**Simulation in Biology Abstract Example**

**Group:** Ecology

**Project name:** Reintroduction of wolves in Montana

**Student name:** Kris Jones

**Project description:**

In the wilds of Montana, wolves have become endangered, and no longer live in most parts of the state. Ecologists wish to reintroduce wolves into the food chain, but local residents are naturally concerned that wolves will be a danger to people. This simulation will attempt to simulate the interaction of wolves with the local rabbit population, and determine what level of human hunting of wolves may eventually be needed to control their population.

**Agents and rules:**

*Carrot rules:*

1) Carrots grow based on environmental conditions of sunlight, nutrient amount and distribution, and temperature

2) Carrots age at a certain rate, and acquire energy from the environment

3) Carrots die if their energy falls below a certain level or if they reach a certain age

4) Carrots reproduce at a certain age and energy level, when there is enough space, nutrients, and appropriate temparature

*Rabbit rules:*

1) Rabbits increase their energy based on the amount of food they eat

2) Rabbits age at a certain rate

3) Rabbits hop based on the amount of energy they have

4) Rabbits die if their energy falls below a certain level or if they reach a certain age

5) Rabbits reproduce if their energy and age reach above a threshold

*Wolf rules:*

1) Wolves increase their energy based on the amount of food they eat

2) Wolves age at a certain rate

3) Wolves move based on the amount of energy they have

4) Wolves die if their energy falls below a certain level or if they reach a certain age

5) Wolves reproduce if their energy and age reach above a threshold

6) Wolves avoid hunters

*Hunter rules:*

1. Hunters can only hunt up to a quota during the hunting season
2. Hunters can only see wolves at a limited range

**Model validation:**

1) Carrot population (representing food for rabbits) will increase in favorable environmental conditions (temperature, sunlight, water, soil nutrients, space for growth) and decrease as the size if the rabbit population increases.

2) Rabbit population will increase when food is plentiful and decrease as the size of the wolf population grows.

3) Wolf population will increase as the rabbit population increases.

**Hypotheses / Predictions:**

1) A hunting season will eventually be needed once per year, with a cap on the number of wolves killed, to contain the wolf population.

2) Environmental conditions may influence the need for a hunting season

**Evaluation (graphs, statistics):**

1) Graphs of the populations of all agents over time

**User Interaction (sliders, buttons):**

1) Sliders allow changes in environmental conditions (temperature, food supply)

2) Sliders allow changes in hunting season variables (length, cap, number)

3) Different setup choices: Vary number of wolves initially introduced to the area

**References:**

I made this scenario up, so I don’t have references here. Your most likely references would be a journal article or articles about your system, but might also include textbooks.