The Checkerboard Wildlife Management Educational System

The following game allows gateways into statistics, ecological modeling, ethics, land use decisions, environmental regulation and laws, economics and many more. It is inexpensive to set up and takes from one to three hours depending upon group size, lesson objectives and lesson depth. This was developed as a way to teach students about deer hunting and why it is critical on private lands to manage populations.

Materials: per group of 2 to 4 students -- A checkerboard (can be regulation or anything with contrasting squares); 1.5 - 2 rolls of pennies per checkerboard, 20 nickels, paper and pencil.

Methods: Announce the game but leave the lessons to be learned until last. Something like "We are going to play a game that can teach us about managing wildlife and some ways to do it. We will also keep score by gender and age group of the wildlife to see what each group gets.

Read aloud:

"This game was developed in Texas because people were talking about deer hunting. Historically in Texas people ate the deer and sold cattle. Then over time they noticed that deer were hard to find and that they liked beef better. Texans began to worry about deer so they made shooting deer illegal. Then later people were allowed to only shoot a male (buck){basic option below}; later than that they allowed females (does) to be harvested too. Some people asked about why shooting deer was allowed again. Others wanted to introduce predators to allow a more natural system. Texas is 98% privately owned land so the landowners have a lot of control about what happens. Today hunting rights for trophy bucks or males (5years old) are worth $5,000 or more per hunt per person."

"Game Rules: Each black square of your checkerboard contains enough food, water, and shelter to sustain a deer for one year. The other squares are cropland, houses, highways, mature forests and other habitat that is unsuitable for deer. The game progresses one year at a time and I will give you the specific rules for each option as we play so we can learn more afterward.

Basic Option: *Start with a penny on each top and bottom black square of your checkerboard. For the game a head represents a male and a tail represents a female. In reality female deer can have one to three babies per year but for this game we will keep it easy and just have one per year.*

For each female deer have a group member flip a penny. If it lands heads up you have a buck and tails up is a doe. Place each baby on your checkerboard on a black square. Another group member gets to record how many were male and how many female each year. ***Since the option can only be heads or tails should it be equal every year? Answer is <u>yes</u> but it seldom is (statistics lesson)****. Keep track of years please and keep going until your checkerboard is full. Ready GO!!"*

Facilitator Notes: It usually takes 4 to 6 years to fill the checkerboard depending on what is used and how the gender statistics turn out. Those with higher female numbers fill faster.

ASK THE STUDENTS:

1. "**How many years did it take to fill your board?**" Have a student record the groups' answers.
2. **"How many bucks each year and how many does each year?"** Have a student record the answers. This is a good chance to talk about statistics and genetics.
3. **"How many have extra deer do you have that don't fit into your checkerboard?"** Here's the fun part. **"Now what should we do with them?"** Let the students discuss then talk about these solutions and theirs.
    a. Let them starve. Any extra deer don't have what is needed to survive. They will die without a black square. Overpopulation of deer in the real world also leads to ecosystem decay as overgraze their habitat. Is this an ethical solution? Is it a humane solution?
    b. Move them to someone else's board that has empty squares. Wildlife naturally move to unoccupied areas if possible. Urban areas, expanses of unsuitable habitat and other things may prevent this.
    c. Blacken more squares. It is possible to change the checkerboard to more or all black squares. Dilemma is what happens to the things that were being done on those squares?
    d. Shoot the extras. Population management by harvesting some is an accepted solution. If the decision is to harvest then how many, what sex, how old, when – like not during birthing season, and other questions must be answered.
    e. Bring in the predators. Students may suggest this and you can either teach that predator populations are never in sync with prey or go through that iteration of the game and let students learn for themselves."
    f. EXTRA CREDIT: What about bringing in a new species from another place that eats what deer eat? Should we do that and tell me why? Answer: It depends. This is an ethical dilemma and a real one. Fallow deer and other exotic species can have a very negative impact on native species (competition for food, water and shelter), and a very positive impact on aesthetics and our bottom line. Remember at one time elk and white tailed deer were not native to the U.S. Dinosaurs were!

Buck and Economics Option:

Replay the game and begin to harvest bucks. If there are many groups use all the options, if few students or they are barely under control you may choose or let the group choose one from each of the two options (next). Options are #1: oldest first, youngest first, random age. Then pick the #2 % of harvest (33%, 50%, and 75%). If time is short combine with the economics lesson and add a penny on top of each buck per year of age. 5 year old bucks become trophies (nickels) and are worth lots of money for the right to hunt them. Depending on harvest options for age and percent ask the students if this changes how many trophies they have. The 33% group of youngest first will have far more than an

oldest first 75% harvest group. This can be separated and the economics part used as a 3rd replay of the game.

Facilitator Notes: Depending on the options chosen it will take longer to fill the checkerboard. Remind the students that one buck can breed multiple does so we don't really need many.

ASK THE STUDENTS:

1. **"How many years did it take to fill your board?"** Have a student record the answers.
2. **"How many bucks each year and how many does each year?"** Have a student record the answers.
3. **"How many trophy bucks for each group?" "If does are worth $100 and young bucks are worth $300 and trophies are worth $5000. Should that affect management of your deer herd?"**
4. **"How many have extra deer that don't fit into your checkerboard?" "Now what should we do with them?" "Does any group not have any bucks left because they were overhunted and what does that teach us?"**
5. **"Did you notice something as more and more does filled the board?"** Answer is that the rate of filling up the habitat increased. Each doe is direct competition for habitat with each buck. From an economics standpoint they are critical but not worth as much if hunting rights are sold. For some audio-visual fun show a clip from trophywhitetails.com where each buck is worth $40,000 or more.

Lions and Wolves and Bears Option: Replay the game with the basic option but with this twist. In year 3 (or all your deer will be eaten) a newlywed predator couple arrives. They produce one offspring every other year. Each predator eats one deer per month (12 per year). Same heads vs tails. Students should track gender, reproduction by year, deer eaten by year.

Facilitator Notes: Typically either all deer are eaten and the predators starve or there are extra deer and then later all deer are eaten etc.

ASK THE STUDENTS:

1. **"Do you think this ecosystem was balanced before mankind began changing this?"** (History lesson) **"Okay when was that?"** ANSWER: Native Americans were the top level predator for centuries and they ate deer! It was never balanced. Wildlife populations fluctuated with disease, moving to new habitat, droughts, changing to different prey species and many, many

more drivers that impacted their ecosystems. Should make us appreciate houses and grocery stores.

2. **"Is it possible to achieve balance and how do you suggest that we do it?** Answer: Maybe not but we can get close. Having a census of populations and reasonable management to harvest or limit harvest can help maintain a stable population that is within sustainability based on food, shelter and water. Droughts, disease, natural disaster and invasive non-native species can all change this balance and require that we adapt our management.

Advanced Placement Options:

- Real deer have one or two fawns and occasionally triplets. Replay with that option.
- Give groups a 20 year time span to manage the deer and track economics, gender, management changes in harvest. Tell students red squares produce $2000 per year income and they can choose to make red squares black by spending one years red income. Once black it takes one year's red income to turn it red again. Play for maximum income. Trophy buck $5000, Non-trophy buck $2000, Doe $100, Predator any age $5,000.
- Quail live on red squares only and like deer but that aren't compatible. A red square can support 20 quail. Quail are worth $75 each.
- Disease randomly kills 2% of the population annually, Car collisions kill 8% with 65% being bucks and 35% being does. Do the math.