example of a food chain that might be typical for a field ecosystem is shown in Figure 1.2.

In reality, feeding relationships in an ecosystem are more complicated than can be depicted by a simple food chain. While some organisms do specialize in their diets (e.g., anteaters feed exclusively on termites or ants), many organisms do not. For example, hawks don't limit their diets to snakes, snakes eat things other than mice, mice eat grass as well as grasshoppers, and so on. A more realistic representation of feeding relationships in an ecosystem is a food web. An example of a food web for an aquatic ecosystem is shown in Figure 1.3. This figure also identifies trophic levels for the types of organisms indicated, although many of the organisms could be identified as belonging to more than one trophic level. Although decomposers, such as fungi or bacteria, are not shown in Figure 1.3, they could be included in the food web as well.

Note that, Figure 1.3 identifies only general types of organisms for many of the feeding steps (e.g., fish-eating fish). In reality, there are many species that could fall into a particular feeding group. For example, largemouth bass, walleye, or striped bass, are all fish-eating fish. Groups of species with similar feeding modes (or other environmental requirements) are referred to as guilds. Identification of food webs and guilds is important to when designing an ecological risk assessment, because there may actually be a number of potential species that can be used to evaluate the movement and effects of contaminants through particular trophic levels. The selection of the species to be evaluated by a particular ecological risk assessment will depend upon a number of considerations, including availability of information, how representative the species is of the guild or trophic level being evaluated, sensitivity to contaminants, and field sampling difficulties.

An important aspect of the transfer of organic matter and energy from one trophic level to the next is the loss of energy during each transfer. This loss is due to the inability of consumers to fully assimilate the food they eat, and to the dissipation of energy as heat during the chemical breakdown of food that occurs following ingestion. Consequently, only about 10% of the energy at one trophic level is assimilated into the next higher trophic level. This results in a smaller biomass (total amount of biological material) at each successive trophic level (Figure 1.4) and explains why there are fewer predators than prey in ecological systems. This also means that a consumer must ingest a large biomass of food from lower trophic levels in order to acquire sufficient energy to maintain itself. From an ecological risk assessment perspective, this means that consumers will often be exposed to higher doses of contaminants that can accumulate in biological tissues than organisms in lower trophic levels.

1.5 Biogeochemical Cycling

While energy does not cycle through an ecosystem, inorganic nutrients do. The inorganic nutrients cycle through more than the organisms, however. They also enter into the atmosphere, the oceans, the soil, and even rocks. Since these chemicals cycle through both the biological and the geological world, the overall cycles are called biogeochemical