BIOl 410 Tutorial 9

Predation and Island Biogeography

Q1

Draw the state-space graph for a predator isocline with a carrying capacity and alternative prey, and a victim isocline with a carrying capacity and an Allee effect. Identify the dynamics at the two intersection points

Q2

You are studying an insect-eating bird with a Type II functional response for which k = 100 prey/hour and D = 5.

a) What is the capture efficiency, α?

b) If the prey abundance is 75, what is the feeding rate (n/t)?

Q3

A species-area relationship for birds on Caribbean island has been fit using a power function, with the constants being found to be c = 8.759 and z = 0.113. The island of Grenada has an area of 120 square miles, and supports 17 land-bird species

a) What is the predicted umber of species from the power function?

b) Suppose that half of the island's area disappears in a volcanic eruption. From the power function, how many species would be expected to remain?

Q4

Data was collected on lizards populating islands in the South Pacific. The data indicate that there are more species of lizards on small islands than large islands. Using an appropriate set of immigration and extinction curves, show that these data do not necessarily contravene the MacArthur-Wilson equilibrium model.

Q5

Suppose that an island in MacArthur-Wilson equilibrium supports 75 species, out of a source pool of 100 species. The maximum extinction rate (E) is 10 extinctions per year. Calculate the maximum immigration rate (I). If I is doubled, what is the new species equilibrium and new turnover rate?