Little Habitat on the Prairie

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In order to determine how habitat fragmentation and predation affect the average time to extinction, we used a Spatially Explicit, Individual (Agent) Based Model of a rodent species. This provides a baseline comparison against observational data that will allow us to extrapolate the persistence of a species in the long term. In doing so, we can predict several decades into the future how a population will respond to landscape/predation changes in the present.

Initialization

Century Model simulates the carbon cycle, which can be used to calculate vegetation growth rates based on precipitation. These growth rates determine how much food is available for our herbivorous species.

Century Model 4 → Vegetation

Real World Data:

- Daily Weather
- Habitat Attributes
- Terrain Info
- Species Attributes

→ Landscape

→ Species

→ Population

Simulation

Spatially Explicit Rodent DYnamics Computation and Analysis (SERDYCA)

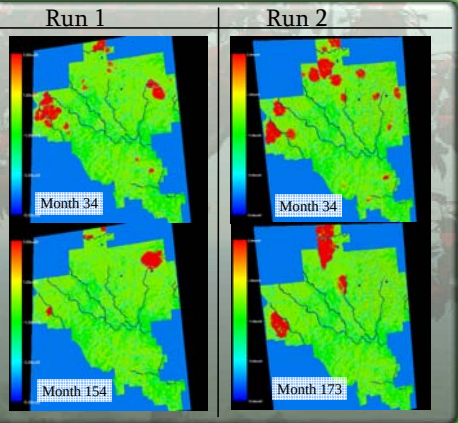
Social Behavior

Output

The user is able to tell SERDYCA which outputs they would like to see, namely different densities of populations or population groups.

30 years of real world weather data were entered into Century4, and a representative landscape of a prairie reserve (shown right) was also used.

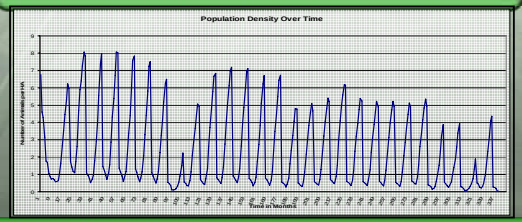
The simulation runs until all animals die, or when no more vegetative growth data is available. (interpolated for 360 months)



Spatial Population Distribution

Overall Goals of this Project:

- How does fragmentation of an animal habitat affect the persistence of a species?
- How do we extend the existing model to represent other prairie-type species (i.e. prairie dogs)?
- How can we create a computer model that takes into account various social behaviors of species?
- What additional parameters are necessary to initialize the new model to ensure accurate results?



Current Tasks: Modifications

- Account for multiple edible vegetations, giving animals a choice of food.
- Implement some sort of social structure to model communities and families.
- Use existing scientific literature to model foraging and movement behavior

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