**Name: #:**

**Limiting Factors**

Every population has limiting factors that limit its population size and prevents that species from taking over its range.  Some populations are increasing in size, some are decreasing in size and others are remaining somewhat stable for long periods of time.  Ultimately, even growing populations will stabilize or decrease due to limiting factors.  Let's learn more about these limiting factors.

1. All species have limiting factors.  For some species, the limiting factors can cause dangerous declines in their populations, threatening their very survival.  Name two species experiencing population declines in North America and identify a limiting factor for each species.  Are these factors density-dependent or density-independent?  Biotic (living) or abiotic (nonliving)?

<http://www.georgiawildlife.org/rare_species_profiles> <http://www.abheritage.ca/abnature/speciesatrisk/speciesatrisk.htm>

<http://www.sararegistry.gc.ca/species/schedules_e.cfm?id=1>

**In the following interactive activity, you will determine why the white-footed mouse population can fluctuate from year to year.
You can find the interactive here:**[**http://www.pbs.org/wgbh/nova/rats/population.html**](http://www.pbs.org/wgbh/nova/rats/population.html) **(Note the symbols for population increases and decreases.)**

**Click on "Launch Interactive" and answer the questions below**

2. What is oak tree masting?

3. How is masting an adaptive strategy for oak trees?
**Fall/ Winter 1**

4. What factor affects the white-footed mouse population during the Fall/ Winter 1?
**Spring/ Summer 1**

5. What are the effects of the large mouse population in the ecosystem during Spring/Summer 1?
**Fall/ Winter 2**

6. What is a limiting factor of the mouse population during this period?
**Spring/ Summer 2**

7. What are the effects of the low mouse population in the ecosystem during Spring/ Summer 2?

8.  Carrying capacity is the maximum number of individuals of a species that an ecosystem can support.  Explain why the carrying capacity of the mouse population would best be expressed as an average over several years.

**One of the most successful animal species in the history of life on earth is the human species.  How have we become so successful?**

10. Explain how human populations have overcome a few of their [limiting factors](http://www.biology.iupui.edu/biocourses/N100/2k4ch39pop.html) throughout history?  (Scroll down to "Human Population Growth".)

11. The global human population is growing exponentially, although the population is not growing in all countries.   What does [exponential growth](http://www.biology.iupui.edu/biocourses/N100/2k4ch39pop.html) mean?

12. What [continent](http://www.pbs.org/wgbh/nova/worldbalance/numbers.html) is the most populated?  (Click on "Launch Interactive".)

13. What is [doubling time](http://geography.about.com/library/weekly/aa051800a.htm?once=true&)?  How is it calculated?  At its current rate of population growth, how long will it take the current global population of about 6 billion to double?

14. Read about potential limiting factors of the human population.  What factors do you think may eventually slow down and limit the human population growth rate?  Include a few possible factors in your answer.

<http://www.pbs.org/wgbh/nova/worldbalance/earth.html>   Click on "Launch Interactive".

<http://www.pbs.org/wgbh/nova/worldbalance/easter.html>

15. Human population growth has impacted the growth rate of many other species.  Consider marine species and the causes of the decreases and increases in their populations.  Identify three human activities that have affected the population growth of marine species.  Explain the cause and effect relationship of each population change.

<https://www.sciencelearn.org.nz/resources/144-human-impacts-on-marine-environments>

<http://aquafind.com/articles/HumanImpact.php>