These notes are posted on my site for the following reasons:

- for students to copy in their own hand-writing
  - in order to complete their class notes
  - if student did not have enough time in class
  - if student was away and missed this section
- for assistants and tutors to follow progress of the concepts taught

Photocopied/printed notes can not be used during the Unit Notebook Check in class.

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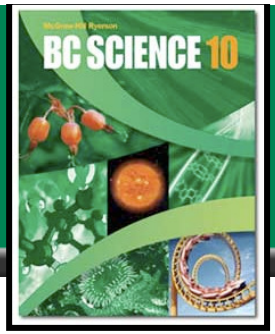
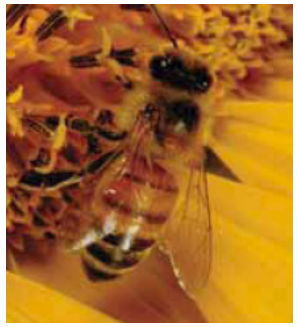
2.1 Energy Flow in Ecosystems



- **Biomass is the total mass of all living things in a given area.**
  - **Biomass is also sometimes used to the mass of organic materials used to produce biofuels such as biogas.**
  - **Biomass is generally measured in g/m^2 or kg/m^2**
- **Within an organism's niche, the organism interacts with the ecosystem by:**
  1. **Obtaining food from the ecosystem**
  2. **Contributing energy to the ecosystem**



  - **Plants are called "producers" because they produce carbohydrates from carbon dioxide, water and the sun's energy.**
  - **"Consumers" get their energy by feeding on producers or other consumers.**
  - **Decomposition is the break-down of wastes and dead organisms, by organisms called "decomposers", through the process of biodegradation.**

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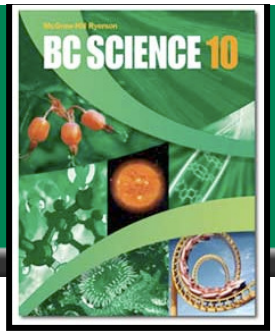
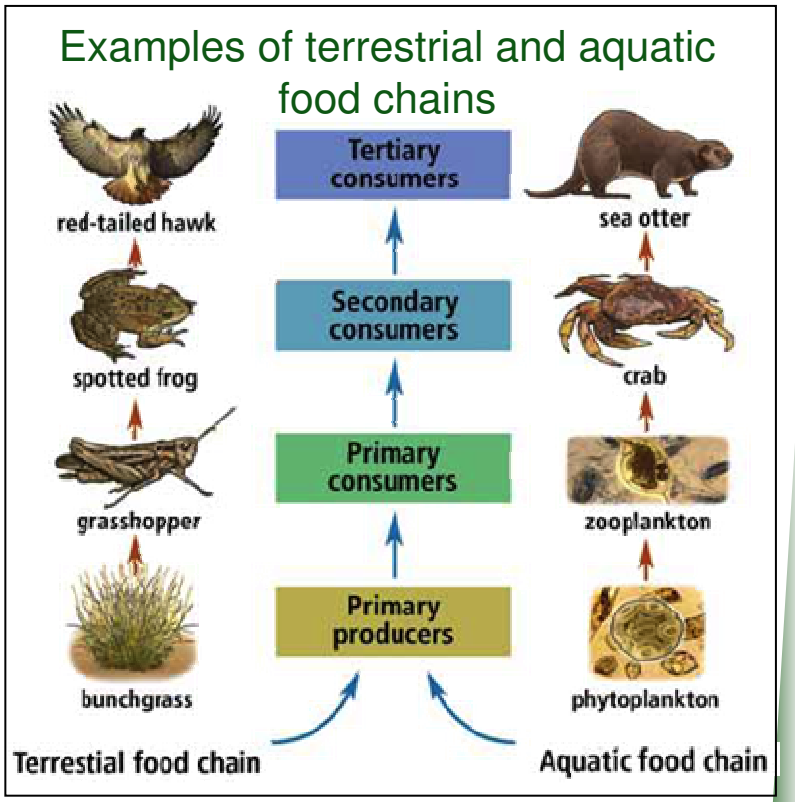
Energy Flow and Energy Loss in Ecosystems: Food Chains



- **Scientists use different methods to represent energy moving through ecosystems.**
  - **Food chains**
  - **Food webs**
  - **Food pyramids**
- **Food chains show the flow of energy in an ecosystem**
  - **Each step is a trophic level**
    - **Feeding & niche relationship**
  - **Producers = 1st trophic level**
  - **Primary consumers = 2nd trophic level**
  - **Secondary consumers = 3rd trophic level**
  - **Tertiary consumers = 4th trophic level**



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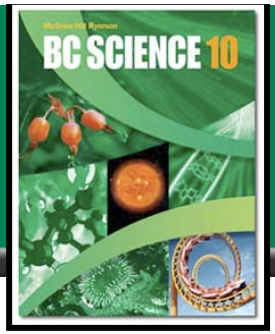
Energy Flow and Energy Loss in Ecosystems: Food Chains (continued)



- **Consumers in a food chain can be classified as:**
  1. **Detrivores - consumers that obtain energy and nutrients from dead organisms and waste matter**
     - **Includes small insects, earthworms, bacteria and fungi**
     - **Detrivores feed at every trophic level**
     - **Detrivores have their own, separate food chains, and are very numerous**
  2. **Herbivores - primary consumers**
     - **herbivores eat plants (producers) only**
  3. **Carnivores - secondary or tertiary consumers**
     - **Secondary consumers eat non-producers, such as herbivores**
     - **Tertiary consumers eat secondary consumers**
       - **Aka top consumers, top carnivores or top consumers**
  4. **Omnivores - consumers that eat both plants and animals**
     - **Examples include humans and bears**

This dung beetle is a detrivore.

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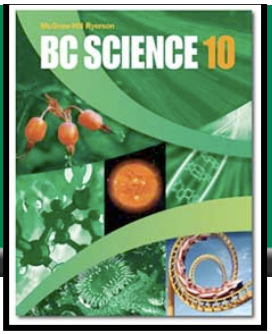
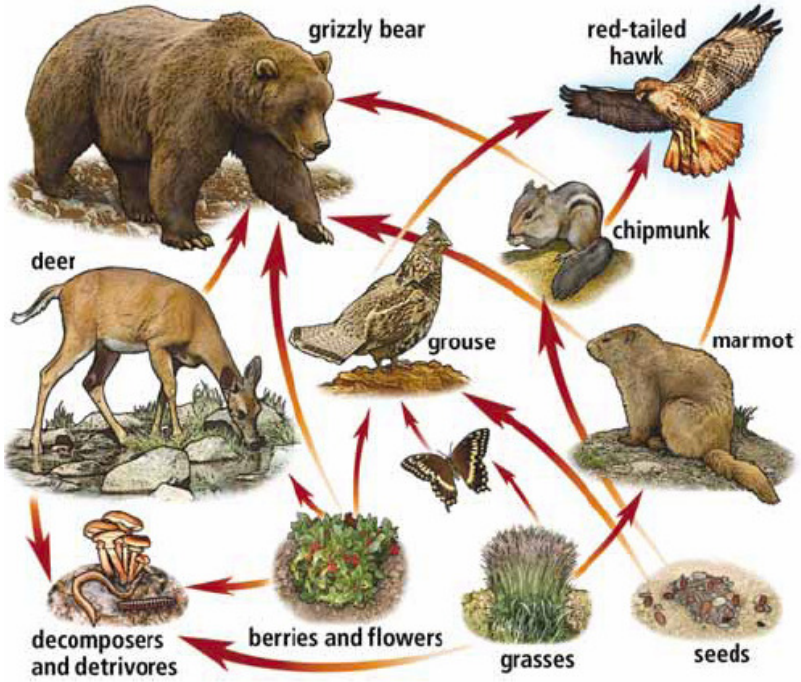
Energy Flow and Energy Loss in Ecosystems: Food Webs



- **Most organisms are part of many food chains.**
  - **To represent interconnected food chains, scientists create a food web.**
    - **Food webs are models of the feeding relationship in an ecosystem.**
  - **Arrows in a food web represent the flow of energy and nutrients.**
  - **Following the arrows leads to the top carnivore(s).**

This food web represents a terrestrial ecosystem that could be found in British Columbia.



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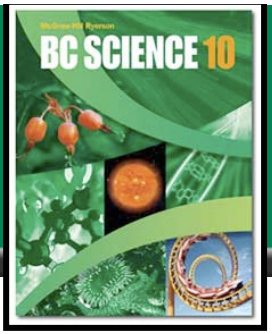
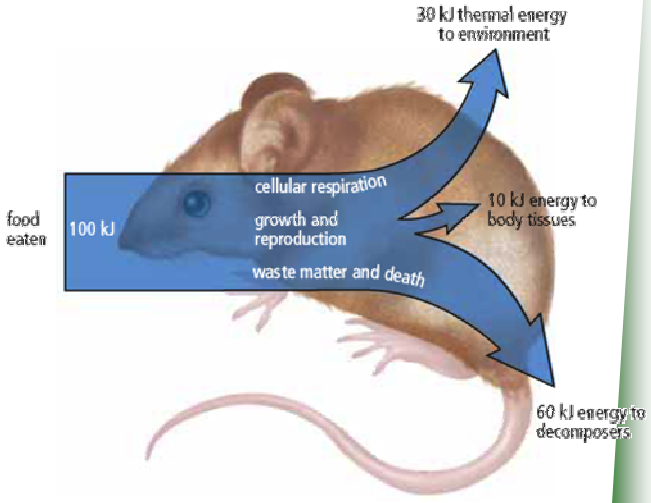
Energy Flow and Energy Loss in Ecosystems: Food Pyramids



- **Food pyramids show the changes in available energy from one trophic level to another in a food chain.**
  - **Aka ecological pyramids**
  - **Energy enters at the first tropic level (producers), where there is a large amount of biomass, and therefore much energy**
  - **It takes large quantities of organisms in one tropic level to meet the energy needs of the next trophic level.**
    - **Each level loses large amounts of the energy it gathers through basic processes of living.**
    - **80% - 90% of energy taken in by consumers is used in chemical reactions in the body, and is lost as heat energy.**
    - **There is very little energy if left over for growth or increase in biomass.**



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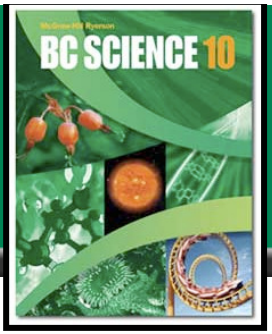
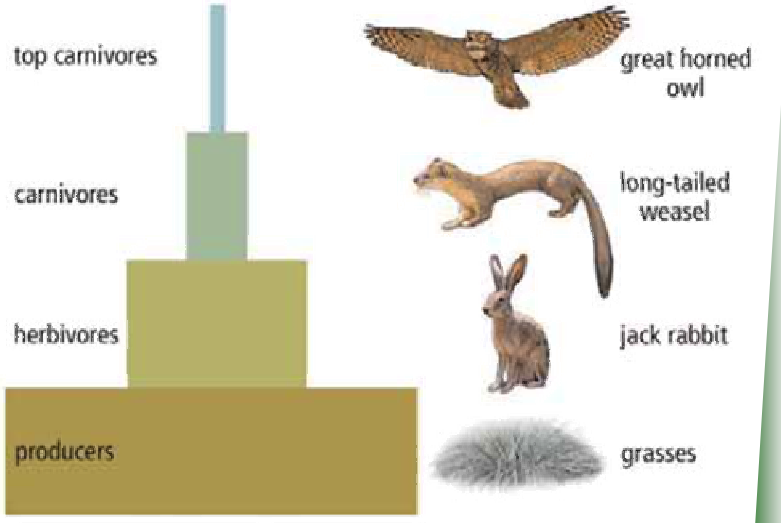
Energy Flow and Energy Loss in Ecosystems: Food Pyramids (continued)



- **Food pyramids are also known as ecological pyramids.**
  - **Ecological pyramids may show biomass, population or energy numbers.**
  - **The amount of life an ecosystem can contain is based on the bottom level of the ecological pyramid, where producers capture energy from the sun.**
  - **Each level in the energy pyramid = a loss of 90% of total energy available**
    - **Lower trophic levels have much larger populations than upper levels.**
    - **This shows the importance of maintaining large, biodiverse populations at the lowest levels of the food pyramid.**



Food pyramid

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Take the Section 2.1 Quiz