ECOLOGICAL CONCEPTS

** Some basics of the biological component of the environment:

Terms:

* **evolution or biological evolution**:

  * all species descend from earlier, ancestral species
  * **macroevolution**: long-term, large-scale changes that lead to new species (**speciation**), and the loss of other species

* **microevolution: longterm, large-scale changes that lead to new species (specieation), and the loss of other species.**

* development of *genetic variability* through **mutations**, random changes of the DNA in a cell; brought about by:
  * exposure to external agents (radiation, chemicals, etc)
  * random mistakes during DNA replication
  * **mutations are:** random and unpredicatione only source of toatlly new geneitice raw material (without human help), relatively rare events.

* **natural selection:** process by which a particular beneficial gene or set of genes is reproduced in succeeding generations more than than other genes. This leads to a population of organisms with a greater proportion of individuals better adapted to certain environmental conditions.

* **adaptation or adaptive trait**:

  EX's: **structural adaptations:** *coloration, mimicry, protective cover, gripping mechanisms*
  physiological adaptations: *hibernation, chemical protection*
  behavioral adaptations: *migration, various mating behaviors*

* **ecological niche**: total way of life or role of a species in an ecosystem, all physical, chemical & biological conditions a species needs to live and reproduce in an ecosystem.

* **habitat**: the physical location in which a species lives

* **species**: group of organisms that resemble one another in appearance, behavior, chemical makeup & processes, & genetic structure

Types of Species:

Generalists: Species with a broad ecological niche, can live in many different habitats, eat a variety of foods & tolerate a wide range of environmental conditions, less prone to extinction.

EX's: humans, flies, cockroaches, mice & rats, raccoons, coyotes,channel catfish, various weed species, etc. *know examples

Specialists: Species with a narrow ecological niche, may live in only one type of habitat, tolerate only one type or a few types of food, tolerate only a narrow range of environmental conditions, more prone to extinction.

EX's: red-cockaded woodpecker, giant pandas, snail kite, numeroustropical rain forest species *Know examples

Native species: species that normally live and thrive in a particular ecosystem

EX's: American bison, American alligator, etc *Know examples

Non-native species: species that migrate into an ecosystem or are deliberately or accidentally introduced into an ecosystem;
also known as **exotic, alien, or introduced species**

EX's: kudzu, Argentine fire ants, nutria, etc.

Indicator species: species that serve as early warnings that a community or ecosystem is being degraded

EX's: many birds, frogs, & toads

Keystone species: species that play roles affecting many other organisms in the ecosystem; often top-level predators

EX's: wolf, leopard, lion, sea otter, great white shark,
variousbees, bats, & ants

When considering the conservation and management of these different types of species (and others), one idea to remember is:

* **How quickly can a species adapt?** Dependent on 3 limitations:

1) *A change in environmental conditions can lead to adaptation only for traits already present in the gene pool of a population*
2) *The population's ability to adapt can be limited by its reproductive capacity*
3) *Even if a favorable trait is present, most of the population would have to die or become sterile so individuals with the trait could predominate & pass the trait on*

* **speciation**: formation of 2 species from one species as a result of divergent natural selection in response to changes in the environment

* mechanism: 2 phases

geographic isolation: separation of populations of species for fairly long times into different areas.

reproductive isolation: long-term geographic separation of members of a particular sexually reproducing species

* **extinction**: complete disappearance of a living species from the earth; happens when a species cannot adapt & successfully reproduce under new environmental conditions or it evolves into one or more new species

Types of extinction:

background extinction: normal extinction of various species as a result of changes in local environmental conditions; a few species here and there of varied taxa