

Glossary of Common Population Dynamics Terms

- **Additive Mortality:** A cause of mortality that when changed in magnitude results in a relatively equivalent and opposite change in overall survival
- **Carrying Capacity (K, *i.e.*, Ecological Carrying Capacity):** the theoretical maximum number of animals that can be supported in a specific environment in a state of quasi-equilibrium (Births = Deaths; net population growth rate = 0)
- **Compensatory Mortality:** A cause of mortality that when changed in magnitude is associated with a relatively equivalent and opposite change in another cause of mortality such that overall (*i.e.*, annual) survival is unchanged
- **Demographic stochasticity:** *random* fluctuations in population size due to the births and deaths of individuals being discrete events; for example, although the probability of individual survival may be 80%, no animal 80% survives; each animal either completely survives or completely dies over each interval. Important mostly for small populations.
- **Density Dependence:** the process wherein population growth rate is affected by population density (density dependent effects are typically pronounced at high population density and minimal at low density); it can be mediated by different mechanisms (*e.g.*, survival and productivity effects)
- **Density Dependent Factor:** a factor affecting a population where the strength of the effect is relative to current or past population density (*e.g.*, food availability, intraspecific competition for other resources, disease)
- **Density Independent Factor:** a factor affecting a population relatively independently of population density (*e.g.*, catastrophic weather [hurricane, tornado, flood, very severe winter], disease, oil spills)
- **Ecological Carrying Capacity (ECC):** See Carrying Capacity
- **Elasticity:** the proportional change in population growth rate resulting from an equivalent proportional change in a specific vital rate
- **Exponential growth:** a pattern of population increase characterized by rapid growth in an environment where resource availability is not limiting; the rate of change is proportional to population size
- **Extinction:** the loss of a species (or subspecies) throughout its entire range (*e.g.*, California grizzly bear)

- **Extirpation:** the loss of a species (or subspecies) in only a distinct portion of its range; other populations exist elsewhere (e.g., woodland caribou in Washington are extirpated)
- **Fecundity:** the physiological maximum potential for an individual female or population of females to produce offspring (*i.e.*, young per female per unit of time); typically age or age-class specific
- **Fertility:** the actual number of offspring produced by an individual female or population of females (realized fecundity); typically age or age-class specific
- **K-selected:** A generalized term for organisms that tend to: mature slowly, have long lifespans, have large body size, produce few young per breeding season, and have high maternal investment in offspring; examples would be elephants and grizzly bears
- **Limiting Factor:** Any factor that “limits” population growth (common use is a factor that causes non-trivial mortality or reduces productivity); does not require density dependence and may or may not promote an equilibrium density
- **Logistic growth:** a model of population growth taking a distinctive “S” shape where at low density the population grows exponentially and at high density growth slows and asymptotes due to density dependence
- **N:** Number of individuals in a population; population size
- **Neonate:** a recently born animal highly dependent on maternal care and obtaining its nutrition primarily through nursing; the neonatal period is characterized by high vulnerability and, in most large mammals, much higher mortality risk than typical of adults
- **Nutritional Carrying Capacity (NCC):** the number of animals an environment can sustain in a specified nutritional state (or consuming diets with a specified nutritional content)
- **Population:** In ecology, a group of animals wherein genetic alleles are likely to be shared among individuals; in application, typically a group of animals occurring in a defined landscape extent
- **Population Estimate:** a formal estimate of N (population size), typically accounting for imperfect detection of individuals; population estimates should include a measure of precision of the estimate such as a confidence interval; an array of formal methods can be used to generate population estimates

- **Population Index:** a derived metric that is assumed to be correlated with actual population size, but the index is not a formal population estimate (index < N); a reliable index will have a consistent correlation with population size across a broad range of population sizes
- **Population Ratios:** typically derived from survey counts (corrected for detectability or not) and most commonly generated for *males:females*, *adult males:adult females*, *juveniles:adults*, or *juveniles: adult females*
- **R-selected:** A generalized term for organisms that tend to: mature rapidly, have short lifespans, have small body size, produce many young per breeding season, and have low maternal investment in offspring; examples would be meadow voles and snowshoe hares
- **Rate of Increase:** a formal metric estimating magnitude and direction of population change (increase or decrease) through time; most commonly estimated by: $\lambda = N_{t+1}/N_t$ or $r = \ln(\lambda)$.
- **Recruitment:** the process of individuals in a particular life stage surviving and entering a subsequent life stage; often applied to juveniles becoming yearlings or juveniles becoming adults (when it is difficult to distinguish yearlings from adults); in ungulates it is also often applied to yearling (or juvenile) males *recruiting* to become adult males
- **Regulating Factor:** A limiting factor that affects population growth and has an effect that varies with density (a regulating factor typically facilitates population increases at low densities and declines at high densities); as such, a regulating factor promotes a quasi-stable equilibrium density that may be less than ECC
- **Reproductive Value:** the expected number of offspring to be produced by an individual female over their remaining lifespan (incorporates both age-specific survival expectancy and age-specific productivity through time)
- **Senescence:** a progressive stage wherein health and fitness of an individual declines with advancing age; there is no fixed age associated with senescence (and it would vary by species depending on lifespan), but it is generally assumed to follow a prolonged *prime-age* state; senescent animals often have higher mortality risk, lower productivity (for females), and higher vulnerability to events like severe winters
- **Vital Rates:** In ecology, vital rates refer to estimates of survival and reproduction (fecundity or fertility), typically specific to sexes and ages or age classes