grade Level: 9-10
Subject: Math

Blacktail Deer Sampling

ESSENTIAL UNDERSTANDINGS

- Sovereignty
- Lifeways
- Treaties with the United States

LEARNING OUTCOMES

- Students will be able to experiment using the capture/recapture sampling activity to estimate a population size.
- Students will be able to solve proportions to estimate population size.
- Student will be able to compile data and justify the number of additional number of hunting tags they recommend the tribe give out.

CULTURALLY RESPONSIVE PRACTICES

- Connecting to the lives of students
- Interaction with others through partner work
- Connecting to students' personal families and family members
- Preserving and honoring cultural history
- Student talk, working together and individually

ASSESSMENT

Students will be assessed on their collaboration skills when working as a team and their proficient completion of the Capture & Recapture Activity Sheet.

Overview

Each year The Confederated Tribes of Grand Ronde distributes hunting tags based on the population numbers on the Reservation. In this lesson, Students will participate in a capture and recapture activity where they will be given varying sample sizes to give an educated estimate on how many additional hunting tags the Confederated Tribes of Grand Ronde should give out.

MATERIALS

- [Sampling Data Presentation](#)
- [Interview with Lindsay Belonga, Wildlife Biologist](#)
- [Video Notes Part 3](#)
- Brown Paper Bags
- Slips of Paper or Beans
- [Capture and Recapture Activity Sheet](#)
- Permanent Markers (if using beans)

LOGISTICS

- Where does this activity take place?
Classroom
- How are the students organized?

Pairs

TIME REQUIRED

50 minutes

STANDARDS

Understand and evaluate random processes underlying statistical experiments.

S.IC.1 Understand statistics as a process for making inferences about population parameters based on a random sample from that population.

S.IC.2 Decide if a specified model is consistent with results from a given data-generating process, e.g., using simulation.

Make inferences and justify conclusions from sample surveys, experiments, and observational studies.

S.IC.4 Use data from a sample survey to estimate a population mean or proportion; develop a margin of error through the use of simulation models for random sampling.

VOCABULARY

- **Hunting Tag** - a physical document you must carry with you while you're hunting that gives the legal right to kill one specific animal. A tag comes with detailed limitations on where and when a hunt can take place, as well as what can be hunted.

Background for Teachers

“Tags are additional permits that can be added on top of a basic hunting license to allow the hunter to pursue certain animals (typically big game animals such as deer, elk, bear, pig, antelope, etc). One tag equals the right to harvest one animal. A tag is actually a physical permit that you carry with you while hunting that you must attach to an animal immediately after you kill it. The tag will have areas on it that you'll need to mark if you kill an animal, such as the date and time of harvest, the location of the harvest, and the sex or other descriptive features of the creature. The widely accepted way to mark a tag is by punching out (making a hole with your knife) the sections corresponding to the correct information pertaining to your hunt. So when someone says they “punched a tag” or “filled a tag”, it means they successfully killed an animal. If someone says they had to “eat their tag” it means that they were unsuccessful — instead of eating fresh wild game they are stuck dining on their permit.”
-[Modern Hunters](#)

Along with the personal harvest of meat, The Confederated Tribes of Grand Ronde also issues Ceremonial Hunting Tags to be used during specific ceremonial hunting times. The meat harvested with these tags is often used at CTGR ceremonial and cultural celebrations such as Restoration and Powwows. It is a great honor to fill a ceremonial hunting tag as it means the individual is providing for their tribe as a whole.

Opening

Review the materials and activities from the two prior lessons (Data Analysis & Ratios)

Begin "[Sampling Data](#)" Presentation. Have students watch part 3 of the Interview with Lindsay Belonga. Have students take notes using the Video Notes Part 3 document.

Activity

1. Discuss how the wildlife biologist takes the data about population size and determines the number of deer tags that will be issued.
2. Have students write down their educated estimate of additional hunting tags the Grand Ronde tribe should give out based on the sampling activity they did the day before.
3. Explain to students they will be participating in another sampling activity. But this time instead of looking for the ratio of bucks to does, we want to know how to estimate a population in an area based on captured and recaptured deer.
4. When the Natural Resources Department at the tribe completed their study, they had collected 269 deer pellet samples. Of those 269 samples, 89 of them were viable. Once the biologist had a complete list of the 89 samples, they had to figure out if they were all individual deer or if there were any recaptured deer. This can change a population drastically. Of the 89 samples, they were 19 deer that were recaptured more than once. To demonstrate how capture and recapture can change a population have students participate in the sampling activity below.
5. Have students get into pairs.
6. Each student will have a job in their pairs. One student will be responsible for pulling "deer" from the bag and making the recaptured "deer". The other student will be responsible for recording the data.
7. Give each pair a paper bag. The paper bag will represent the nodes.
8. Beforehand teachers will need to put the beans into the bags.
9. Explain to students that they will reach into the bag and grab a handful of beans from the bag. They will count the beans they have pulled and record that number. Then students will mark the beans that were pulled from the bag.
10. Then return all beans back to the bag.
11. Have students pull out 10 beans from the bag again.
12. Record on the data sheet how many slips of beans were "new" and which ones were "recaptured".
13. Do this process a total of six times, making sure to record the data each time.
14. Once each pair has their data sheets completed have them go through the steps to determine the total number of beans in the bag.
15. Have students reconven into whole group discussion.
16. To close the lesson have students participate in a swap meet, where students switch partners to share their findings. Students will compare how close their predictions were to each other.

Closure

Students will write an email to Lindsay stating whether they support or don't support the capture/recapture method and why.

Differentiation

- If students are uncomfortable with the data and materials, this activity can be done in a whole-group or small group setting

Extension

- Students can view the videos from the Confederated Tribes of Grand Ronde where CTGR Tribal Members discuss the impact that the Consent Decree has had on their families and what hunting means to them personally.
 - Tribal member Reyn Leno, talks about the consequences of the consent decree: https://youtu.be/WwvIX_1UyyA
 - Tribal member Bobby Mercier, on how the consent decree has impacted his family and community.: https://youtu.be/MpHRdUzGu_g
- https://youtu.be/vU_mv9cbqVM - The Ways, Hunting Deer: Sharing the Harvest
This video explains the meaning and importance of hunting to Native American peoples. This video does show pieces of a hunt which includes blood and a dead animal. Please show discretion and preview the video ahead of time. Hunting is an essential piece of the Native American culture but scenes shown in this video may not be deemed acceptable by all individuals.

Notes/Other

Jan Michael Looking Wolf's or Grand Ronde Canoe Family audio tracks can be played as background music while students are working. These audio tracks can be found on Spotify or Apple Music.

Jan Michael Looking Wolf: [Spotify](#) and [Apple Music](#)
Grand Ronde Canoe Family: [Spotify](#) and [Apple Music](#)

Appendix

Sampling Data Presentation:

https://docs.google.com/presentation/d/19IQAbTeebRhIvGtqD0JWBjBXM6NbWf6y_YTzL3nnKPQ/e/dit?usp=sharing

Interview with Lindsay Belonga, Wildlife Biologist:

<https://drive.google.com/file/d/19DQbx8ir06Ya51D4omYank4jwuut8lDf/view?usp=sharing>

Video Notes Part 3:

<https://drive.google.com/file/d/1Pb3hLGzdTVlurKMObsCVw38xBvB2Wrf9/view?usp=sharing>

Capture and Recapture Activity Sheet:

https://drive.google.com/file/d/1SqrWxtUK1slunFtXlo_vSsyRQnOfRh5r/view?usp=sharing