

ECOLOGY

- Ecology is the study of the relationships among living organisms and their interactions with the physical environment
- these relationships are in a constant state of FLUX(change), and even SMALL CHANGES can cause effects throughout the ECOSYSTEM
- Stability in an ecosystem is a **BALANCE** between competing effects

BIODIVERSITY

- Biodiversity refers to the collective **VARIETY** of living organisms in an ecosystem
- this structure is influenced by **ALTERATIONS IN HABITAT**, including:
 - *** climatic changes
 - *** fire
 - *** flood
 - *** invasions by organisms from another system

*****THE MORE BIODIVERSITY IN AN ECOSYSTEM, THE GREATER ITS STABILITY AND RESILIENCY!!!!!!!**

ANALYZING CHANGE IN ECOSYSTEMS

- analysis of change can help people to describe and understand what is happening in a natural system (and to some extent **CONTROL OR INFLUENCE THAT SYSTEM**)
- understanding *different kinds* of change can help to improve predictions of what will happen next
- changes in ecosystems often manifest themselves in predictable patterns of:
 - *** **CLIMATE**
 - *** **REPRODUCTIVE CYCLES**
 - *** **POPULATION CYCLES**
 - *** **MIGRATIONS**

!!!!!!! HOWEVER: Unexpected disturbances caused by human intervention or the introduction of a new species (for example) **MAY DESTABILIZE THE OFTEN COMPLEX AND DELICATE BALANCE IN AN ECOSYSTEM**

- analyzing changes in an ecosystem can require complex methods and techniques because variation is *not necessarily simple* and may be interrelated with changes or trends in other factors
- rates and patterns of change, including trends, cycles, and irregularities, are essential features of the living world and are useful indicators of change that can provide data for analysis
- often it is important to analyze change over time, a process called **LONGITUDINAL ANALYSIS**

FLUCTUATIONS IN POPULATION SIZE

- fluctuations in the size of a population are often difficult to measure directly but may be estimated by measuring the relative rates of:

*** birth

*** death

*** immigration

*** emigration

- the number of deaths and emigrations over time will *decrease* a population's size, and the number of births and immigrations over time will *increase* it

- comparing rates for death and emigration with those for birth and immigration will determine whether the population shows a net growth or a decline over time

THE WATER, CARBON, & NITROGEN CYCLES

!!!!!!!Water, Carbon, and Nitrogen cycle between abiotic resources and organic matter in the ecosystem

!!!!!!!OXYGEN cycles through the ecosystem via PHOTOSYNTHESIS and RESPIRATION

- living things depend on *nonliving* things for life

- at the organism level, living things depend on natural resources

- at the molecular level, they depend on CHEMICAL CYCLES

- Water, carbon, nitrogen, phosphorus, and other elements are recycled back and forth between organisms and their environments!!!!!!!

- WATER, CARBON, AND NITROGEN are necessary for life to exist

- these chemicals are incorporated into plants(producers) by photosynthesis and nitrogen fixation and used by animals(consumers) for food and protein synthesis

- Chemical recycling occurs through:

***** RESPIRATION**

***** EXCRETION OF WASTE PRODUCTS**

***** DEATH OF ORGANISMS**

THE ROLE OF PRODUCERS AND DECOMPOSERS IN AN ECOSYSTEM

- an ecosystem's *producers*(plants and photosynthetic microorganisms) are primarily responsible for the *production* of organic matter

- an ecosystem's *decomposers*(fungi and microorganisms) are primarily responsible for the *recycling* of organic matter

- CONDITIONS THAT THREATEN THE STABILITY OF PRODUCER AND

DECOMPOSER POPULATIONS IN AN ECOSYSTEM JEOPARDIZE THE AVAILABILITY OF ENERGY AND THE CAPABILITY OF MATTER TO RECYCLE IN THE REST OF THE BIOLOGICAL COMMUNITY

FOOD WEBS AND ENERGY PYRAMIDS

- at each link in a food web some energy is stored in newly made structures **BUT** much energy is *dissipated into the environment as HEAT!!!!!!*

- this dissipation may be represented in an **ENERGY PYRAMID**

*** an **ENERGY PYRAMID** shows how stored energy is passed from one organism to another

*** at every level in a food web, an organism uses energy metabolically to survive and grow, **BUT MUCH IS RELEASED AS HEAT, USUALLY ABOUT 90%!!!**

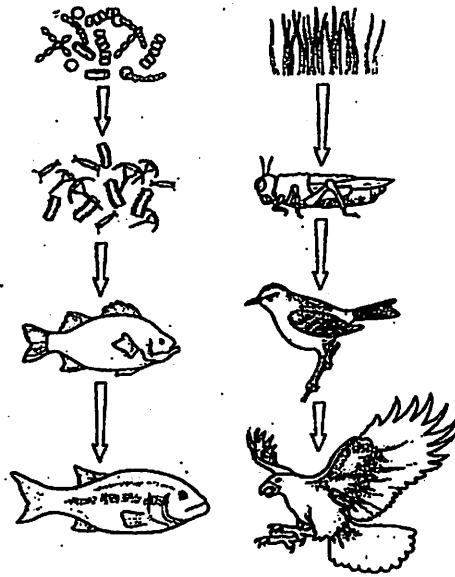
*** at every link in a food web, energy is transferred to the next level, but typically only 10% of the energy from the previous level is passed on to the consumer

NAME _____

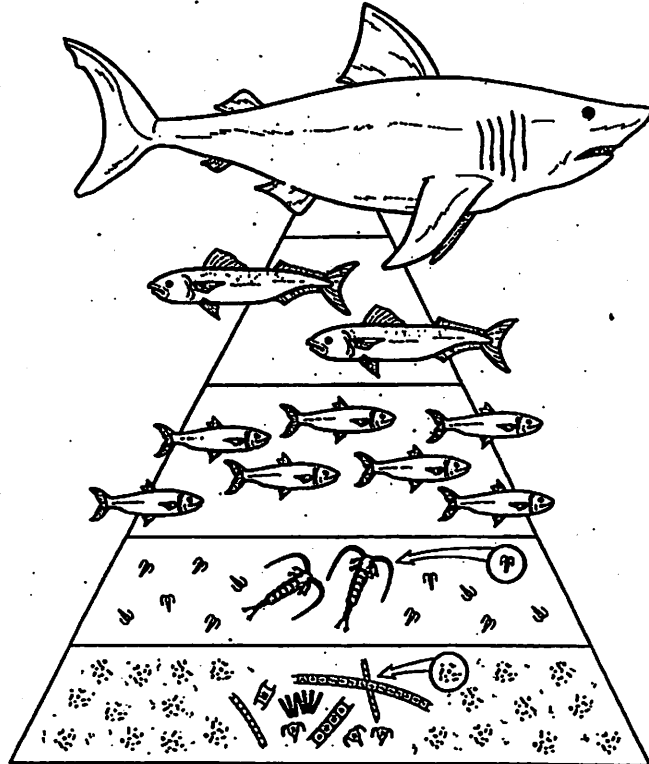
DATE _____ HOUR _____

ECOSYSTEMS

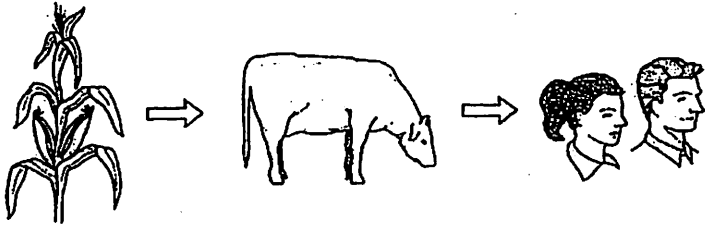
TROPHIC LEVELS



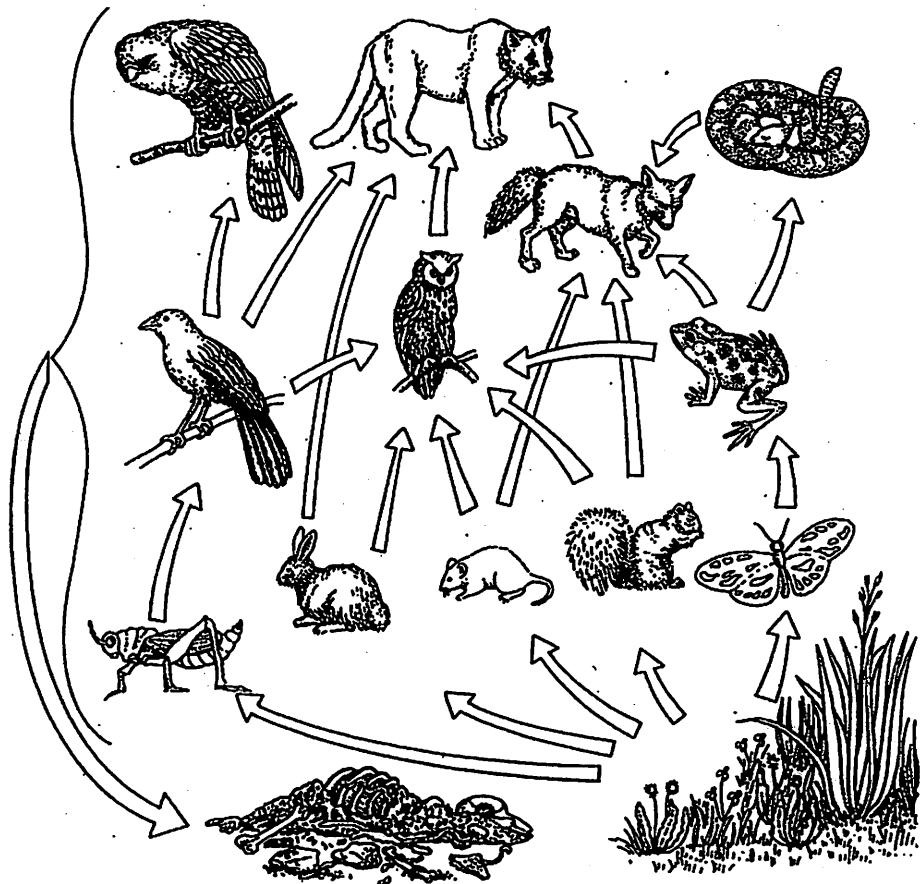
ECOLOGICAL PYRAMIDS



FOOD CHAIN



FOOD WEBS



QUESTIONS

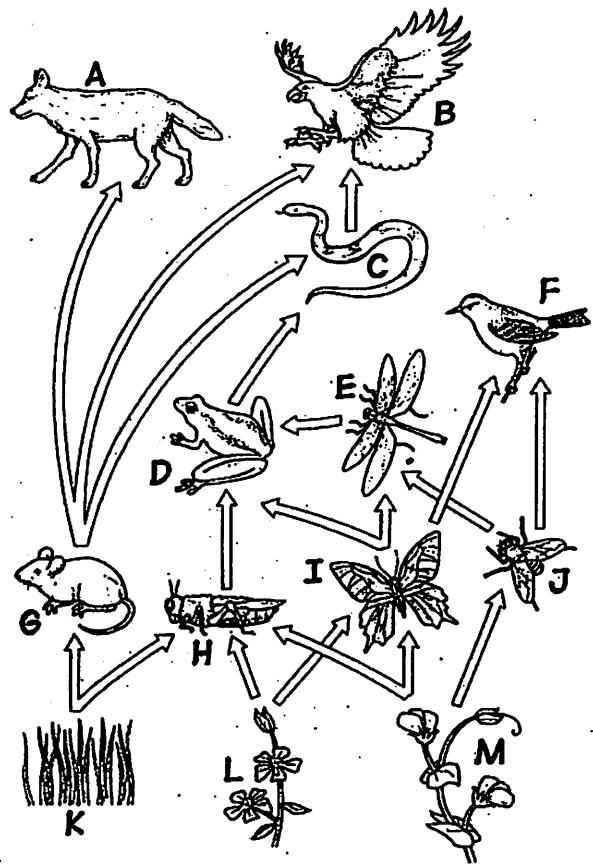
1. Define ecosystem. _____

2. Identify the trophic level described in each of the following. Use the key to indicate your answers.

- A. Detritivores
- B. Primary consumers
- C. Primary producers

- D. Secondary consumers
- E. Tertiary consumers

- _____ Autotrophs
- _____ Convert sun energy into chemical energy
- _____ Plants, photosynthetic protists, cyanobacteria, chemosynthetic bacteria
- _____ Herbivores
- _____ Eat primary producers
- _____ Primary carnivores
- _____ Eat primary consumers
- _____ Secondary carnivores
- _____ Eat secondary consumers
- _____ Consumers that obtain their energy by consuming dead plants and animals
- _____ Fungi, bacteria, nematodes, earthworms, insects, scavengers
- _____ Letters K, L, and M
- _____ Letters G, H, I and J
- _____ Letters D, E, and F
- _____ Letter C



- _____ Letter A
- _____ Letter B

3. What is the source of energy for each of the following?

Primary producer	
Primary consumer	
Secondary consumer	
Tertiary consumer	
Detritivores	

4. Describe the efficiency of energy transfer between trophic levels.

5. How does the amount of energy available at each trophic level affect the structure of the ecosystem?

6. If the cells in the dead terrestrial plant material that washed into the lake contained a commercially produced toxin, what would be the likely effects of this toxin on the food web on page 2? Explain.

7. Water cycle: What effect does each of the following processes have on the water cycle?

Evaporation	
Condensation	
Transpiration	
Respiration	
Precipitation	

8. Carbon Cycle: What is the role of each of the following in the carbon cycle?

Photosynthesis	
Respiration	
Eating	
Burning	

9. Nitrogen Cycle: Match the description with the correct term.

- A. Ammonification
 B. Assimilation
 C. Denitrification

- D. Nitrification
 E. Nitrogen-fixation

- _____ Soil bacteria or bacteria in the soil convert nitrogen gas (N_2) into usable forms
- _____ Bacteria convert ammonium (NH_4^+) into nitrites (NO_2^-) and nitrates (NO_3^-)
- _____ Decomposers and some nitrogen-fixing bacteria produce ammonium (NH_4^+)
- _____ Plants absorb nitrates from the soil and animals eat plants or other animals to obtain nitrogen-containing compounds
- _____ Bacteria convert nitrates into nitrogen gas