

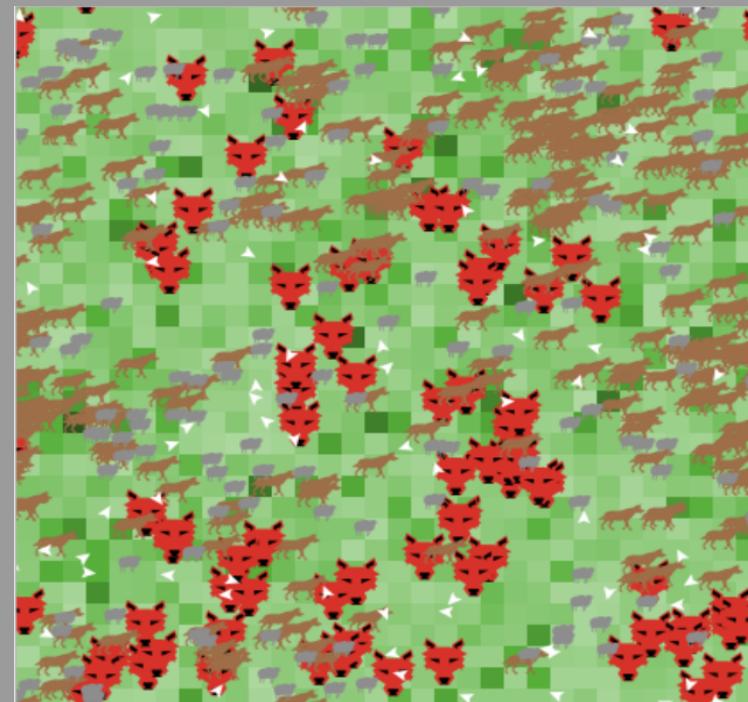
Savanna Ecosystem

Hyena Packing

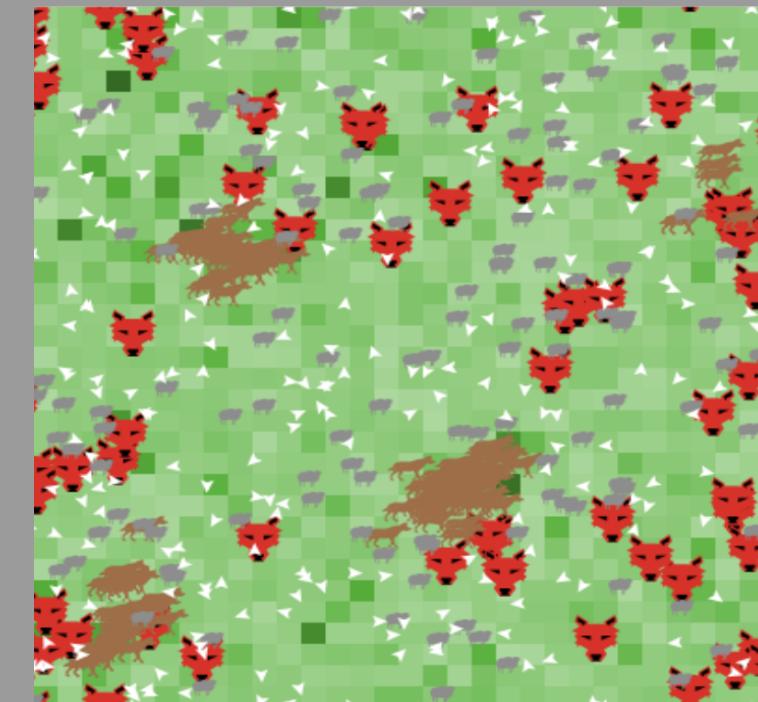
Evolution of packs as packing tendency increases:



100% random hyena movement

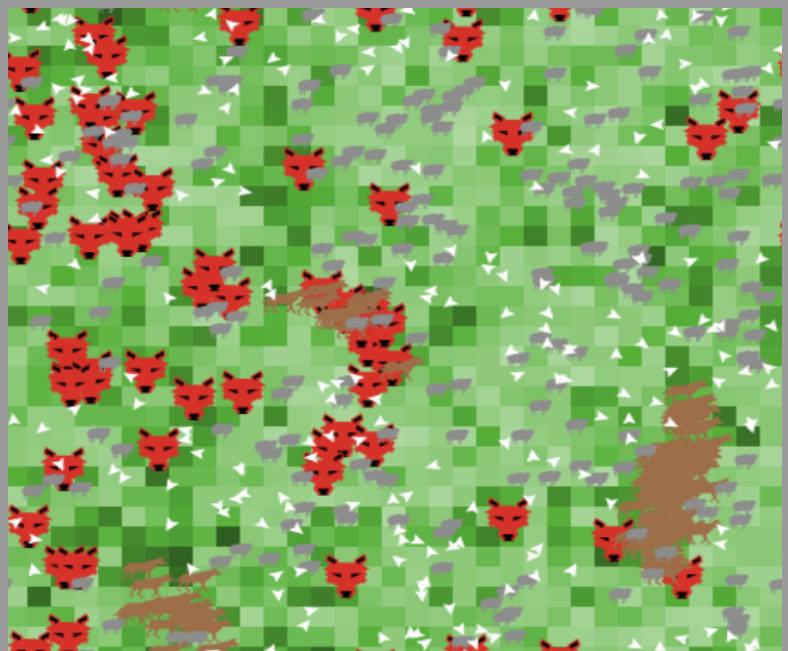


50% random hyena movement



0% random hyena movement

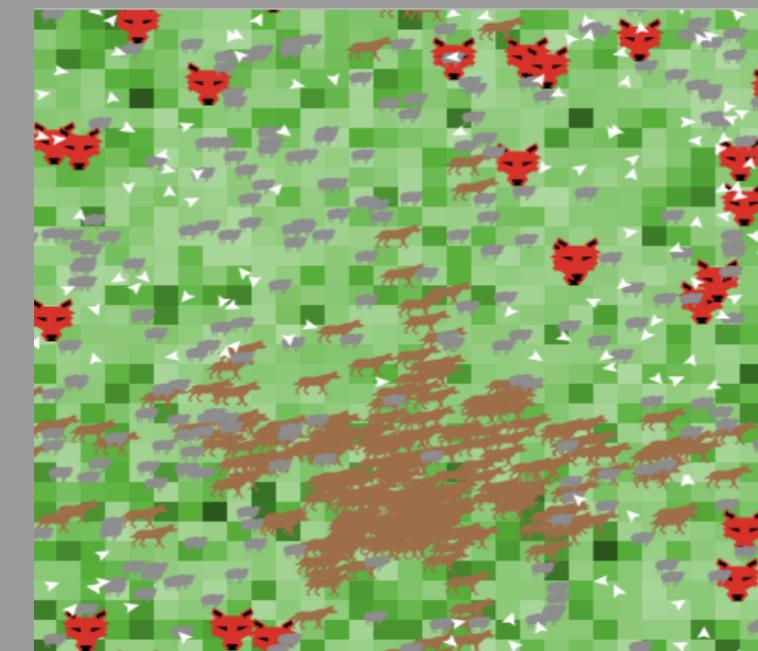
Evolution of packs as pack-radius increases:



pack-radius set to 3

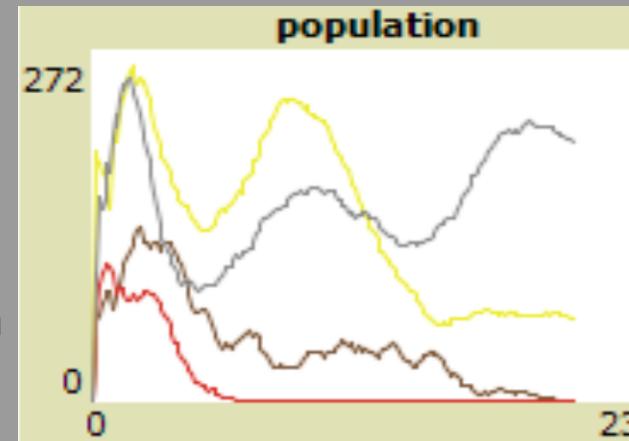


pack-radius set to 8



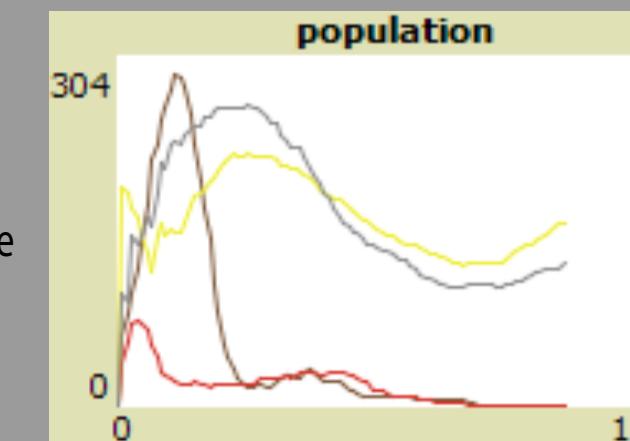
pack-radius set to 20

A smaller pack-radius leads to more packs with less total hyenas. This leads to greater longevity in for the population

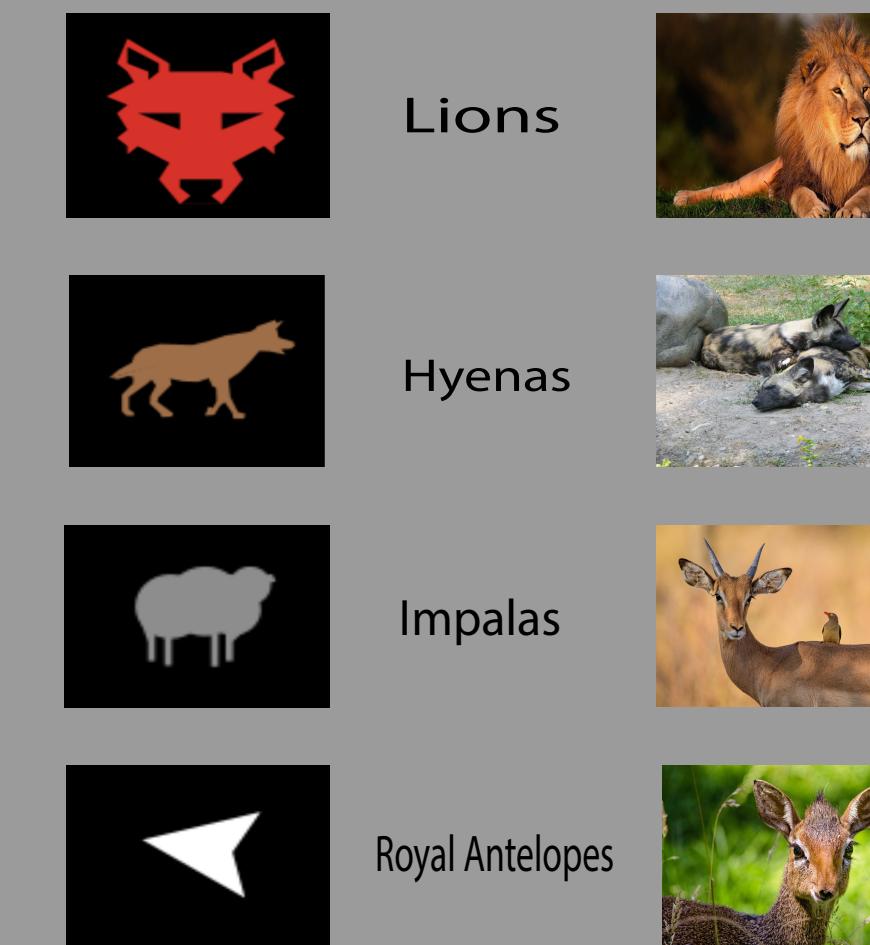


Pack -Radius set to 5

The larger pack-radius effectively creates a massive apex predator that consumes most of the available resources, leading to rapid population declines.



Pac-Radius set to 20



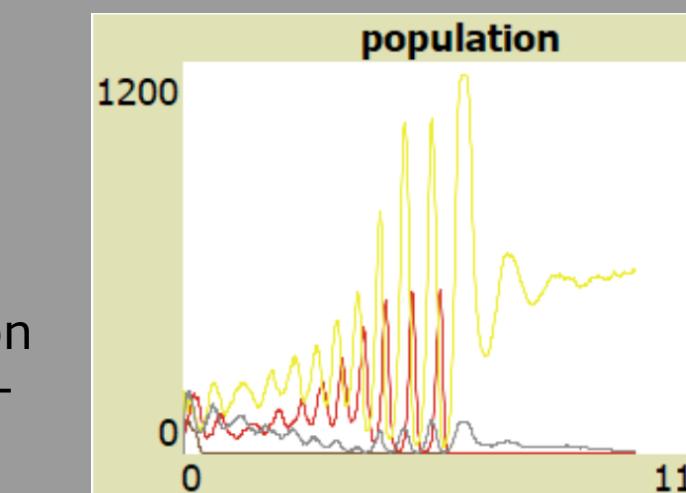
Model Rules Summary

1. Animals move randomly except for hyenas
2. Predators eat when they collide with their prey
3. Grazing animals eat if there is grass on their current patch
4. Animal reproduce when they reach a certain energy threshold
5. Lions are the apex predator
6. Hyenas can eat antelopes individually, but can form packs to take down impalas and even lions

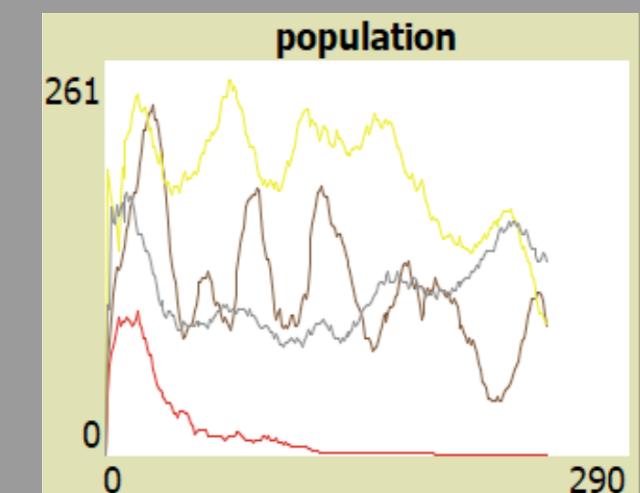
Food Preference Population Dynamics

Motivation

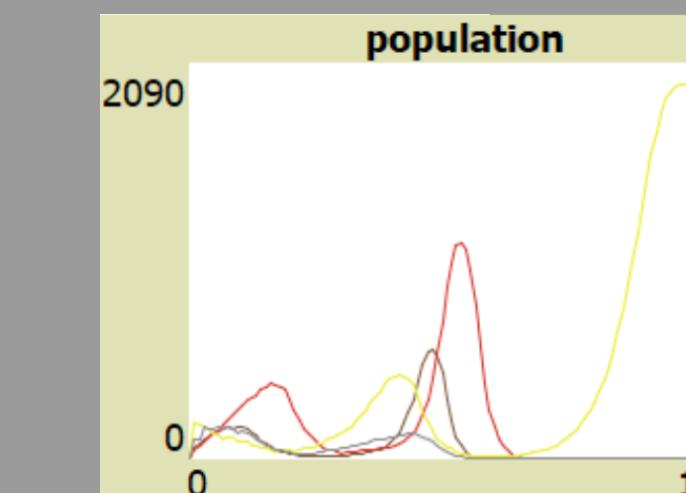
1. Investigate the effects of hyena packing on their population performance and the overall ecosystem.
2. Investigate the how having a dynamic food preference based on energy changes ecosystem populations.



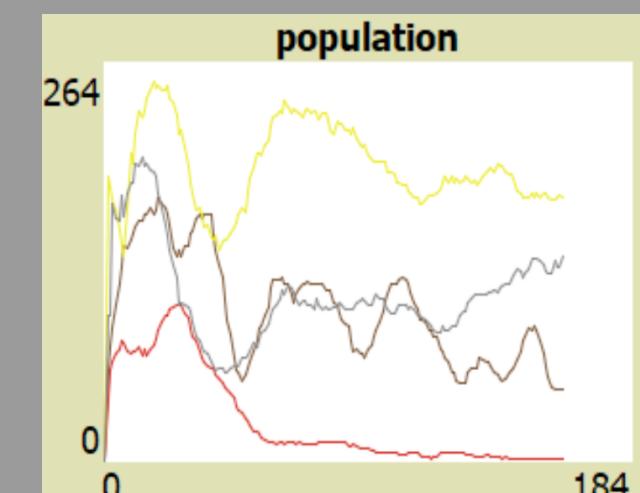
Without hyena packing and preference-threshold off



With hyena packing and preference-threshold off



Without hyena packing and with preference-threshold on



With hyena packing and preference-threshold on

