

What is Sustainable Forestry? Ron Eckstein, January 15, 2019

To answer this question, I reviewed various definitions relating to forest management. These definitions include silviculture, forest management, ecosystem management, sustainable forestry, sound forestry, generally accepted silviculture principles, landowner goals and objectives, and ecological forestry. My preference are those definitions associated with ecological forestry.

From WI DNR Division of Forestry Website

Silviculture: The practice of controlling forest composition, structure, and growth to maintain and enhance the forest's utility for any purpose. 2) The art and science of controlling the establishment, growth, composition, health, and quality of forests to meet the diverse needs and values of landowners and society on a sustainable basis.

Sustainable Forest Management (Sustainable Forestry): The practice of managing dynamic forest ecosystems to provide ecological, economic, social, and cultural benefits for present and future generations. 2) The practice of meeting the forest resource needs and values of the present without compromising the similar capability of future generations. 3) The stewardship and use of forests and forest lands in a way, and at a rate, that maintains their biodiversity, productivity, regeneration capacity, vitality, and potential to fulfill, now and in the future, relevant ecological, economic, and social functions at local, national, and global levels, and that does not cause damage to other ecosystems.

Ecosystem Management: A system to assess, conserve, protect, and restore the composition, structure, and function of ecosystems, to ensure their sustainability across a range of temporal and spatial scales, and to provide desired ecological conditions, economic products, and social benefits. 2) Management guided by explicit goals, executed by policies, protocols, and practices, and made adaptable by monitoring and research based on the best understanding of ecological interactions and processes necessary to sustain ecosystem composition, structure, and function over the long term.

Forest Ecology: The science concerned with the forest as a biological community dominated by trees and other woody vegetation, the interrelationships between the various trees and other organisms constituting the community, and the interrelationships between the organisms and the physical environment in which they exist.

Forest Management: The practical application of biological, physical, quantitative, managerial, economic, social, and policy principles to the regeneration, management, utilization, and

conservation of forests to meet specified goals and objectives while maintaining the productivity of the forest.

Forest: An ecosystem characterized by a more or less dense and extensive tree cover, often consisting of stands varying in characteristics such as species composition, structure, age class, and associated processes, and commonly including meadows, streams, fish, and wildlife. 2) An organized assemblage of trees, other plants, and animals in complex association with each other and their physical environment.

From WI Administrative Code NR 1.25 Generally accepted forestry management practices.

PURPOSE. Section [823.075 \(1\) \(d\)](#), Stats., requires the department to define generally accepted forestry management practices.

“Generally accepted forestry management practices” means forestry management practices that promote sound management of a forest. “Generally accepted forestry management practices” include those practices contained in the most recent version of the department publication known as Wisconsin Forest Management Guidelines and identified as PUB FR-226.

“Sound management of a forest” means sustainably managing a forest with the application of ecological, physical, quantitative, managerial, economic, and social principles to the regeneration, management, utilization, protection and conservation of forest ecosystems to meet specified wildlife habitat, watershed, aesthetics, cultural and biological goals and objectives while maintaining the productivity of the forest.

From WI DNR’s “Forest Management Guidelines, 2018”

Chapter 2 – Generally Accepted Silvicultural Principles.

Sustainable forestry practices must be based on compatible landowner objectives, the capabilities of each particular site and sound silviculture. Each of these factors is equally important. Landowners’ goals and objectives might encompass a wide range of values and benefits such as commercial products, recreation, aesthetics, wildlife habitat, endangered and threatened resources, and clean water. Understanding landowners’ goals and objectives is essential to ensure that prescribed forestry practices are relevant and will endure over time. Landowners’ goals and objectives must also be compatible with sustainable forestry defined as the management of dynamic forest ecosystems to provide ecological, economic, social, and cultural benefits for present and future generations. The silvicultural principles discussed in this guide assume that landowners are committed to sustainable forestry. Site capabilities help define sustainable forestry practices. Each particular growing space has its own set of environmental conditions affecting tree growth. Factors like soil type, aspect and climate influence the moisture and nutrients available to individual trees, and must be considered to ensure long-term tree health and vigor (see “Site Evaluation and Stand Delineation,” page 2-5). Silviculture is based on both forest ecology (relations between organisms) and the silvics (behavior or response) of individual tree species. Silvicultural systems are applied to stands of trees (rather than to individual trees) composed of species that commonly grow together. By

definition, silviculture is the practice of controlling forest composition, structure and growth to maintain and enhance the forest's utility for any purpose. Silviculture is applied to accomplish specific landowner objectives. The following sections of this guide will cover a number of silvicultural systems and harvest methods. The ability to adapt silvicultural systems to address multiple objectives is limited only by one's imagination and creativity, making the practice of sustainable forestry both an art and a science.

FOREST ECOLOGY The science concerned with 1) the forest as a biological community dominated by trees and other woody vegetation; 2) the interrelationships between various trees and other organisms constituting the community; and 3) the interrelationships between organisms and the physical environment in which they exist.

SUSTAINABLE FORESTRY The practice of managing dynamic forest ecosystems to provide ecological, economic, social, and cultural benefits for present and future generations (from Ch.28.04(1)e, Wisconsin Statutes).

SILVICULTURE. The practice of controlling forest composition, structure and growth to maintain and enhance the forest's utility for any purpose.
Generally Accepted Silvicultural Principles.

Silviculture and forestry practices are not ends within themselves, but rather a means of achieving specific objectives in a landowner's overall goal to manage a forest on a sustainable basis. The test of a silvicultural prescription or recommended forestry practice is how well it meets the landowner's sustainable forestry goals and objectives. As noted previously, landowner goals may be varied, reflecting a variety of forest values and benefits. Some goals may have a higher priority than others, but it is important to remember they are often interrelated, and generally depend on sound forestry practices to be realized. Goals can be achieved by accomplishing specific objectives. For example, a goal of periodic income or maintenance of wild turkey habitat might be achieved through an objective to regenerate an oak timber type through small shelterwood harvests spread over time. Think of a silvicultural prescription as a site-specific "action plan" to accomplish objectives. In developing goals, landowners should realize that although specific site characteristics of their land could make some objectives unsustainable, there might be other viable courses of action to choose from. It is up to the forester and other resource professionals to identify all options open to the landowner, and to use as much flexibility as possible in designing a silvicultural prescription that best addresses the full range of landowner goals (see Chapter 10: Forest Management Planning for more information). Figure 2-2: Landowners and resource managers should meet on-site prior to preparing a plan or conducting operations. Such meetings can help assure common understanding of landowner objectives, forestry prescriptions and site.

LANDOWNER GOALS AND OBJECTIVES

GOAL. A concise statement that describes a future desired condition normally expressed in broad, general terms that are timeless with no specific date by which the goal is to be achieved.

OBJECTIVE. Concise, time-specific statements of measurable, planned results that relate to

overall goals. Generally, “goals” apply to an entire property and “objectives” to individual stands.

Generally Accepted Silvicultural Principles. Site capability determines what types of forestry practices are sustainable. A site is defined by the sum total of environmental conditions surrounding and available to the plants. A site is also a portion of land characterized by specific physical properties that affect ecosystem functions and differ from other portions of the land (Kotar, 1997).

From WI Administrative Code NR 46.01 and NR 46.15 Forest Crop & Managed Forest Land

NR 46.01 Forest Crop Land. It is the purpose of this chapter to interpret, enforce and administer the provisions of the Wisconsin statutes pertaining to the forest croplands program, the woodland tax law program and any other tax programs concerning private forest lands. **(17)** “Practice forestry”, “sound forestry practices” and “sound forestry” mean sound and commonly accepted timber cutting, transporting and forest cultural methods recommended or approved by a qualified forester of the department for most effective propagation and improvement of the various timber types common to Wisconsin.

NR 46.15 Managed Forest Land Definitions. Sound forestry practices are defined in s. NR 46.15(29) Wis. Adm. Code, as “timber cutting, transporting and forest cultural methods recommended or approved by the department for the effective propagation and improvement of the various timber types common to Wisconsin. “Sound forestry practices” also may include, where consistent with landowner objectives and approved by the department, the management of forest resources other than trees including wildlife habitat, watersheds, aesthetics and endangered and threatened plant and animal species.” Three fundamental principles have emerged from research on natural disturbance regimes and stand development processes, which form the basis of an ecological forestry approach. These include 1) understanding the importance of biological legacies created by a tree-regenerating disturbance and incorporating legacy management into harvesting prescriptions; 2) recognizing the role of stand development processes, particularly individual tree mortality, in generating structural and compositional heterogeneity in stands and implementing thinning prescriptions that enhance this heterogeneity; and 3) appreciating the role of recovery periods between disturbances in the development of stand complexity. We label these concepts, when incorporated into a comprehensive silvicultural approach, the “three-legged stool” of ecological forestry (Fig. 1).

Ecological Forestry

Palik and Zasada 2002; Franklin et al. 2007. The overriding goal of classical silvicultural systems is to maximize wood production, but managed forests often tend toward overly homogenous structures comprised of single (even-aged) or multiple cohorts (uneven-aged) of trees with little

tree species diversity (Hansen et al. 1991, Aplet 1994). The inclusion of ecological values among the goals of forest management has resulted in a greater emphasis on producing managed stands whose structural characteristics and species combinations approach those of unmanaged forests. Suggested modifications to traditional even- and uneven-aged management systems are attempts to mimic natural forest stand dynamics and, more specifically, the heterogeneous structure which develops following natural disturbances.

R. Gregory Corace III and P. Charles Gorbel 2010. The Wildlife Professional. Spring 2010

To provide wildlife habitat, maintain biodiversity, and meet multiple ownership objectives, contemporary forest management should incorporate ecological principles that are based on landscape position, soils, natural disturbance regimes, and resulting patterns in composition and structure. Doing so will create forest ecosystems that are more resilient to natural and anthropogenic stressors in a quickly changing world.

Franklin, Jerry F., Robert J. Mitchell, and Brian J. Palik. 2007 USDA Forest Service Northern Research Station General Technical Report NRS-19. Natural Disturbance and Stand Development Principles for Ecological Forestry. Three fundamental principles have emerged from research on natural disturbance regimes and stand development processes, which form the basis of an ecological forestry approach. These include 1) understanding the importance of biological legacies created by a tree-regenerating disturbance and incorporating legacy management into harvesting prescriptions; 2) recognizing the role of stand development processes, particularly individual tree mortality, in generating structural and compositional heterogeneity in stands and implementing thinning prescriptions that enhance this heterogeneity; and 3) appreciating the role of recovery periods between disturbances in the development of stand complexity. We label these concepts, when incorporated into a comprehensive silvicultural approach, the “three-legged stool” of ecological forestry.

United States Department of Defense for forests on military lands (no date found). Such a sustainable approach to management is embodied in ecological forestry, which is a silvicultural philosophy and approach that perpetuates ecosystem integrity at landscape spatial scales while continuing to provide wood products and other ecosystem services. Natural models of forest disturbance and stand development provide the scientific basis for defining ecosystem integrity and developing congruent silvicultural practices. Three guiding principles of ecological forestry are: incorporating legacy features, such as retaining snags and downed woody debris, into silvicultural prescriptions, understanding and incorporating intermediate stand development processes, such as fire, and incorporating appropriate recovery periods between silvicultural treatments into management systems

Northwest Natural Resources Group, Seattle, Washington. 2015. Forest Stewardship Council® (FSC®) certification provides a useful framework for implementing practices of Ecological Forestry. FSC has a set of 10 Principles and 57 Criteria to ensure that forests are sustainably

managed and achieve outcomes such as diversity and forest health. For instance, Principle 6 stresses the importance of forest management in conserving biological diversity “and, by so doing, maintaining the ecological functions and the integrity of the forest.”

Palik, Brian J. and Anthony W. D’Amato. Ecological Forestry: Much More Than Retention harvesting. J. For. m11591): 51-53. The broader framework of ecological forestry is based on four foundational principles, as discussed in various way by different authors over the last several decades (e.g., Seymour and Hunter 1999, Franklin et al. 2007, Long 2009, Franklin and Johnson 2012). These principles generally include the following: (1) continuity—the provision for continuity in forest structure, function, and biota between pre- and postharvest ecosystems during regeneration harvests; (2) complexity—the need to create and maintain structural and compositional complexity and biological diversity, including spatial heterogeneity at multiple spatial scales through all silvicultural interventions; (3) timing— referring to the importance of applying silvicultural interventions at ecologically appropriate time intervals; and (4) context— underscoring the importance of planning and implementing silvicultural interventions in the context of objectives developed at larger (landscape) spatial scales.

Chelsea Batavia for the degree of Master of Science in Forest Ecosystems and Society presented on June 4, 2015. Title: Ecological Forestry: A Critical Analysis. The idea at the core of ecological forestry is that non-anthropogenic processes of forest development and disturbance should be used as a reference and a guide for humans to selectively take and leave elements of the harvested forest (Franklin et al., 2007; Long, 2009; Seymour & Hunter, 1999). The tools of ecological forestry are age-old silvicultural concepts and practices: selection, thinning, regeneration, and rotation length (Puettmann et al., 2009), re-imagined and described anew as legacies, variable density thinning, variable retention harvest, and extended rotations, or recovery periods (Franklin et al., 1997; Franklin et al., 2007). Historically, silvicultural practices often aimed to achieve a single goal, namely, the efficient harvest of trees for human use (Puettmann et al., 2009; Seymour & Hunter, 1999). In ecological forestry, by contrast, the goal is to manage forests to achieve multiple economic and non-economic objectives.

Marcella Windmuller-Campione, University of Minnesota Forest Resources Department, 2017. Ecological forestry has many definitions but at the simplest it is balancing the need for the extraction of forests products and natural stand and disturbance dynamics. Increasingly foresters and natural resource managers have to balance multiple objectives when developing silvicultural prescriptions. Silvics, the knowledge of individual tree’s life history, growth, and behavior, is the foundation of silviculture. By using knowledge of silvics, disturbance history, and underlying site characteristics, natural resource managers can use ecological forestry to develop silvicultural prescription to increase overall forest health.