Eco-Link
Linking Social, Economic, and Ecological Issues
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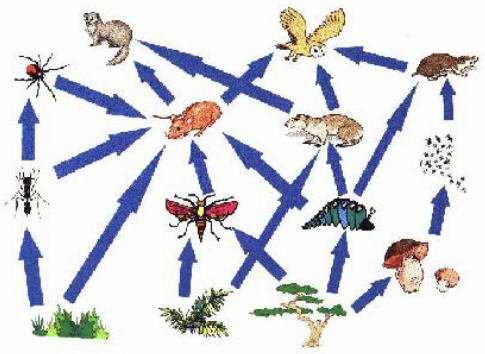
Wildlife and Forests

Forests are made up of much more than just trees. They are dynamic ecosystems filled with intricate relationships between flora and fauna. Every part of a forest, whether it is a worm, mushroom or cougar, plays an integral role in the ecological web that makes up forests. The removal of a species in an ecosystem disrupts its balance, much like the removal of a spoke in a web negatively impacts the entire structure. In order to conserve or manage natural resources, we must clearly understand the relationships between single species as they relate to their habitats (Johnson and O'Neil, 2001). Succession, forest habitat use by wildlife, fragmentation, trophic cascades, ecological roles of wildlife, managing forests for wildlife, and wildlife protection policies are elements discussed in this Eco-Link.

Wildlife habitat as defined by Morrison, Marcot, and Mannan (1992) "is an area with the combination of the necessary resources (e.g., food, cover, water) and environmental conditions (temperature, precipitation, presence or absence of predators and competitors) that promotes occupancy by individuals of given species (or population), and allows those individuals to survive and reproduce." Defining habitat components as they relate to wildlife is essential from a natural resource management perspective (Johnson and O'Neil, 2001). This is important because according to McComb, "Each species and each population has its own habitat requirements", and they act in response differently to management activities which may alter their habitats (2001).

Habitat Structure

Structural components are major features of wildlife habitats. Structure is described as the layers of vegetation in a forest such as shrubs, seedlings, small trees, larger trees and so on. Managing land for timber production and wildlife habitat is possible. Harvesting practices can be tailored to produce certain forest structural components which attract wildlife associated with those structures. Leaving snags and decaying wood in a harvested forest is integral to many wildlife species as a source of food, nutrients, and cover (Rose et al, 2001). Pileated woodpeckers, for example, feed on wood boring insects found in snags. Saplings are another structural component which favor browsing ungulates like deer and elk for example. Forest structures and wildlife habitat relationships can be further examined through the concept of succession in a forest.



For if one link in nature's chain might be lost, another might be lost, until the whole of things will vanish by piecemeal.

- *Thomas Jefferson*

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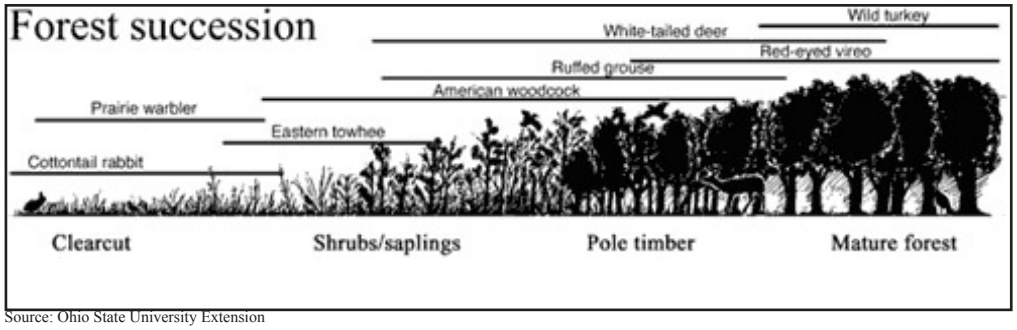
Forest ecosystems are in continual cyclical processes of change and growth over time. These processes are collectively referred to as "succession". Plant succession occurs when "vegetation follows established patterns of regrowth and change after disturbances by farming, timber harvesting, hurricanes or fires." (http://www.env.duke.edu/forest/forest/succession.htm). Wildlife, like plants and trees, are affected and often adapt to changes in forest structure following disturbances. Three stages of forest succession are shown below. Within each stage of succession are specific habitat structural components and wildlife associated with those habitat types.



Source: Ohio State University Extension

Succession Stage	Forest Structure	Wildlife Type	Wildlife Associated
Early or Primary	Open areas, shrubs	Generalist	Deer, nesting birds, bear
Secondary	Saplings, pole timber	Generalist	Squirell, red-tailed
Climax or Mature	Large live trees, snags	Specialist/Generalist	Marten, bobcat

Wildlife Types

Habitat generalists are able to utilize many of forests successional stages for their habitat requirements and their populations are usually abundant.

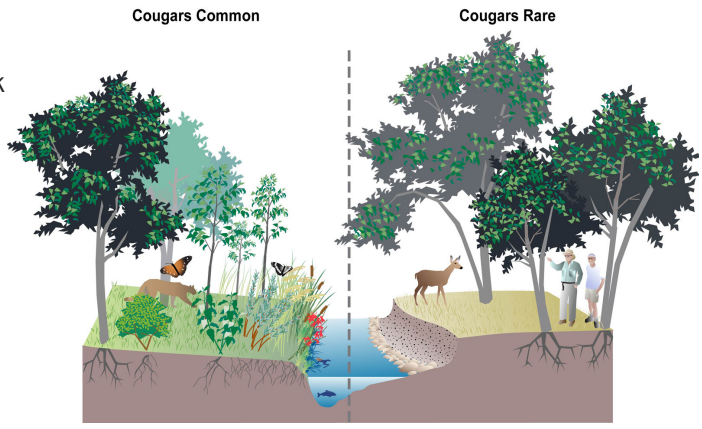
Wildlife species classed as habitat specialists are rarer than habitat generalists and have stricter habitat requirements.

Managed forestland often favors early successional species such as the Wild Turkey (Wilderness Society). The once imperiled turkey has made a dramatic comeback. During the 19th and early 20th century their populations decreased significantly due to hunting and habitat loss. With the creation of conservation groups like the Wild Turkey Federation and turkey restocking programs, the population started to increase dramatically. However, as edge habitat increases with habitat fragmentation, it is probable turkey populations will be threatened because of an increase in nest predation.

Ecological Roles of Wildlife

All wildlife species have an important niche or ecological role within their ecosystems. Ecological roles of wildlife as defined by Marcot and Vander Heyden (2001) are "the main ways organisms use, influence, and alter their biotic and abiotic environments" or "how organisms change their environments by what they do". For example, squirrels fill an important niche in the forest by spreading and burying seeds which later grow into trees. Carnivore predation can keep ungulate populations in balance which minimizes over- grazing. This is another example of an ecological role of wildlife.

Two studies involving top trophic level carnivores demonstrate the influence they have over their ecosystem function and structure. Cougar decline in Zion National Park has been linked to extreme ecological damage stemming from an increase in deer populations. The abundant deer populations browse on young cottonwood trees causing a loss in the tree species. Cottonwood trees are important to the park's ecosystem in that they provide shade and erosion control to streambanks. The loss continues from there with a loss in shrubs, wetland plants, amphibians, lizards, wildflowers, and butterflies (Beschta, 2006). This type of ecological disruption is referred to as a trophic cascade; or according to William Ripple (2006), a "cascade of changes that can take place in an ecosystem when an important part is removed."

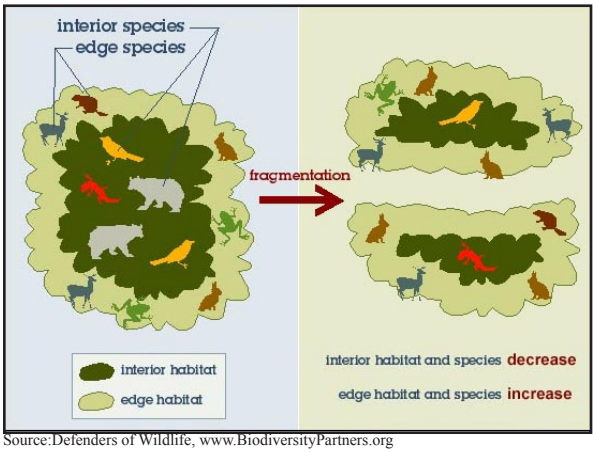


Source:Ripple, Bill, OSU College of Forestry

Another example of a trophic cascade can be seen in Yellowstone National Park with the reintroduction of wolves. Long term elk browsing on young cottonwoods and aspen trees had taken its toll on the park's ecosystem. Wolves, a natural predator to elk, had been eradicated from the park since 1926 (Ripple, OSU, 2003). Robert Beschta, a professor at Oregon State University in the College of Forestry, states that, "Before the wolves came back, it was pretty clear that in some areas we were heading towards an outright extinction of cottonwoods (2003)." With the reintroduction of wolves into Yellowstone, renewed growth of cottonwoods occurred in areas occupied by wolves because of fear or vulnerability of elk and accordingly less browsing in those areas, allowing the trees to grow. An increase in cottonwood trees has positive effects throughout streamside ecosystems.

Habitat Fragmentation

The habitat fragmentation process "generally is viewed as the breaking apart of a given area of habitat into smaller, geometrically more simple pieces as a result of natural processes as well as human activities" (Rochelle, conference summary, Forest Fragmentation: wildlife and management implications, 1998). The effect that fragmentation has on wildlife depends on the individual species habitat preference. It is important to distinguish between the location of habitat within a landscape and the species within those habitats when discussing the effects of wildlife from fragmentation. Two types are explained: species that prefer interior habitats and species that prefer edge habitats. A major distinction between these species types is that interior species are generally less abundant than edge species and can be habitat specialists whereas edge species are often habitat generalists and more abundant. Forests that have been fragmented by timber management activities such as a clearcut, for example, have a larger proportion of edge habitats than in un-fragmented forests. Therefore, the potential for species loss due to loss of habitat from fragmentation is greater in such forests.



Source:Defenders of Wildlife, www.BiodiversityPartners.org

A major determining factor that affects wildlife is the degree of isolation of the fragmented patches. The smaller the patch, the smaller the availability of habitat for wildlife; the reverse is true with larger patches - the larger the patch, the more the available habitat. Most important according to McComb (2001) is that "a patch of habitat must be sufficiently large to provide energy inputs and energy conservation features to sustain a population." What is equally of importance for a habitat to be of use for wildlife is not only size but structural components within the habitat area.

Timber Harvesting and Wildlife Policies:

Foresters today often are concerned with much more than managing forests to extract raw timber for wood products. They are also concerned about wildlife habitat, watersheds and water quality, employment, community development, climate change and much more. Many policies have been enacted to protect the current and future populations of wildlife, to name a few:

- Migratory Bird Treaty Act (1917)
- Duck Stamp Act (1934)
- Wilderness Act (1964)
- Endangered Species Act (1973)
- National Forest Management Act (1976)
- Interior Appropriations Act (2003)

Habitat Conservation Plans

In 1982 the Endangered Species Act (ESA) was amended by Congress to include Section 10, which allows states, local governments, and private landowners to apply for Incidental Take Permits once a Habitat Conservation Plan (HCP) is complete. The HCP is intended to describe what the landowner will do to "minimize and mitigate" the impact of the permitted take on species listed under the ESA. As stated under Section 10, the Act is a way to promote "creative partnerships between the public and private sectors among governmental agencies in the interest of species and habitat conservation" (1982). The reasoning behind the amendment to the ESA in the take of listed species is "that some individuals of a species or portions of their habitat may be expendable over the short term, as long as enough protection is provided to ensure the long term recovery of the species" according to Audubon's "A Citizen's guide to Habitat Conservation Plans" (no date).

HCP in Practice

The federally listed endangered red-cockaded woodpecker which lives in mature southern pine forests is making a comeback according to the Fish and Wildlife Service (FWS). FWS reports a twenty-three percent population increase, from 1994 to 2004. The increase can be attributed to increases in privately managed woodpecker habitat in combination with woodpecker oriented management on millions of acres of managed state, national forests and military lands (Cusick, 2005). One of the largest wood product companies in the world, International Paper Company (IP), has contributed to red-cockaded woodpecker habitat through their Habitat Conservation Plan. In 1999, International Paper began managing almost 7,000 acres of its land in southwest Georgia for red-cockaded woodpeckers. The birds have increased from three male birds in a family unit to fifty birds, increasing the potential for breeding pairs (IP, 2006 Resource Facts). In this HCP, woodpeckers from other company lands can be transplanted to the Georgia land, thus allowing IP to cut forests from their other land holdings (Cusick, 2005).

The verdict is still out on HCP's and there are some things to consider regarding the plan:

--Top federal officials acknowledge that they have no system to track how habitat conservation plans are affecting threatened species, saying they monitor the overall health of the animals and so far none seem to be going extinct." From seattlepi.nwsource.com, by McClure and Stiffler (May 3, 2005).

--It has been difficult for officials to enforce the ESA on private land, so this may be a way to minimize loss on those lands.

--Is it beneficial for species to be removed from their natural range into an experimental private forest?

--Is profit winning over protection?

--Timothy P. Cullinan of the Audubon Society points out that in some circumstances an "HCP fails to demonstrate that the permitted acts will not appreciably reduce the likelihood of the survival and recovery of listed species in the wild." (http://www.audubon.org)

Glossary of Terms

Browse: To feed on young branches of trees or shrubs (often deer, elk or other ungulates)

Ecology: The relationship between organisms and their environments.

Ecosystems: The set of all its component organisms andpopulations and their ecological interactions with each other and with the abiotic (air, chemicals etc.) world.

Edge: The location of where two or more ecosystems meet.

Food web: The interrelated or linked food chains in an ecological community.

Niche: The job or function of a species within their ecosystem.

Population: A group of the same species that inhabit a given area.

Predator: An animal that lives by preying on other organisms as a source of food.

Snags: Dead standing trees.

Trophic: Pertaining to nutrition or to a position in a food web, chain or food pyramid.

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