PEER Life Science Ecosystems Population Balance Notes Outline

**Why It Matters**

* The first rule of species survival in an ecosystem is that the population must be large enough to withstand disease, shortages of food and water, predators, and the other hazards of living.
* The direct transfer of energy between organisms is called a food chain. When these paths of energy transfer start intertwining and becoming interrelated, they create food webs.
* Asexual reproduction produces two identical copies of the parent cell.
* Sexual reproduction is advantageous because it increases genetic diversity which increases the likelihood of organisms adapting to changing ecosystems.
* Human activities have disturbed the balance of many ecosystems. One way we do this is by introducing invasive or non-native species to ecosystems where they fit into a new niche or compete with a native species for an existing one.

**How We Know**

* Most of what we know about ancient populations comes from fossils.
* Name three types of events or information that can be revealed by fossils:
  + Mass extinctions
  + Periods when many new species appeared in a short time
  + Relationships of living species to one another
  + Rapid environmental changes
  + Effects of human-caused changes to the earth
  + Effects of environmental changes of biological diversity and ecological structure
* Sources of error in fossil records include that some species do not easily become fossils, distribution of fossils may be uneven around the world, and scientists might not have taken samples from the right places.
* After natural disasters like forest fires, barren land experiences a succession of species being introduced again.
  + Put the following species in order of appearance in ecological succession: small mammals, large mammals, small trees and brush plants, large trees
    - Small trees and brush plants, small mammals, large trees, larger mammals
* Scientists can also tell how populations change over time by studying how genetic material changes over time.

**What We Know**

* There are many ways to define a species. One way to define whether organisms are of the same species is by whether or not they can produce offspring that can reproduce.
* Many members of the same species make a population.
* Populations can be characterized in the following ways
  + Density - the number of individuals divided by the area of suitable environment
  + Age distribution - helps determine the growth of a population
  + Sex ratio - ratio of males to females in a population
* The vast majority of species that have lived on earth are now extinct.
* Each population in an ecosystem occupies a specific niche. If this niche is disturbed, the size of the population may change.
* A given population of a species has a certain distribution of genes, or gene frequencies. If these frequencies are changing, the species likely has a high capacity to evolve.
* The gene pool refers to all of the genes found within a population.
* Geographic isolation can isolate gene pools. This can lead to two populations of the same species evolving into separate species.
* As a population grows, the chances for evolving new species may also increase because more individuals with specific gene frequencies are able to be acted on by natural selection.
  + Unless growth is limited, population growth occurs exponentially. Factors that influence population growth include: light, predators, food and water, and contagious disease.
* Regardless of body mass or numbers in a population, a given mass of prey will support a given mass of predator. Consequently, if the numbers of prey go down, the numbers of predators go up/down. If the numbers of predators go down, the numbers of prey will go up/down.