Biodiversity and Wildlife

Environmental Effects of Woody Biomass

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Background

Biological diversity (biodiversity) considers the richness and abundance of plant and animal life in an area. The three components of biodiversity are:

[4]Genetic diversity (variation of genes within a species or population),

Species diversity (variety of living species at local, regional or global scales), and

Ecosystem diversity (the variety of ecological units which consist of communities of organisms interacting with each other and with their physical environment).

Habitat and habitat diversity are particularly important concepts to help maintain biological diversity. Habitat is the natural environment of a plant or animal and is characterized by the quality and quantity of food, water, shelter, cover and space available to a particular species. Every species has habitat preferences. Habitat diversity on the other hand is the complexity, distribution, and abundance of different plant and animal habitats in a given area.

Short-rotation woody crop plantations are generally established with a single woody plant species (e.g., willow, poplar), much as in a corn field. In that monoculture, the grower is able to establish plants which will have similar input needs (e.g., the amount and timing of fertilizer, water, herbicides) and which will mature at the same rate.

Live trees, snags (dead standing trees), stumps and fallen trunks or limbs of more than 6 inches in diameter at the large end (coarse woody debris or CWD) and tops, limbs and woody debris of less than 6 inches in diameter (slash or fine woody debris or FWD) provide habitat for many wildlife species. Slash provides shelter, reducing wind velocity and fluctuations in ground surface temperature (Mahendrappa and Kingston 1994; Proe et al. 1994). It also provides habitat for small mammals (Ecke et al. 2002) and ground-active beetles (Gunnarsson et al. 2004). It may shelter plants sensitive to desiccation immediately following clearcuts (McInnis and Roberts 1994; Brakenhielm and Liu 1998).

Benefits

Habitat changes will benefit some species while negatively impact others. Growing and harvesting biomass can be used to create favorable habitat for desired species. For example, establishment of biomass plantations on lands that were previously deforested will usually improve the habitat for plants and animals that cannot survive deforested areas.

Concerns

Growing and harvesting woody biomass has the potential to change the quantity and quality of habitat available at both stand and landscape levels because of the modification to and removal of habitat elements. Management activities which occur when wildlife are most vulnerable (e.g., breeding, nesting and calving

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seasons) can have a large impact on populations. The development of infrastructure (e.g., roads, skid trails, and landings) when growing and harvesting biomass has been reported to have a variety of effects on wildlife (Noss 2002). Impacts include road kill, pollution, behavioral modifications such as road aversion, fragmentation and isolation of populations, alteration of hydrology and terrestrial and aquatic habitats, increased access, and cumulative impacts from all of the factors.

While there is a relatively large uniform area of habitat in an intensively managed woody biomass plantation, biodiversity is low as compared to a more natural forest. Activities of concern include site preparation, irrigation and the application of chemicals such as fertilizers and herbicides. Because the habitat requirements for some wildlife species include specific tree species, extensive monocultures can reduce biodiversity when displacing natural habitats. Planting biomass through the practice of alley cropping agroforestry system may offer more diversity and increase wildlife benefits.

During biomass harvesting, concerns include impacts to species which are listed as endangered or threatened as well as the removal of vertical structure (i.e., live trees and snags) and a reduction of CWD and FWD at levels higher than might normally occur during a roundwood harvest.

Mitigation Strategies

Some states have published woody biomass harvesting guidelines which are intended to mitigate a variety of impacts. They can serve as an excellent source of strategies to consider. Selected strategies are presented below. When working with a third-party contractor, consider including relevant mitigation strategies in a written, signed contract.

- Avoid operating in areas where plant or animal species are listed as endangered or threatened (MFRC, 2007).
- Minimize the development of roads and use water quality best management practices to reduce the flow of sediment and other pollutants.
- Time management activities to avoid breeding, nesting and calving seasons.
- Evaluate the amount of habitat area over a larger area, rather than just one stand (Angelstam et al., 2002). This is extremely important for species requiring large habitat areas.
- Identify one species that has particular habitat requirements and whose presence and population health is highly correlated with other species (Angelstam et al., 2002). Managing the habitat area for that “umbrella species” can successfully maintain habitat for several species by association.
- Maintain leave (live) trees which are either clumped or scattered throughout a harvest site (MFRC 2007).
- Avoid harvesting within leave tree clumps.
- Maintain structural complexity throughout the harvest area by retaining CWD and FWD (slash) and all snags possible (Lindenmayer and Franklin 2002, MFRC, 2007).
- Retain and scatter tops and limbs from 20% of trees harvested in the general harvest area (MFRC 2007).
- Use special management areas, such as riparian management zones (areas adjacent to waterbodies such as streams and lakes) where management approaches are modified, to help maintain suitable habitat (Russell et al., 2004).

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