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Panel: "Pest Problems of Older Plantations"

Implications of plantations on wildlife: How can habitat be enhanced?

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Introduction

Plantations are an inevitable consequence of disturbance events or management activities as they are the means to quickly reforest disturbed areas with some control over the genetic composition of the stock. Fires, windstorms, and other disturbance events are natural, and necessary, processes in forests and will continue to occur causing tree mortality and canopy openings. Management actions to control insect activities, reduce the incidence of disease organisms, or produce timber will also continue to open forests.

While plantations will continue to be used as a forest management tool, they can and should be managed for objectives in addition to timber production, and minimization of insect attack and disease such as visual appearance and wildlife habitat. Numerous studies have documented the changes in vertebrate assemblages immediately following severe harvests that remove trees from more than a couple of acres of land. Typical responses include shifts to species including pocket gophers, deer mice, voles, various sparrows, and towhees or species activities associated with grass/forb or shrub dominated systems such as deer foraging.

The specific mix of wildlife species present in a plantation will depend on the composition and structure of the revegetated stand. The mix of species will change as the plantation develops and matures although little empirical data

exist to project patterns of species change. My objective in this paper is to briefly provide some information on the concerns about traditional management of plantations and to offer some recommendations that should improve plantations for wildlife. While the literature does not include a great deal of substantive information on how to manage plantations, publications such as Franklin (1989) and Thomas (1979) do provide a conceptual framework and recommendations for determining important components to be the focus of plantation management.

Concerns about Plantation Management Relative to Wildlife

While grass/forb and shrub dominated areas and their wildlife species assemblages, are not undesirable in our forests, they often indicate the conversion of a forest patch with diverse structural characteristics, (i.e., trees of different diameter and height and spacing, broken tops and limbs of live trees, dead and down material, and snags) to one with much simpler structural characteristics (i.e., a plantation of young trees planted in discrete rows and managed to minimize competing vegetation). These patches may also fragment the relatively unbroken landscape that historically was largely dominated by large diameter trees and had relatively complex structures with few openings dominated by small trees and perhaps some shrubs.

Historical Plantations and the Development of a Complex Structure

In time a plantation will develop a more complex structure and judicious management should be able to accelerate such development. Many forests logged in the late 1800s and early 1900s have developed naturally into a relatively complex structure in the 80-100 years since reestablishment of the trees. The Show Plantation, established about 1919, today has a

relatively complex structure with trees of different diameters, standing dead trees (snags), and established seedlings. Several precommercial and commercial thinning entries contributed to the development of this structure. As land stewards and managers, we should be able to develop complex forest structures that will provide good habitat for many wildlife species and **reduce** the incidence of insect infestations and disease outbreaks. Reduction of the incidence of insect infestations and disease outbreaks is, perhaps, necessary but it is undesirable to eliminate them even if that were possible. Mortality and disease are natural forest processes (excepting that caused by exotic species) and are necessary to develop and maintain structural diversity in forests. Research suggests that a tree's value to a forest ecosystem has only begun while the tree is alive (see Harmon et al. 1986). For many wildlife and invertebrate species, large snags and logs are an essential habitat component; one that is often missing from managed, young plantations.

Plantations—Improving Them For Wildlife

It is not possible to develop a generic "prescription" for improving plantations for wildlife because of differences in the needs of various wildlife species, and the variation in topography, vegetation composition and structure before and after treatment, and intent of the treatment. There are, however, a number of general recommendations that, if implemented, will enhance a plantation for a wide variety of wildlife species by developing some of the desirable structural characteristics at a faster rate than if a plantation is not managed.

Plantation Shape, Size, and Location on the Landscape

Natural patches of forest often follow topographic features or wildfire borders rarely having linear borders or geometric shapes.

Irregular shapes which increase edge between forest patches are preferable over straight lines when laying out plantation borders. Not only are forest patch borders usually not linear, they are generally "fuzzy" having a rather wide zone with vegetation compositions and structures somewhat intermediate between those within the patches.

Natural forest patches can vary greatly in size but the greatest number of patches are of smaller size classes. For many wildlife species, small patches simply blend into the surrounding forest when not in close proximity to another patch of similar age or structure. Plantations are often created in response to disease or wildfire or other disturbance event which largely dictates the size and shape of the area affected. Whenever possible, plantations should vary in size with the majority of plantations being rather small in an attempt to mimic the natural distribution of patch sizes.

Disturbance in forests seem to occur episodically in space and time; that is the spatial and temporal pattern of disturbance is not uniformly spaced over the forest in time. Plantations distributed at irregular intervals can benefit wildlife as well as improve the economics of subsequent treatments in the plantations.

Fitting plantations to the terrain, avoiding regular geometric shapes, feathering the boundaries of plantations into the surrounding forest, and varying the size and distribution of plantations within the forest will help provide variations in structural diversity that should benefit a wide variety of wildlife species.

Tree Species Composition

Often the tree species composition of a plantation differs from the surrounding forest and the forest that existed on the site before the plantation. There may be good management or economic reasons for altering tree species composition, but from a wildlife standpoint, such

changes should be carefully considered to ensure that they will contribute to similar or better habitat conditions. Generally, plantation tree compositions should reflect the composition of the surrounding forest while reflecting the species dynamics of forest succession.

Residual Tree Retention

Residual trees, both live and dead, will provide a plantation with structural diversity. They also should hasten the development of additional diversity especially if the residual trees are not removed at a future date. Retention of larger trees is preferable because they are important to many wildlife species; with the retention of a few larger trees, the plantation will more quickly take on the characteristics of a more structurally developed stand. Larger trees are important because they provide structures such as cavities, platforms, and multi-layer canopies which are important habitat elements for some wildlife species.

Increased structural diversity and the presence of dead trees, especially larger dead trees, in a plantation provide valuable habitat for many species not usually associated with young plantations. The retention of trees will also provide canopy shading that modifies the microclimate for benefiting seedlings, other plants, and soil organisms.

Plantation Management

Active management of plantations can accelerate the growth of the future "crop" trees and can develop structural characteristics that are desired by additional wildlife species. Judicious thinnings will increase tree growth but can also be used to break up the regular spacing of the plantation, vary the growth rates of individual trees by varying the thinning intensity, and create small openings that could support shrubs, grasses and forbs.

Consider varying management activities over a patch to accelerate growth in some areas while retarding it in other areas. This will

provide shrub thickets in some areas and minimize them elsewhere. The resulting forest will be a better mimic of a natural forest which "messy" rather than orderly.

As stands mature, it may be desirable to manage the understory especially if dominated by shrubs like ceanothus (*Ceanothus sp.*) and manzanita (*Manzanita sp.*). These species can quickly form thickets that preclude use by some wildlife and reduce or eliminate other shrubs, forbs, and grasses.

Conclusions

Plantations can be managed to promote desirable wildlife habitat. However, there are no firm guidelines for achieving better habitat quality because of the variation in forest characteristics as well as the variation in habitat requirements expressed by different wildlife species. Further, while much is known about desirable forest characteristics for certain species, there are few "prescriptions" to achieve such characteristics and even less information available on how to manage for a variety of species through the lifetime of a plantation. Forest managers will need to take the lead in managing plantations to achieve desired characteristics for species of interest. Forest management needs to be creative and should not result in all acres having the same characteristics. Nature is complex, chaotic, and even messy. It is this dynamic "messiness" that permits forested systems to function, develop, and respond to disturbances be they "natural" or the result of management.

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