Saving Skidgits: Using a Game to Model Protected Area Management

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Abstract

Games and simulations give students the opportunity to practice critical thinking skills by developing and modifying a strategy and can lead to a deeper understanding of subject material. Simulations are particularly useful in illustrating scenarios where there are multiple paths to a successful outcome. To take advantage of these benefits, I developed a simulation game to illustrate principles of protected area management as part of the Wildlife Ecology and Conservation curriculum at the Smithsonian-Mason School of Conservation. In the simulation, students are given the role of managers for a protected area and are tasked with keeping a hypothetical species, the skidgit, alive for two years. Students set their management goals and balance needs and resources to protect and manage their skidgit populations in the face of stressors presented as the simulation unfolds. Evaluations of the activity indicate students have an increased understanding of the challenges and processes involved in managing protected areas while having fun learning.

The Premise

- Manage hypothetical skidgit species for two years in a protected area
- Protected area designs include either a single large area of land or several small areas under private or government management

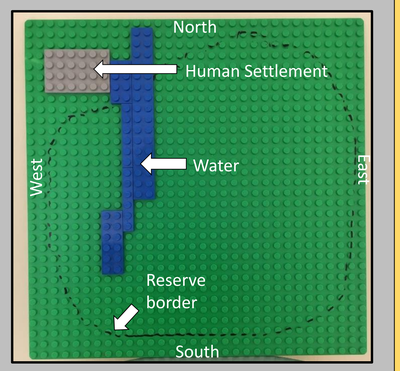
Activity Objectives

- Illustrate principles of protected area design
- Set management goals for a threatened population and formulate a plan for reaching those goals
- Practice balancing resources and population needs in the face of unpredictable disturbances
- Have fun!

Before Play Begins

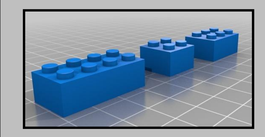
- Each student receives a green LEGO board with the reserve boundary and randomly distributed water sources and human settlements.
- Reserves can be affiliated with private owners or with corrupt or non-corrupt governments

Private | Corrupt Government | Non-Corrupt Government

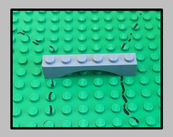


Students receive a pool of $50,000 to purchase resources:

Wells ($5,000 each)
- Size randomly determined



Corridors ($20,000 each)
- Necessary to connect habitat patches

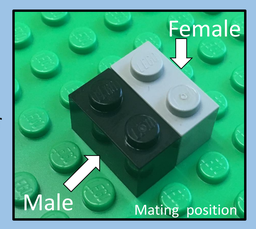


Guards ($10,000 each)
- Three necessary to cover single large reserve
- One guard/patch in several small reserves

- There are opportunities to get more resources during the simulation
- You can redistribute your resources half-way through the simulation
- Some perturbations can be dealt with if you have money available

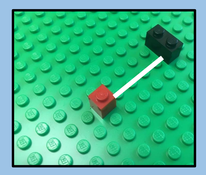
Skidgit Biology

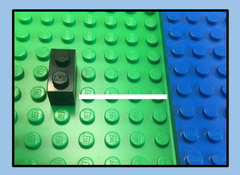
Reproduction
- Begin with 8 males and 8 females
- Males and females mate in the 10th month of the year
- Singleton or twin offspring based on coin flip



Food and water requirements
- Must stay within 5 pegs of a stoneflower
- Must stay within 5 pegs of a water source

Stoneflowers

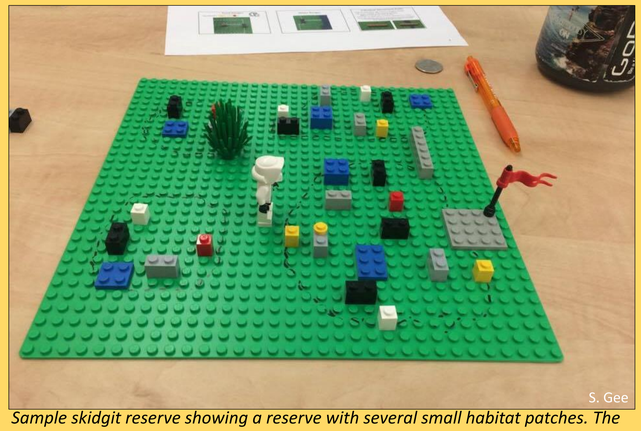




Movement
- Can never be in human settlement or water
- Half the population can move in any given month
- Can move outside of the reserve area, but to move between habitat patches in several small reserves, there must be a corridor

Gameplay

- Each round consists of one month of activity
- At each new round:
  - Check to see if skidgits starved (did they move further than 5 pegs from a stoneflower?)
  - Check to see if skidgits are too far from water (more than 5 pegs away?)
  - Mating results if seasonally appropriate (students flip coin to determine number of offspring)
  - Perturbation(s) (see below)
  - Movement (half the students' skidgits can move on the board)



S. Gee

Sample skidgit reserve showing a reserve with several small habitat patches. The student has chosen a private affiliation, a guard for one patch, one corridor, and two wells. There is also a non-spreading invasive plant present.

Perturbations

- Each round students must respond to changes or challenges that affect the skidgits, their environment, or the reserve's resources
- Perturbations can repeat in successive rounds and can be modified at the instructor's discretion

Examples (a full list is available from the author)

Attack of the chlorofiends! INVASIVE PLANTS
Everyone gets a randomly selected plant:

Can pay $5000 to eliminate now
Can eliminate in the future but the price will go up $1000 each month

A. DeLuycker

A student receives a spreading invasive plant.

Good relations pay off! The neighboring communities give you an end of year bonus!

- $5000 for corrupt government preserves
- $7000 for non-corrupt government preserves
- $10,000 for private reserves

Cash in and buy some new resources!

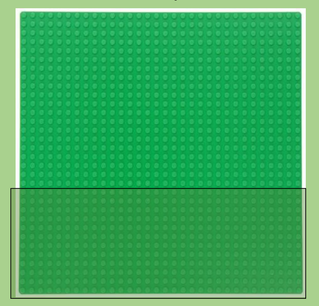
A. DeLuycker

Students apply new resources to their reserves

A. DeLuycker

Students contemplate the double-threat to their reserve

DROUGHT strikes!
Stoneflowers in the southern-most 12-peg band are dead and cannot be replaced



Also, POACHERS target reserve
All skidgits outside reserve are dead
- 2 skidgits dead in reserve (except in guarded patches)

Wrapping up the Game

Discuss:
- What were the most successful management strategies for large vs. several small reserves?
- Did students successfully reach their management goals?
- What are other elements that could be modeled using this simulation? How could they be represented?

Student Evaluation

- Student evaluation of activity:
  - Helpfulness to professional development: 4.6 out of 5 (4 is "much help", 5 is "great help"; n=44 students)
- Student comments:
  - "The SLOSS skidgit activity was one of my favorites"
  - "The SLOSS skidgit modeling activity was probably my favorite class-did a great job of being interactive while demonstrating the issues at hand"

Take-aways

- Using a game to illustrate complicated issues of resource allocation leads to a dynamic class session and better student understanding of management principles
- Instructional games should be:
  - Clearly structured
  - Goal-oriented
  - Fun!

Acknowledgements

Thanks to Stephanie Lessard-Pilon for her help in refining the original activity, Anneke DeLuycker and Spencer Gee for photos and the many students who have participated in the activity