Fire And Ecosystems Essay, Research Paper

Introduction

Fire is an important part of many ecosystems, affecting wildlife populations in various ways, such as by changing habitat, affecting food supply or quality, or by altering interactions of species. Fire suppression has allowed forested areas to achieve a climax state, which provides less forage for wildlife. While terrestrial wildlife is benefited by fire, large fires through the increase in sediment flow negatively impact aquatic ecosystems. Fire is essential in maintaining biological diversity in the Northern Rocky Mountain forests.

Nutritional Effects

Fire affects nutrition of wildlife in the short-term by increasing the quality of their diets or by alteration of plant content. Long-term benefits are the maintenance of habitats in forage producing conditions. Fire alters the type of plant material present, allowing animals to select for greater nutritional plant material, this improves their diets. Mountain sheep and mule deer in the Rocky Mountains have higher nutritional diets following prescribed fires due mainly to increases in the amount of new plant growth. Plants utilized by the Key deer in the Florida Keys Islands increase in nutritional content and digestibility for seven to eleven months following fire. Although total plant material is severely reduced during fire, the plants recover to original levels or surpass them within two years. Fire increases the digestibility and protein content of lodge pole pine bark through decreases in plant secondary metabolites and organic matter. Although dead bark and burned bark show similar composition, elk use burned bark as a food source even when higher nutritional foods are present in abundance. It is presumed that elk use burned bark as a short-term food source because they can strip and consume bark in large amounts while expending less energy than if obtaining other food.

Grazing Patterns

Fire alters elk and bison grazing patterns during late winter and spring. Since they are able to move large distances, their grazing patterns show preferences for burned locations. During winter, habitat that has recently burned has reduced dead plant material, making access to higher protein containing forage easier. Burned grasslands have greater grass growth during the winter period due to the increase in soil temperature through the additional absorption of solar radiation in the blackened soil. However, topography has a great impact on frequency of grazing of particular locations. Areas with southerly aspects and steep slopes do not retain snow as long and thus are used more frequently for grazing. The beneficial effects from fire last for a few years and then decrease. In grassland and shrub communities, more complete fires result in the effects lasting longer. Overall, winter conditions impact ungulates more than effects of fire on grazing locations. The alteration of ungulate grazing patterns by fire affects other species that are impacted by the ungulates. Bison often graze preferentially around black-tailed prairie dog towns accelerating changes in the plant community surrounding the town. Bison will graze on recently burned locations, thus decreasing their use of areas surrounding prairie dogs colonies. Reasons proposed for the change in bison grazing include the selection for new growth and reduced dead biomass, both results of fire. Therefore, fire can alter how bison and prairie dogs interact, enabling managers to use fire to prevent bison from constant use and degradation of prairie dog towns.

Succession

Fire prevents plant communities from succession to a climax condition, therefore maintaining the habitat in a state, which provides greater forage. Woodland caribou are adversely affected by crown fires in the short-term due to major losses of forage and the avoidance of burned locations by the caribou. However, these fires provide the long-term benefit of ensuring some of the habitat will remain as jack pine forest, which provides greater forage quantity for caribou. Key deer are also benefited by long term maintenance of habitat. Plant species used most often by the Key deer are located in pine forests, which are replaced by hardwood, forests in the forest succession. Fire maintains areas of jack pine forest thus benefiting the Key deer. In oak-jack pine forests, white-tailed deer are found in greater numbers in burned areas eight years following a large fire. Fire acts as a disturbance creating a mosaic of patches that each undergo succession at different times.

Birds

Birds in Florida slash pine forests are relatively unresponsive in the short-term to ground fires; while in ponderosa pine forests; bird populations increase after fire. Response of birds in slash pine forests varies depending upon the type of cover used by the species. Woodpeckers and ground-dwelling birds use burned areas frequently because bare ground is rare in undisturbed slash pine forests and woodpeckers utilize the snags created in the fire. Other birds such as the Florida scrub jay show no response to most fires because their range is much larger than the area affected by the fire. Cover and food are relatively unaffected by fire for most bird species in the slash pine forest. In the ponderosa pine forests, bird populations increase following ground fires for a single year and then decrease to normal populations. These fires do not alter the habitat structure and thus the change in bird populations may be attributed to an unknown increase in food quality or. However, fires repeated at short interval lead to the decline of shrub-dwelling birds. In conifer forests of the Northern Rocky Mountains, areas burned by intense fires have a wide diversity of bird. In these areas, migrant birds were found to be the major bird species utilizing the burned forest.

Negative Effects – Aquatic Ecosystems

Contrary to the beneficial impacts of fire on terrestrial wildlife, aquatic ecosystems are negatively affected, such as the decrease in fish populations by fire. In the North Fork Shoshone River adjacent to Yellowstone National Park, fish died from increased sediment flow during a heavy rainstorm two years after the canyon had burned. Fish are sensitive to sediment both in concentration and length of exposure. When fire clears vegetation on slopes surrounding a river, runoff from rainstorms carries sediment into the river, killing portions of the fish population by obstruction of the gills.

Conclusion

Fire is beneficial to terrestrial wildlife through improvements in nutrition and maintenance of forage areas. However, in aquatic ecosystems fire can negatively impact fish populations. Types of fire affect wildlife in different ways. Ground fires have short-term effects and wildlife are not severely impact by these fires. Crown fires show major changes in habitat use patterns by wildlife and have much longer effects, sometimes with. Fire intensity has not often been taken into account when determining the effect of fire on wildlife. The general effect of fire on aquatic systems needs to be more intensively studied. The greatest impact of fire is its disturbance of habitats creating patches, which are each undergoing succession. This mosaic of areas provides areas that are utilized by wildlife for forage. Intense fire is essential to some conifer forests of bird species and in maintenance of biological diversity. Fire plays a critical role in the regulation of many wildlife habitats.