



OLD GROWTH FOREST

FOREST STEWARDSHIP MANAGEMENT NOTE #38

"Not so very long ago, the great white pine was king."

- Folksinger "Kirby"

WHAT IS OLD GROWTH FOREST?

Old growth forest occurs when a stand of trees develops without major natural or human disturbance for a long enough period that the dominant trees reach their average life expectancy for the site and begin dying of old age. Ironically, this process of death changes the structure, function and composition of the forest in ways that create a rich habitat full of life.

The above definition of old growth captures the essence of the concept, but it does not provide practical criteria for identifying old growth stands, nor does it indicate the great variation in vegetation dynamics that occurs among old stands of different species. To be able to recognize old growth in the field and to appreciate its complexity, it is helpful to consider four categories of criteria (#2).

1. AGE/DISTURBANCE CRITERIA - Although the features described below give old growth its practical value, stand age is the essential feature (#10). Because the longevity of different tree species varies widely, so does the age at which stands of different species become old growth. However, as a rule-of-thumb, about one and a half times the age at which conventional timber harvesting generally occurs can be used to mark the onset of old growth for a given species. Thus, for most species in Michigan, at least 150 years without major disturbance is required for old growth characteristics to develop. Keep in mind that old growth characteristics develop gradually, and many stands contain multiple species, so setting specific ages for old growth designation is rather arbitrary.

2. STRUCTURAL CRITERIA - Stands that have reached the old-growth stage are typified by the following structures (#5,10).

Many large trees, often with cavities, broken tops, curved and leaning trunks, thick moss and lichens on the bark. Thoreau called this the "wild, damp, and shaggy look" (#8).

Many large snags (standing dead trees).

Uneven canopy with occasional gaps in which various age-classes of younger trees occur.

An abundance of tip-up mounds and fallen logs in various stages of decay.

Multiple layers of foliage from the ground to the canopy (i.e., much vertical structure).

3. FUNCTIONAL CRITERIA - Stands that have reached the old-growth stage are typified by the following functions.

Tight nutrient cycling, resulting from complex food webs including much "hidden diversity" involved in decay processes (#10).

High resilience to natural disturbances, resulting from the rich "biological legacies" contained in structures that survive disturbances (#6).

4. COMPOSITIONAL CRITERIA - Stands that have reached the old growth stage may not be as distinct compositionally as they are structurally, but they are typified by the following compositional characteristics.

Greater concentrations of wildlife species that use large trees for nest or den sites (e.g., large woodpeckers, large owls) or for escape (e.g., black bear) than occur in younger stands.

Abundant populations of lichens, mosses, and other bark-inhabiting organisms.

High diversity of invertebrates, fungi, and microbes.

Stands of all tree species gradually develop old growth characteristics as they age, but stands dominated by short-lived species, such as aspen, reach an age at which so many trees die within a few years that a "post-old-growth" structure is attained which resembles young growth. This is not to say that such stands do not provide old-growth values, only that many of these values cannot be expected to last long in any one place.

WHY IS OLD GROWTH FOREST IMPORTANT?

From a timber production perspective, old growth represents a lost opportunity due to the increased mortality and the slow growth of old trees. Thus, foresters and loggers have traditionally referred to old growth stands as "overmature" or "decadent". However, such timber-oriented language is fading as the following values of old growth are being more widely understood and appreciated (#2):

1. **BIODIVERSITY** - As mentioned above, old-growth stands tend to structurally and compositionally diverse. The complexity of the woody vegetation in turn leads to a great variety of animals, fungi, microbes, and other plants (#5). Thus, maintaining old-growth stands is key to the conservation of biodiversity (#1, FSMN #37).
2. **SCIENTIFIC VALUE** - Old-growth forests represent living laboratories through which we, or future generations, may be able to learn how to create sustainable forests (#3,5). Ancient forests provide a link with the past, showing us how healthy, natural forests function and maintaining the genetic resources required for that functioning (#9). From a timber perspective, they give us examples of maximum limits of individual tree and stand production (#3).
3. **RECREATIONAL VALUE** - Stands of big, old trees inspire spiritual renewal in many people and provide enjoyable recreational experiences for many more.
4. **ENVIRONMENTAL VALUE** - Because nutrient cycling in old-growth stands is very tight, such stands are valuable as buffers along streams to maintain water quality. And because of the large amounts of carbon they store, old-growth forests help offset the release of carbon into the atmosphere from fossil fuels.
5. **ECONOMIC VALUE** - Although the economic value of the above factors is difficult to calculate, it does not diminish their importance for a healthy tourism and timber economy. A more direct economic benefit to the timber industry can be recognized in the incredible diversity of invertebrates that live in old growth and that are predators or parasites of other forest insect pests (#5). Old growth stands also provide important habitat for insectivorous birds that protect forest from outbreak of defoliating insects.

MANAGING FOR OLD-GROWTH VALUES ON PRIVATE LANDS

Because the value of old growth depends primarily on factors other than tree age per se, effort should be focused on identifying areas where these factors exist, and where they can be encouraged, rather than wasting time trying to decide if an area meets some arbitrary definition of old growth.

1. **WHERE TO LOOK FOR EXISTING OLD GROWTH** - Look for the poorest sites, the hardest, harshest, and most inaccessible places.
2. **WHERE TO MANAGE FOR FUTURE OLD GROWTH** - Concentrate on areas that are:
 - Adjacent or close to existing old growth.
 - Less economically valuable for timber production.
 - More vulnerable to degradation or more in need of protection, such as riparian and wetland buffer zones.
 - Visually prominent or important, such as along frequently used roads or favorite trails.
 - Critical wildlife habitats, such as traditional nesting sites, where disturbance should be minimized.

All different forest types, if possible.

3. HOW TO MANAGE FOR FUTURE OLD GROWTH - If you can wait a hundred years, do nothing. Otherwise, the following practices can be used to accelerate the development of old-growth conditions (#8).

Favor long-lived, shade-tolerant species such as sugar maple and hemlock.

Retain trees with existing and potential cavities, especially large diameter trees (FSMN #28).

Retain or create snag trees and large woody debris on the ground (FSMN #28).

Use the crop tree method of timber stand improvement to accelerate the growth rate of selected trees (FSMN #16).

If none are present, create 1-4 canopy gaps per acre about 25-40 feet across by felling trees; leave them as woody debris.

REFERENCES

FSMN #'s refer to other Forest Stewardship Management Notes in this series.

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