

Determination of Sustainable Harvest Limits

Consider the following hypothetical situation. You are a species of humanoid that has just decided to colonize planet Incredibilia. The reason why your species has decided to colonize this world is that your scientists have discovered that it supports vast populations of organisms known as Tasties, the sole food source for your people. After several years of study from a distance, your experts have declared this planet perfect for colonization and supplied your people with the following data.

1. The Tasties on Incredibilia exhibit no sentience or intelligence, they display no behavior of any kind, and have no nervous system; they do not react in any way to your harvesting them for food.
2. Tasties survive and grow quite well requiring only atmospheric gases; therefore they are not limited by shortages of food.
3. There are two large Tasty populations (of one million individuals each) found on the planet: one on the largest northern continent and one on the largest southern continent.
4. Tasties can not fly, swim, or move in any way; therefore there is no migration between these two populations
5. The northern population exhibits a birth rate of approximately ten per hundred per year and a death rate of five per hundred per year.
6. The southern population exhibits a birth rate of twenty per hundred and a death rate of ten per hundred
7. Tasties reproduce only once, during the springtime (assume the seasons on Incredibilia are similar to those on Earth and result from the same factors)
8. Each Tasty is in competition with other Tasties for gases and therefore does not like to be located too close to other Tasties. In fact, when they are crowded together (closer than ten feet to their neighbors) they no longer reproduce.
9. Approximately ten percent of the landmass on each continent is appropriate Tasty habitat. The rest is available for colonization by your people.
10. Tasties are large and one harvested Tasty can feed ten of your people for a month.

Your job as colony supervisor is to determine the rules by which the colonists of Incredibilia must live. Subjects to address are:

1. How many colonists will you take to Incredibilia?
2. Where will they be allowed to settle?
3. When will harvesting be done?
4. Who will do the harvesting and why?
5. How many Tasties will be harvested?
6. How will harvesting be regulated, that is what rules will you set in place?
7. How will you enforce the rules regarding harvesting and settlement?
8. Who will monitor Tasty population changes? What will observers be interested in learning about the Tasty population in your area?
9. How will your colony's population growth affect harvesting?
10. Should you attempt to regulate the population growth rate of your colonists?

Use information from you textbook chapter on population growth to answer the questions above. Remember the formula for population growth: $r = (B + I) - (D + E)$