Name: _____

Population Biology: Recovery of Animal Populations: Gorongosa

A population is a group of individuals of the _____ that _____ with one another.

Let's collect some <u>demographics</u> on the populations of elephants, waterbucks and zebras in Gorongosa National Park.

Population Size: Total number of individuals in a population
    Remember the collected numbers only represent approximately 4% of the entire park

	1994	2014
Elephants		
Waterbucks		
Zebras		

Population density: the number of individuals per unit area
    Let's calculate per square kilometer- Gorongosa is 4,000 km^2

	1994	2014
Elephants		
Waterbucks		
Zebras		

Population distribution: location of individuals relative to one another
    Distribution patterns can be Clumped, Uniform, or Random

    Elephants:

    Waterbucks:

    Zebras:

In the 1970's, a civil war in Mozambique decimated the populations of species in Gorongosa, to very low numbers. This is an example of what type of effect/event (hint: it is from our discussion on evolution)?

Let's see how the populations have grown since.

Population growth is the number of _____ minus the number of _____.

However true population growth is also affected by the time it takes young individuals to reach sexual maturity.

Birth rate: # offspring/individual/year
   Calculate: (12 months/year) ÷ (**gestational period**: #offspring/month) ÷ (2 (since only females have babies))

Death rate: # deaths/year
   Calculate: (1 individual) ÷ (**life span:** years/individual)

Maturation rate: # sexual mature individuals/year
   Calculate: (12 months/year) ÷ (**maturation period**: #mature individuals/month)

	Birth rate	Death Rate	Maturation Rate
Elephants			
Waterbucks			

Waterbuck's population growth.

Look at the model for population growth based off the scientist's calculations and predictions. How do the observed numbers match this model?

   Population growth can be exponential, when the size increases by the same percentage every year or logistic, when the populations size is limited by different factors.

   What type of growth are the waterbucks observing?

What do you think eventually will happen to the waterbuck's population size and why? (Hint: look at what the model predicts and determine why- can you determine which factors affect growth?)

The Carrying capacity is the maximum number of individuals of a species an environment can support. Eventually population size levels off to this number.

Why do you think there is a maximum number?

Why does the model fluctuate around carrying capacity?

Elephant's population growth

Look at the model for population growth based off the scientist's calculations and predictions. How do the observed numbers match this model?

What do you notice is different compared to waterbucks?

What type of growth are the elephants observing, exponential or logistic?

Is this expected and why?

Predictions

Why has the zebra population size remained so small?

What do you think will happen to the waterbuck population if it exceeds carrying capacity?

Do you think the zebra population would have recovered if the initial numbes were higher?

Gorongosa Collected Data

Individual counts of each species. Counts represent only 4% of the entire park.

	1968-1972	1994	2000	2007	2014
Elephants	1,898	5	14	168	528
Waterbucks	2,562	6	490	2,285	34,401
Zebras	2,723	3	9	2	18

Birth, death and maturation rates

	Gestational period	Life Span	Maturation period
Elephants	22 months	70 years	240 months
Waterbucks	9 months	20 years	16 months

Spatial distribution from a 2016 aerial wildlife count.
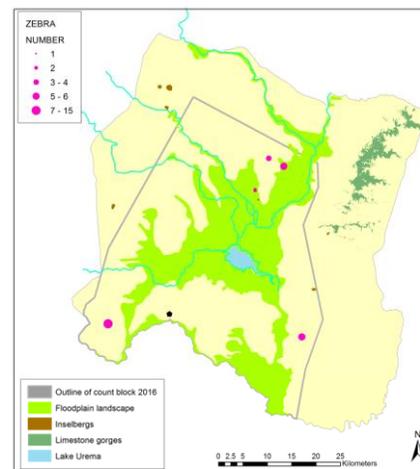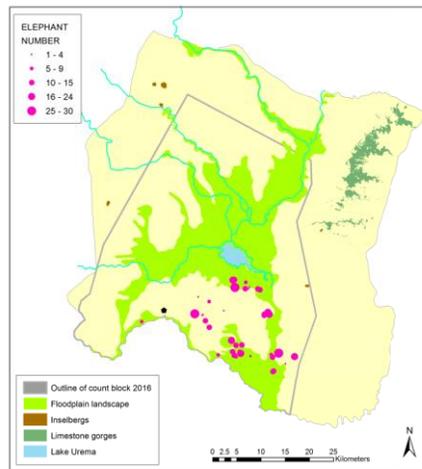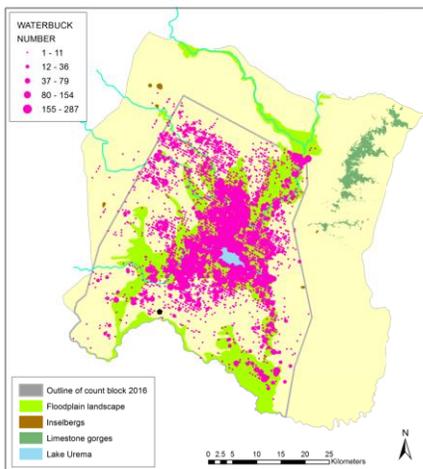
Sources: *Aerial wildlife count of the Parque Nacional da Gorongosa, Mozambique, October 2016 Approach, results and discussion Dr Marc Stalmans & Dr Mike Peel November 2016 and HHMI Modeling Populations and Species Interactions by Corina E. Tarnita*

Model Predictions Compared to Observations

Waterbuck Population
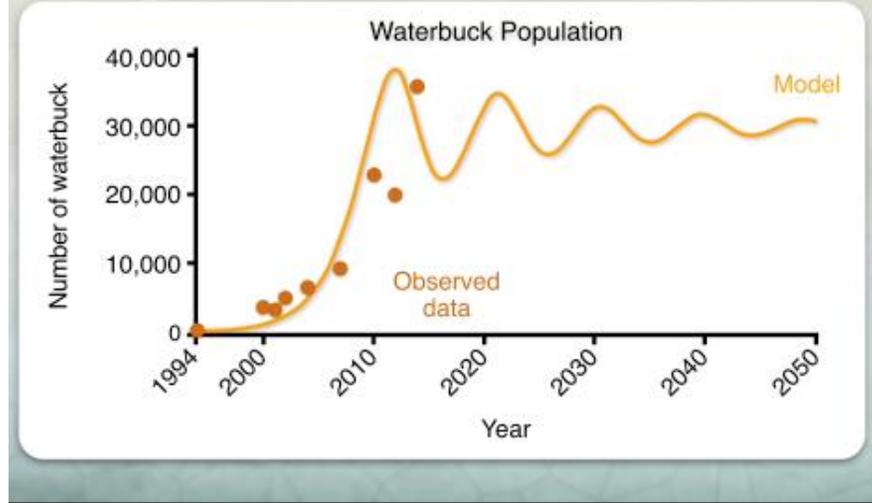
Model Predictions Compared to Observations for the Elephant Population

Elephant Population