Wyatt Whiting

6 Feb 2019

Reading Assignment 2

The equations governing populations F and S are markedly similar to those presented in section 49. Using this as a guide, we can see that the rate of change for F would exhibit exponential growth were it not for the $-Cs$ term. Thus, F's population is curbed only when S is present, so we can conclude that S preys on F. Furthermore, since in the absence of S, F would grow exponentially, we can safely assume that F has abundant resources to continue growing.

Now to study S in detail. The $-k$ term indicates that, in the absence of F and G, that S would exhibit exponential decay. The $+\lambda F$ term confirms the suspicion that S preys on F, because a higher value for F would cause S to increase. Continuing analysis of species S presents a $-mG$ term, which indicates that the population of G contributes to the decline of S, so we may conclude that G preys on S. However, it is worth noting that F does not rely on G, so G and F do not directly interact.

Species G, exhibits species S, demonstrates exponential decay when populations F and S are absent. The population of G may only increase if S is sufficiently large. Therefore, G must prey on S, as the $+\sigma S$ term suggests.

In summary, species F is one that has access to abundant food and is preyed upon by species S. Species S, in turn, relies on species F for food, and is preyed upon by species G. Finally, species G relies on species S for food, and doesn't interact directly with species F. F, S, and G could reasonably represent phytoplankton, krill, and blue whales, respectively. Phytoplankton need only carbon dioxide and sunlight to grow, so it is reasonable to assume that in the absence of predators, they would grow exponentially. Krill eat phytoplankton, which accounts for the predation of species F by species S. However, without phytoplankton, the krill would die out, which further matches the model. Species G, the blue whale, likewise fits into the model quite nicely. This is because the blue whale eats the krill, but does not eat the phytoplankton directly. In addition, without krill, the blue whales would exponentially decrease in number.