Course- FRW- 602 Wildlife Management & Research

Course Instructor; Dr. Sangam Khalil

Dept. Forestry Range & Wildlife Management

6th Lecture

Management of small populations.

Population size is extremely important in evaluating conservation priorities for a species. Small populations are at risk of going extinct because of demographic stochasticity and genetic drift.

The goal of most captive breeding programs for endangered species is to establish captive populations that are large enough to be demographically stable and genetically healthy. But the numbers of animals in any one zoo is too small to meet this goal. So zoos have linked together in cooperative captive breeding programs, such as the American Zoo Association's Species Survival Program (SSP) to pool their animals into one much larger managed population.

In this exercise, you will learn about three of the meanings of "effective population size" and how to estimate two of them. You will then learn how to apply these techniques to specific conservation situations, using the concepts of inbreeding, the minimum viable population size, and the 50/500 rule. Effective Population Size Population size has a major impact on the dynamics of a population. For example, in chapter 11 you used simulations to see that genetic drift reduces allelic diversity much faster in small populations of woggles than in large ones. Population size also influences the chances of extinction through demographic stochasticity, the random change in population size over time due to random variation in individual survival and reproductive success. Such events have a proportionally large effect in small populations. For example, in a population of 10 individuals, one accidental death would reduce the population size by 10%. In contrast, if the population were made up of 1000 individuals, one accidental death would reduce the population size by only 0.1%. Thus, small populations are much more likely to go extinct due to demographic stochasticity than are large populations. Effective population size (N_e) helps us quantify how a particular population will be affected by drift or inbreeding. Effective size takes into account not only the current census size of a population, but also the history of the population. Effective population size is the size of an “ideal population” of organisms (ideal refers to a hypothetical population in the Hardy Weinberg sense with a constant population size, equal sex ratio, and no immigration, emigration, mutation, or selection) that would experience the effects of drift or inbreeding to the same degree as the population we are studying. For example, if our actual population of 50 animals experiences the effects of drift at the same rate as an ideal population of 20 animals, the population has a drift effective size of 20. There is no such thing as “the effective size” of a population. Different effective population sizes help us estimate the impact of different forces. The effective size you estimate will depend on the scientific question you are trying to address .Estimating the appropriate effective population size is crucial in conservation biology; in most (but not all) cases, effective population size will be smaller than the actual number of organisms in the population.