

Biogeography

Wolves of Isle Royale

Name: _____

Section: _____

Score: ____/ 5

Directions: You will be working as a class to record observations of animal behavior based on images in a given unit of study. Please do not work ahead as the activity is dependent upon student participation in a sequential order.

Image 1: Wolf and Moose 1

1. Record your observations to what is happening in the photo above.

2. Make a prediction as to what will happen next. What are the potential costs and the potential gains for each animal?



Background Information: Wolves of Isle Royale

For almost 60 years, scientists have been examining the relationship between wolves and moose on Isle Royale National Park in the longest continuous predator-prey study in the world. Moose likely came to Isle Royale, an island about 580 square kilometers in size in Lake Superior, in the early 1900s by swimming from the mainland. Without any predators around, the population shot up and then crashed in 1934 as the moose depleted the food available to them on the island. A wolf population was established on the island in the late 1940s, probably after crossing an "ice bridge" from the mainland. In 1958, scientists started monitoring the cyclical rise and fall of moose and wolf numbers, with one population influencing the other, but also responding to other factors, such as disease, tick outbreaks, severe winters, and immigrant wolves. The wolf population grew to as many as 50 individuals in 1980, and 24 wolves lived on the island as recently as 2009.

The number of wolves has steadily declined since 2009. In recent winters, few wolves have immigrated to the island, resulting in higher rates of inbreeding and accompanying higher wolf mortality rates. Climate change has resulted in a steady reduction in ice cover over the Great Lakes. Currently, the wolf population is down to two individuals, making their local extinction likely. Without wolves, the already-large moose population is on track to double in the next few years. The moose are likely to repeat the pattern from the 1930s, decimating their diet of native vegetation. The National Park Service will soon decide whether to introduce 20 to 30 new wolves to the island.

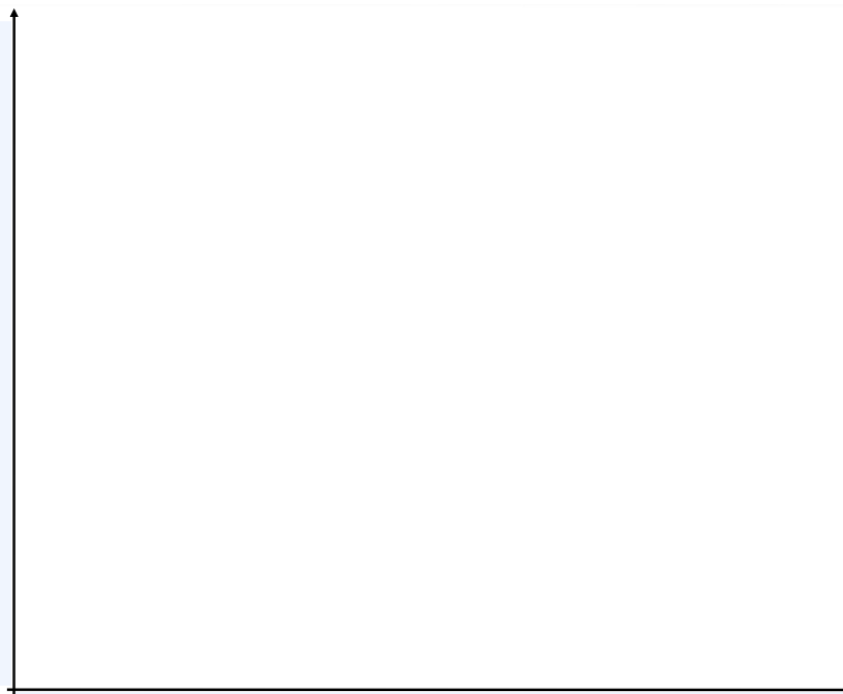
Image 2 - Wolf and Moose 2



Image 3 - Wolf and Moose 3



3. Record observations of one of the potential outcomes, based on the situation from Image 1. Again make predictions and make a cost benefit analysis for all animals (Note-about 94% of Wolf Moose encounters end with the Moose escaping).
4. What effect do wolf populations have on moose populations? What effect do moose populations have on wolves?
5. Work with a table-mate to come up with a visual representation that shows the correlation between the two species on Isle Royale. Use different colors to represent each species (Lines or symbols) with the X axis representing Years and the Y Axis representing population. Start with initial populations of moose at 500, and an introduced population of 20 wolves.



Work with a partner through this Click and Learn Module by hhmi Biointeractive to explore the exponential growth model and the logistic growth model of population growth and answer the series of questions below (http://media.hhmi.org/biointeractive/click/populationdynamics/?_ga=2.115351814.1882149914.1541369494-364117387.1538001820)

6. How does the Exponential model examine population dynamics? What is the relationship between an initial population and the per capita growth rate (r) over time (t)?

7. How does the Logistic Model represent population dynamics? How does it explain the relationship of a species at a given time ($N(t)$) as dependent upon the per capita growth rate (r) Euler's Number (e) and the carrying capacity for an ecosystem (k)?

8. Which model do you think is a more appropriate model to represent wolves? What would happen to the wolf model if you were to remove the moose from the ecosystem?

9. Which model do you think is a more appropriate model to represent the moose? What would happen to the moose model if you were to remove the wolves from the ecosystem?

10. What other factors need to be considered to factor in the calculation of wolf populations and moose populations on Isle Royale over time? Come up with 2 factors for each.