

Predator diversity and abundance were particularly reduced in planted stands, potentially limiting ability to control pest populations. Predator species present in old growth, but absent in adjacent planted forests, may require habitats, host resources, or moderate climatic conditions provided by old growth.

Loss of invertebrate species through old-growth harvest would eliminate medical and pest management resources. Invertebrates produce an enormous variety of chemicals to detoxify food, attract mates, and discourage enemies. Relatively few species have been examined for useful chemicals, but these have provided drugs for treating leukemia, arthritis, warts, and infection, as well as natural insecticides, fungicides, and repellents. Biological control of pests depends on natural or augmented abundances of predators. Reduced predator diversity as a result of forest conversion would limit biological control options.

Large-scale conversion of tropical forests has fueled concern for loss of diversity and promotion of pests in crop systems. Conversion and fragmentation of native forests in the Pacific Northwest also will decimate rich and largely unknown species assemblages and promote forest pests.

Arthropods: The Invisible Diversity

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The interest in old-growth forests of all types is part of a larger concern for the loss of biological diversity in general (Wilson, editor, 1988. *Biodiversity*. Washington, D.C.: National Academy Press). The rate of habitat modification and destruction is escalating, and with it the accompanying loss of species and the unique genetic information they contain. Animal diversity in terrestrial ecosystems is nearly synonymous with arthropod (insects and their allies) diversity. Arthropod species are associated with every plant and vertebrate species in every habitat type. Their ecological functions are the very fabric of food webs—digesting the plants, recycling the soil nutrients, and as food sources for and parasites of vertebrates.

Habitat destruction, which has been emphasized most in the tropics, is important in the Pacific Northwest, as well. The Andrews Forest on the lower west slopes of the Cascade Mountains of Oregon

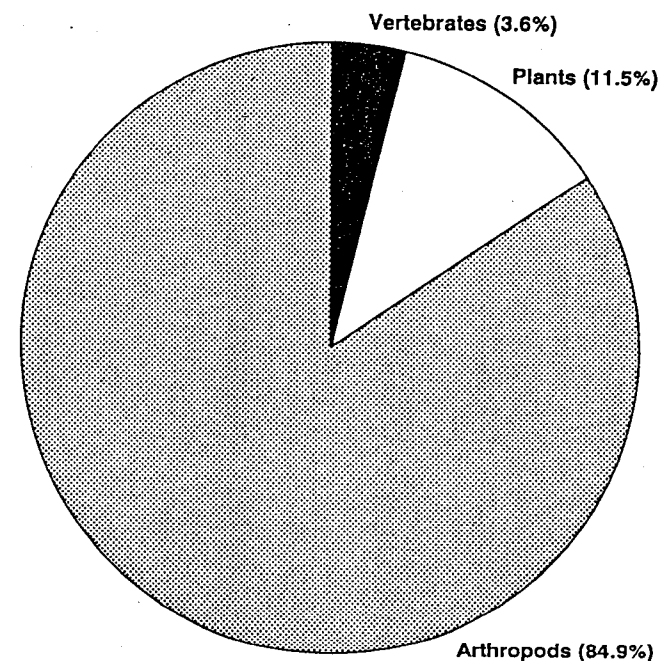


Fig. 1. This simple illustration is instructive with regard to where future conservation research must be focused. The preservation of designated habitat not only benefits single, high-profile species, but also less conspicuous organisms that represent the biological diversity of western United States forests.

is one of 17 long-term ecological research sites designated by the National Science Foundation. As such, it is an important center for ecosystem study in the western coniferous biome. Lists of plants, vertebrates and arthropods are available, providing the opportunity to examine species richness within a western coniferous forest habitat. There are 143 species of vertebrates (mammals, fish, reptiles, birds), 460 species of vascular plants, and 3,402 species of arthropods known to date. Although the vertebrate and plant lists are exhaustive, it is likely that the arthropod list is no more than half complete. Figure 1 shows the relative percentages of these various species components. The vast majority (84.9%) are arthropods, whereas vertebrates comprise only 3.6%.

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