

## Appendix A

# Glossary and Acronyms

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## Glossary

### A

**accessibility** - The ability of a site, facility or activity to be enjoyed by persons of varying physical and mental abilities.

**adaptive management** - A strategy that views decision making as part of an on-going process. As projects and treatments are implemented and vegetation changes across the landscape, scientific findings and the needs of society may indicate some practices are more effective than others. Monitoring the results of actions will provide a flow of information that may indicate the need to change or adapt the types and combination of treatments.

**administrative use** - in reference to off-highway vehicles, administrative use includes management activities conducted by the Forest Service, search and rescue missions conducted by authorized officials, and operation and maintenance of oil and gas facilities where approved by the Forest Service.

**advanced regeneration** - Seedlings or saplings that develop or are present in the understory, normally considered when planning regeneration treatments.

**Advisory Council on Historic Preservation** - A federal advisory body that advises the President and Congress on national historic preservation policies, encourages private and public interest in historic preservation, and review and comments on federal undertakings that might have an effect on properties listed on or eligible for the National Register of Historic Places.

**age class** - 1) A grouping of stands according to their age by an interval of years, usually 10 years. 2) A distinct aggregation of trees within a stand, originating from a single natural event or regeneration activity. (See cohort.)

**all terrain vehicle (ATV)** - Any motorized off-highway vehicle 50 inches or less in width, can be straddled, travels on 3 or more low-pressure tires (10 pounds per square inch (PSI) or less, or as recommended by the vehicle manufacturer.)

**allowable sale quantity** - The amount of timber that may be sold from the area of suitable timberland covered by the forest plan for a time period specified by the plan. The ASQ is based on a 10-year period, although it may be expressed on an “average annual ASQ” basis.

**aquatic ecosystem** - Refers to the interaction between the following biotic and abiotic components: the stream channel, lake and estuary beds, water, biotic community, and associated habitat features. Included are perennial, intermittent and scoured ephemeral streams and lakes with intermittently, semi-permanently and seasonally flooded channels. In the absence of flowing water, intermittent and scoured ephemeral streams may have pools, or surface water may be absent altogether.

**aspect** - The direction a slope faces. For example, a hillside facing east has an eastern aspect.

## B

**barrier** - 1) Any feature or condition that restricts movement of organisms or prevents establishment of organisms that have migrated there. 2) A natural or artificial obstruction used to stop or check a fire or to provide a control line from which to work. See firebreak.

**bench** - Normally a long, narrow, relatively level ledge or gently inclined strip of land bounded by steep slopes above and below, and formed by differential erosion of rocks and soils that are bedrock controlled.

**biological assessment (BA)** - Information prepared by, or under the direction of, a federal agency to determine whether a proposed action is likely to: 1) adversely affect listed species or designated critical habitat; 2) jeopardize the continued existence of species that are proposed for listing; or 3) adversely modify proposed critical habitat.

**biological diversity** - The variety of life in an area, including the variety of genes, species, plant and animal communities and ecosystems, and the interaction of these elements. The term is often abbreviated to biodiversity. (See habitat diversity.)

**biological opinion (BO)** - A document that includes: 1) the opinion of the US Fish and Wildlife Service as to whether or not a federal action is likely to jeopardize the continued existence of listed species, or result in the destruction or adverse modification of designated critical habitat; 2) a summary of the information on which the opinion is based; and 3) a detailed discussion of the effects of the action on listed species or designated critical habitat.

**board foot (BF)** - A measurement term for lumber or timber. It is the amount of wood contained in an unfinished board 1 inch thick, 12 inches long, and 12 inches wide. The conversion factor used in the preparation of this document is: 6.0 board feet per cubic foot.

## C

**canopy** - The part of any stand of trees represented by the tree crowns. It usually refers to the uppermost layer of foliage, but it can be used to describe lower layers in a multi-storied forest.

**cavity** - A hole in a tree, often used by wildlife species for nesting or roosting.

**chemical control** - The use of pesticides to control pests or undesirable species. Contrast with biological control and mechanical control.

**clearcut** - A regeneration method in which all or almost all of the trees are removed in one cutting.

**coarse woody debris** - Defined in this document as pieces of wood (branches, whole trees, root wads, etc.) that are at least 4 inches in diameter and 3 feet in length, within a stream channel. Coarse woody debris contributes to habitat complexity by forming pools, encouraging scour from stream banks, partitioning the water column and providing cover for aquatic species. Coarse woody debris serves as a refuge for fish and the hard substrates and associated invertebrate production is an important food source. Coarse woody debris also influences flow velocity, channel shape and sediment storage and routing. Also referred to as large woody debris.

**collector roads** - Roads that serve small land areas and are usually connected to a forest development road, a county road, or a state highway.

**communications site** - An area of National Forest System land designated through the land and resource management planning process. A communications site may be limited to a single communications facility, but most often encompasses more than one. Each site is identified by name, usually a local prominent landmark, such as John's Creek Communications site.

**community** - In ecology, the collection of species that characteristically occur together under a specified set of conditions. Often, the term is used to refer only to vegetation.

**concern level** - In scenery management, the measure of the degree of public importance placed on landscapes as viewed from travelways and use areas. Concern levels are ranked as 1 for high, 2 for moderate, and 3 for low. (Similar to Sensitivity Level under the Visual Management System.)

**concessionaire** - The permitted, private operator of a USDA Forest Service recreation facility.

**conifer** - A tree that produces cones, such as a pine, spruce, or fir tree. Also known as softwood.

**controlled surface use stipulation** - A mineral leasing stipulation that identifies standards that an operator must meet to mitigate potential adverse effects to surface resources.

**coppice harvesting** - A method of regenerating a stand in which all trees in the previous stand are cut and the majority of regeneration is from sprouts or root suckers.

**corridor** - 1) A feature of the landscape that connects similar areas. 2) A linear strip of land developed for locating transportation or utility rights-of-way within its boundaries.

**Council on Environmental Quality (CEQ)** - An advisory council to the President, established by the National Environmental Policy Act of 1969. The CEQ reviews federal programs for their effect on the environment, conducts environmental studies, and advises the President on environmental matters.

**cover** - 1) Any feature that conceals wildlife or fish. Cover may be dead or live vegetation, boulders, or undercut stream banks. Animals use cover to escape from predators, rest or feed. 2) The kind of and nature of vegetation which casts a shadow on the ground. Can describe any or all vertical layers of vegetation.

**critical habitat** - Areas formally designated for the survival and recovery of federally listed threatened or endangered species.

**crown** - The part of a tree or woody plant bearing live branches and foliage.

**cultural resources** - The physical remains of sites, structures, networks, or objects used by humans in the past. They can be historic, prehistoric, archaeological, or architectural in nature (see heritage resources).

**cumulative effect or impact** - Impact on the environment that results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time.

## D

**desired landscape character** - Appearance of the landscape to be retained or created over time, recognizing that the landscape is a dynamic and constantly changing community of plants and animals.

**developed recreation (DR)** - Recreation that takes place at defined areas where constructed facilities are provided for such use. Developed recreation sites include campgrounds, picnic areas, boat ramps and interpretive sites. Contrast with dispersed recreation.

**dispersed recreation** - Recreation that takes place in less developed settings where few, if any, constructed facilities are provided. Trail use, rock climbing, boating, hunting and fishing are examples of dispersed recreation. Contrast with developed recreation.

**disturbance** - A discrete event, either natural or human induced, causing change in the condition of an ecological system, community, or population structure; and changes resources, substrate availability, or the physical environment.

**duff** - The fermentation and humus layer of the forest floor material lying below the litter and above mineral soil; it consists of partially decomposed organic matter whose origins can still be visually determined as well as the fully decomposed humus layer. This layer does not include the freshly cast material in the litter layer. Contrast with litter.

## E

**ecology** - 1) The interrelationships and interconnectedness of living things to one another (biotic) and to their environment (abiotic). 2) The study of these interrelationships and interconnections.

**ecoregion** - An area over which the climate is sufficiently uniform to permit development of similar ecosystems on sites that have similar properties. Ecoregions contain many landscapes with different spatial patterns of ecosystems.

**ecosystem** - An arrangement of biotic and abiotic components and the forces that move among them.

**edge** - The junction between two dissimilar habitat types or successional stages.

**endangered species** - A plant or animal species that is in danger of extinction throughout all or a significant portion of its range. Endangered species are identified by the Secretary of the Interior/Secretary of Commerce in accordance with the Endangered Species Act of 1973.

**environmental analysis** - 1) An analysis of actions and their predictable long and short-term environmental effects. Environmental analyses include consideration of physical, biological, social, and economic factors. 2) A general term that could refer to an environmental assessment or an environmental impact statement.

**environmental impact statement (EIS)** - A disclosure statement revealing the environmental impacts of a proposed action, which is required for major federal actions under Section 102(2)(C) of the National Environmental Policy Act. A draft EIS is released to the public and other agencies for review and comment. The statement provides full and fair discussion of significant environmental impacts and informs the decision maker and the public of the reasonable alternatives, which would avoid or minimize adverse impacts or enhance the quality of the human environment.

**ephemeral stream** - A stream that flows only in direct response to precipitation, receives no water from springs, and does not have a continuous supply from surface sources. Ephemeral streams have a functional channel with streambed and banks which are annually cleared of debris and leaf litter.

**epicormic branching** - A new branch arising spontaneously from a dormant bud on the stem, branch, or bole of a tree, often following exposure to increased light.

**eradication** - In silviculture, elimination of gypsy moth from an area infested as a result of artificial movement of gypsy moth life stages from the generally infested area.

**erosion** - The wearing away of the earth's surface by running water, wave action, moving ice and wind, or processes of mass wasting. Geologic erosion refers to natural erosion processes occurring over long (geologic) time spans. Accelerated erosion generically refers to erosion in excess of what is presumed or estimated to be naturally occurring levels.

**European settlement** - In an ecological context, the era of European settlement in the area of the Wayne National Forest is regarded as beginning around 1700 A.D. The era of pre-European settlement is generally defined as 1000 to 1700 A.D.

**even-aged management** - See even-aged silvicultural system.

**even-aged silvicultural system** - A planned sequence of treatments designed to maintain and regenerate a stand with one age class. The range of tree ages is usually less than 20 percent of the rotation; i.e. clear-cutting, seed-tree, shelterwood, and coppice methods. (Also referred to as even-aged management.)

**existing landscape character** - A term used in scenery management to refer to a word picture that includes cultural values, positive attributes, and sense of place. It can serve as a baseline for developing alternatives in land and resource plan revision and to develop Landscape Character Themes. (See Landscape Character Theme.)

## F

**feature** - Topographical evidence of disturbance created by previous mining activities such as subsidence, open portals, highwalls, slumps, and seeps.

**federally listed species** - Refers to one or more species listed by the U. S. Fish and Wildlife Service as endangered (E), threatened (T) or proposed for federal listing as threatened or endangered (P).

**filterstrips** - A filterstrip is primarily a sediment and nutrient trapping tool. The width of the filterstrip necessary to protect the riparian area (including the aquatic and riparian ecosystems) and water quality will vary, depending on many factors: e. g. topography; aspect; landform; climate; soil and parent geology slope; condition of the vegetative community; aquatic community; hydrologic regime; management activity and resource objectives. Filterstrip requirements may vary from a minimum of 50 to 100 feet.

**fire intolerant species** - A species with morphological characteristics that give it a higher probability of being injured or killed by fire than a fire-tolerant species, which has a “relatively low” probability of being injured or killed by fire.

**fire regime** - Patterns of fire occurrence, size, severity and effects in a given area or ecosystem. A natural (historical) fire regime is a general classification of the role fire would play across a landscape in the absence of modern human intervention, but including the influence of aboriginal burning.

**Fire Regime Condition Class (FRCC)** - The ecological condition of the vegetation and fire regime of a landscape. FRCC is measured by describing the degree of departure from historical fire regimes, possibly resulting in alterations of key ecosystem components such as species composition, structural stage, stand age, canopy closure and fuel loadings. The three classes are defined as:

**Condition Class 1** - Fire regimes are within a historical range, and the risk of losing key ecosystem components is low. Species composition and structure are intact and functioning.

**Condition Class 2** - Fire regimes have been moderately altered from the historical range. The risk of losing key ecosystem components is moderate. Fire frequencies have departed from historical frequencies by one or more return intervals. This results in moderate changes to one or more of the following - fire size, intensity and severity, and landscape patterns. Vegetation attributes have been moderately altered from their historical range.

**Condition Class 3** - Fire regimes have been significantly altered from their historical range. The risk of losing key ecosystem components is high. Fire frequencies have departed from historical frequencies by multiple return intervals. This results in dramatic changes to one or more of the following: fire size, intensity and severity, and landscape patterns. Vegetation attributes have been significantly altered from their historical range.

**fire suppression** - All the work of extinguishing or confining a fire beginning with its discovery and continuing until the fire is completely extinguished.

**firebreak** - A natural or constructed barrier used to stop or check fires that may occur, or to provide a control line from which to work. (See fireline.)

**fireline** - The part of the fire control line along which mineral soil has been exposed. See firebreak.

**flood prone area** - An area along streams which generally includes the active floodplain and the low terrace. It is delineated on-the-ground by the elevation that corresponds to twice the maximum depth of the bankfull channel as taken from the established bankfull stage.

**floodplain** - The lowland and relatively flat areas joining inland and coastal water including the debris cones and flood-prone areas of offshore islands and, at a minimum, that area subject to a 1 percent (100-year recurrence) or greater chance of flooding in any given year.

**forest** - In ecology, a mostly closed high canopy contiguous area of trees with a moderate to high basal area (60-120 or more square feet/ acre). In forestry, land at least 10 percent stocked by forest trees of any size, including land that formerly had such tree cover and that will be reforested. The minimum area for classification of forest is one acre, and at least 120 feet wide. Also referred to as forestland, forest land or forested land. When capitalized in this document, the word Forest refers to the Wayne National Forest.

**forest canopy** - The cover of branches and foliage formed collectively by tree crowns

**forest development road (FDR)** - Road under the jurisdiction of the USDA Forest Service.

**forest health** - 1) The perceived condition of a forest derived from concerns about such factors as its age, structure, composition, function, vigor, presence of unusual levels of insects or disease, and resilience to disturbance. Note that perception and interpretation of forest health are influenced by individual and cultural viewpoints, land management objectives, spatial and temporal scales, the relative health of the stands that comprise the forest, and the appearance of the forest at a point in time. 2) A condition where biotic and abiotic influences do not threaten resource management objectives now or in the future. Ill health is associated with declines in biological diversity, loss of primary productivity, reversal of successional patterns, widespread and severe disease, and loss of nutrient capital. A healthy forest can be envisioned as one with the capacity for renewal and resilience to a range of disturbances, while meeting the current and future needs of people.

**forest land** - (See forest.)

**Forest Supervisor** - The official responsible for administering National Forest System lands on one or more national forests. A Forest Supervisor reports to a Regional Forester.

**forest type** - A category of forest defined by its vegetation, particularly its dominant species, as based on a percentage cover of trees. Also referred to as forest cover type.

**forestland** - (See forest.)

**fragmentation** -The breaking up of contiguous areas into progressively smaller patches. The process of fragmentation occurs across a range of landscape patterns. At one extreme, it is represented by small disturbance patches, which disrupt the continuity of a habitat. At the other extreme, widespread habitat conversion causes isolation of the remnant original habitat into patches.

**fuel loading** - The amount of fuel present expressed quantitatively in terms of weight of fuel per unit area. This may be available (consumable) fuel or total fuel and is usually dry weight. Also referred to as fuel load.

**fuels management** - Manipulation, including combustion, or removal of fuels to reduce the likelihood of ignition and/or to lessen potential damage and resistance to control.

**fuels** - In fire management, flammable natural fuels such as leaf litter or logging slash.

**fuelwood** - Wood used for conversion to some form of energy, for example in homes or in cogeneration plants.

**function** - A the process within an ecosystem through which the elements interact, such as succession, the food chain, fire, weather, and the hydrologic cycle.

## G

**goal** - In planning, a concise statement that describes a desired future condition to be achieved with no specific date by which it is to be attained. It is normally expressed in broad, general terms. Goal statements form the principal basis from which objectives are developed.

**grazing** - The consumption of standing forage by livestock or wildlife.

**group selection** - An uneven-aged regeneration method in which trees are removed periodically in small groups. On the Wayne National Forest, the group size is between one-quarter and two acres.

**guideline** - Statements describing a preferred or advisable course of action that is generally expected to be carried out. Because guidelines are discretionary, deviation from a guideline does not require an amendment to the Forest Plan, but the rationale for such deviation should be documented in the project record.

## H

**habitat** - The physical and biological environment for a plant or animal species in which all the essentials for its development, existence, and reproduction are present.

**habitat capability** - The ability of a land area or plant community to support a given species of wildlife.

**habitat diversity** - The diversity of wildlife habitat types within a given area. See biological diversity.

**heritage resources** - The physical remains of sites, structures, networks, or objects used by humans in the past. They can be historic, prehistoric, archaeological, or architectural in nature. Generally a synonym of cultural resources, although heritage resources may be more broadly inclusive. (See cultural resources.)

**Historic American Buildings Survey/Historic American Engineering Record (HABS/HAER)** - Federal programs to document and record important architectural, engineering and industrial sites throughout the United States. A complete set of HABS/HAER documentation on a given site consists of measured drawings, large-format photographs, and a detailed written history that becomes a lasting archival record which is housed at the Library of Congress in perpetuity.

**historic range of variability** - The natural fluctuation of components of healthy ecosystems over time. The range of conditions and processes which are likely to have occurred prior to settlement by people of European descent.

## I

**integrated pest management (IPM)** - The planned use of a variety of preventive, suppressive, or regulatory tactics and strategies that are ecologically and economically efficient and socially acceptable, to maintain destructive pests at tolerable levels.

**Interdisciplinary Team (IDT)** - A team of individuals with skills from different disciplines that focuses on the same task or project.

**interior forest habitat** - High canopy forest conditions suitable to meet the requirements of area-sensitive species that are adversely impacted by forest edge, including microclimate change (warmer, windier), increased predation, increased brood parasitism, and increased competition.

**intermediate thinningcutting** - An intermediate treatment involving the removal of trees from a stand sometime between the establishment of the stand and the regeneration cut(s). See intermediate treatments.

**intermittent stream** - A stream that normally flows in response to a seasonally fluctuating water table in a well-defined channel (flowing 10-90 percent of an average year). The channel will exhibit signs of annual scour, sediment transport and other stream channel characteristics, absent perennial flows. Intermittent streams typically flow during times of elevated water table levels and may be dry during significant periods of the year, depending on precipitation cycles. Intermittent streams do not maintain fish populations or aquatic insects that have larvae with multi-year life cycles. Contrast with ephemeral stream and perennial stream.

**interpretation** - The conveyance of information to the public on topics such as natural and heritage resources or general forest information through various methods to better help visitors relate to, experience, understand and enjoy the natural environment and their recreation experience.

**interpretive site** - A site designated primarily for providing the public interpretive materials and programs.

**invasive species** - A species that can move into an area and become dominant either numerically or in terms of cover, resource use, or other ecological impacts. An invasive species may be native or non-native.

**issues** - Topics of unresolved conflict or special concern involving management of the National Forest.

## J

## K

**keystone species** - A species whose influence on ecosystem function and diversity are disproportionate to their numerical abundance.

## L

**landing** - A cleared area in the forest to which logs are yarded or skidded for loading onto trucks for transport.

**Landscape Character Goal** - In scenery management, the visual and cultural image of a geographical area. It uses base information from ecological unit descriptions supplemented with existing land use patterns or themes. It is the adopted desired future appearance of the area and represents trade-off analysis with other resources. Levels include Natural Evolving, Natural Appearing, Pastoral/Agricultural, Historic, Transitional, Suburban, and Urban.

**landscape character** - Particular attributes, qualities, and traits of a landscape that give it an image and make it identifiable or unique.

**landscape** - A large land area composed of interacting ecosystems that are repeated due to factors such as geology, soils, climate, and human influences throughout the area. Landscapes are generally of a size, shape, and pattern that are determined by interacting ecosystems.

**Landscape Character Description** - A combination of objective information and subjective values assigned to a landscape, which gives a visual and cultural image of a geographic area.

**landtype** - A unit of ecological land classification based on similar bedrock geology, soils and landform, which repeats on the landscape.

**large woody debris** - see coarse woody debris.

**litter** - The top layer of the forest floor directly above the duff layer, which includes freshly fallen or only slightly decomposed plant material, including leaves, needles, bark flakes, cone scales, fruits (including acorns and cones), dead matted grass and other vegetative parts that are little altered in structure by decomposition. Contrast with duff.

**long-term sustained-yield capacity** - The highest uniform wood yield from lands being managed for timber production that may be sustained under specified management intensity, consistent with multiple-use objectives.

## M

**management indicator species (MIS)** - 1) A species whose condition can be used to assess the impacts of management actions on a particular area. 2) A species whose population changes are believed to indicate the effects of management activities, and is monitored to track population numbers and habitat conditions, as a way of monitoring biodiversity.

**mature forest** - Trees that have attained full development, especially height, and are in full seed production.

**mature timber** - Generally used in an economic sense to indicate that a forest has attained harvest age.

**mechanical site preparation** - The killing or retardation of competing vegetation to prepare an area for reforestation, using heavy equipment. See specific mechanical methods: chopping, disking, scarification, shearing, shredding, raking, and ripping. See site preparation, manual site preparation, chemical site preparation, and mechanical control.

**mesic** - Refers to moist to moderately moist soil conditions. Under mesic conditions, soil moisture is predictably adequate for plant growth during the growing season.

**mesophytic** - Of or adapted to a moderately moist environment.

**microclimate** - The climate of a small site. It may differ from the climate at large of the area due to aspect, tree cover (or the absence of tree cover), or exposure to winds. (Contrast with macroclimate.)

**mineral materials** - Mineral commodities having a low value per ton such as sand, gravel, stone, clay and other similar materials. Such mineral materials are saleable minerals in accordance with the Mineral materials Act of 1947.

**mineral soil** - Soil that consists mainly of inorganic material, such as weathered rock, rather than organic matter.

**mitigation** - Collective actions taken to avoid, minimize, or rectify the negative impact of a land management practice.

**mixed mesophytic forest** - A forest containing tree (mostly hardwood) and plant species, which normally grow in moderately moist soils, typically in coves, or in riparian areas.

**monitoring and evaluation (M&E)** - the periodic evaluations of forest management activities to determine how well objectives were met and how management practices should be adjusted.

**mortality** - 1) The death rate of a species within a given population or community. 2) In forestry, the quantity of formerly merchantable trees that have died within a specified period of time.

**mosaic** - In this document, areas with a variety of plant communities, generally repeating over a landscape, such as forested and non-forested areas.

## **N**

**National Historic Landmark** - Cultural properties designated by the Secretary of the Interior as being nationally significant. These cultural properties may be buildings, historic districts, structures, sites and objects that possess exceptional value in commemorating or illustrating the history of the United States.

**National Historic Preservation Act (NHPA)** - A federal Act, passed in 1966, which established a program for the preservation of additional historic properties throughout the nation and for other purposes, including the establishment of the National Register of Historic Places, the National Historic Landmarks designation, regulation for supervision of antiquities, designation of the State Historic Preservation Offices, guidelines for federal agency responsibilities, technical advice, and the establishment of the Advisory Council on Historic Preservation.

**National Register of Historic Places (NRHP)** - A list of heritage resources that have local, state, or national significance maintained by the Secretary of the Interior.

**native species** - Any species native to a given land or water area by natural occurrence.

**Natural-Appearing Landscape Character** - Landscape character that has resulted from human activities, yet appear natural, such as historic conversion of native forests in to farmlands, pastures, and hedgerows that have reverted back to forests through reforestation activities or natural regeneration

**National Environmental Policy Act (NEPA) process** - A series of procedural steps derived from the National Environmental Policy Act of 1970. The NEPA process is intended to help public officials make decisions that are based on public input and understanding of environmental consequences, and take actions that protect, restore, and enhance the environment.

**niche** - As it relates to recreation marketing; the role best suited for the Forest Service in its provision of recreational facilities, activities and settings to the public it serves.

**no surface occupancy (NSO)** - A mineral leasing stipulation that prohibits occupancy or disturbance on all or part of the land surface to protect special values or uses.

**non-native invasive species (NNIS)** - An introduced species that evolved elsewhere, and that has been transported and disseminated purposefully or accidentally.

**notice of intent (NOI)** - A notice in the Federal Register that an environmental impact statement will be prepared.

## O

**objective** - In planning, a concise, time-specific statement of measurable planned results that respond to pre-established goals. An objective forms the basis for further planning to define the precise steps to be taken and the resources to be used in achieving identified goals.

**obliteration** - In engineering, actions taken on a roadway or motorized trail over which travel has been and will continue to be denied. The entrance is obscured, and the wheel tracks or pathway is no longer continuous and suitable for travel. Maintenance needs have been eliminated, and it has been removed from the transportation or trail system inventory. Obliteration does not necessarily imply returning the road prism back to its original contours.

**off-highway vehicle (OHV)** - Any motorized vehicle designed for or capable of cross-country travel on or immediately over land, water, snow, ice, marsh, swampland, or other natural terrain. It includes but is not limited to four-wheel drive and other high-clearance vehicles, low-pressure-tired vehicles (ATV), motorcycles and related two-wheeled vehicles (OHM), and any other means of transportation deriving power from any source other than muscle or wind; except that such term shall exclude any registered motorboat; any military, fire, or law enforcement vehicle; any farm-type tractor and other self-propelled agricultural equipment used exclusively for agricultural purposes; any self-propelled equipment for harvesting and transporting forest products, or for earth moving or construction while being used for these purposes on the work site (and self-propelled lawnmowers, snow-blowers, garden or lawn tractors, or golf carts while being used for their designed purpose). See all-terrain vehicle.

**old-growth** - Old-growth encompasses the later stages of stand development that typically differ from earlier stages in a variety of characteristics which may include tree size, accumulation of large wood material, number of canopy layers, species composition, and ecosystem function. Different forest communities reach old-growth conditions at different ages, under different disturbance regimes, and via different management strategies. (Specific descriptions of old-growth on the Wayne National Forest can be found in Appendix D-Range of Natural Variability in the EIS.)

**outstanding mineral rights** - The rights to extract subsurface minerals that are retained by the owner of those minerals, when ownership of the surface of the land (by subsequent party) is transferred to the federal government.

**overmature forest** - A tree or stand that has attained full development, particularly in height, and has begun to lessen in commercial value because of declining vigor, health, or soundness.

**overstory** - 1) The trees in a two- or multi-layered forest stand that provides the upper crown cover. 2) A more or less continuous cover of branches and foliage formed collectively by the upper portion of the vegetation structure.

## P

**patch** - An area of vegetation that is homogeneous in structure and composition. (See stand.)

**perennial stream** - Any watercourse that normally flows most of the year (greater than 90 percent of an average year) in a well-defined channel, although droughts and other precipitation patterns may influence the actual duration of flow. It contains fish or aquatic insects that have larvae with multiyear life cycles, and water-dependent vegetation is typically associated with it. (Contrast with ephemeral stream and intermittent stream.)

**personal use** - The use of a forest product, such as firewood, for home use as opposed to commercial use or sale.

**planning area** - In this document, the area of National Forest System land covered by a Forest Land and Resource Management Plan.

**planning period** - The 150-year time frame for which goods, services, and effects were projected in the development of the Forest Plan.

**precommercial thinning** - The removal from a stand of some of the trees that are too small to be sold for timber products, to promote growth of the remaining, more desirable trees. (See thinning.)

**prescribed burning** - The controlled application of fire to wildland fuels in either their natural or modified state, under specified environmental conditions that allows the fire to be confined to a predetermined area, and produce the fire behavior and fire characteristics required to attain planned fire treatment and resource management objectives.

**prescribed fire plan** - A written statement defining the objectives to be attained as well as the conditions of temperature, humidity, wind direction and speed, fuel moisture and soil moisture under which a fire will be allowed to burn. A prescription is generally expressed as acceptable ranges of the prescription elements and the limit of the geographic area to be covered.

**prescribed fire** - A fire ignited by management actions to meet specific objectives. More specifically, it is the controlled application of fire to wildland fuels in either their natural or modified state, under specified environmental conditions that allows the fire to be confined to a predetermined area, and produce the fire behavior and fire characteristics required to attain planned fire treatment and resource management objectives.

**present net value (PNV)** - The measure of the economic value of a project when costs and revenues occur in different time periods. Future revenues and costs are "discounted" to the present by an interest rate that reflects the changing value of a dollar over time. The assumption is that dollars today are more valuable than dollars in the future. PNV is used to compare project alternatives that have different cost and revenue flows. Also called present net worth; net present value.

**professional archaeologist** - An archaeologist who meets the Secretary of the Interior's Standards for Archaeology and Historic Preservation.

**public involvement** - In planning, the use of appropriate procedures to inform the public, obtain early and continuing public participation, and consider the views of interested parties in planning and decision making.

## Q

**q-factor** - A term used in uneven-aged silviculture to describe the relative distribution of tree diameter size classes in a stand. This is expressed in terms of the "q" ratio between numbers of trees in successive 2-inch diameter classes. For example, a "q" of 1.5 means there are 1.5 times as many 10-inch trees as there are 12-inch trees, and 1.5 times as many 12-inch trees as there are 14-inch trees, etc. The lower the "q-factor", the more large trees there are in proportion to small trees.

## R

**range of variability** - Refers to the range of sustainable conditions in a healthy ecosystem, which is determined by time, processes, species, and the land itself. For instance, ecosystems that have a 10-year fire cycle have a narrower range of variation than ecosystems with 200 to 300-year fire cycles. Also called the historic range of variability or natural range of variation.

**ranger district (RD)** - The administrative sub-unit of a national forest, supervised by a District Ranger who reports directly to a Forest Supervisor.

**Recreation Opportunity Spectrum (ROS)** - A framework for stratifying and defining classes of outdoor recreation environments or settings, activities, and experiences along an opportunity spectrum. The spectrum is defined typically by six classes of opportunities (see below for each class description).

**primitive** - 1) Minimum modification. 2) Area is characterized by fairly large, essentially unmodified natural environment. Interaction between users is very low and evidence of other users is minimal. The area is managed to be essentially free from evidence of human induced restrictions and controls. Motorized use in the area is not permitted

**semi-primitive non-motorized** - 1) Minimum modification. Motorized access not allowed. 2) Area is characterized by a predominantly natural or natural appearing environment of moderate to large size. Interaction between users is low, but there is often evidence of other users. The area is managed in such a way that minimum on-site controls and restrictions may be present, but is subtle. Motorized use is generally prohibited.

**semi-primitive motorized** - 1) Minimum modification. Motorized access is allowed. 2) Area characterized by a predominantly natural or

natural-appearing environment of moderate to large size, with a moderately high probability of experiencing isolation from the sights and sounds of humans, independence, closeness to nature, tranquility, and self-reliance through the application of woodsman and outdoor skills in an environment that offers challenge and risk. Motorized use is permitted.

**roaded natural** - 1) Moderate modification. 2) Area is characterized by a predominantly natural or natural-appearing environment of moderate size. Interaction between users is low, but there is often evidence of other users. The area is managed in such a way that minimum on-site controls and restrictions may be present, but is subtle. Motorized use is permitted, but may be restricted in some areas.

**rural** -1) Heavy modification. 2) Area is characterized by substantially modified natural environment. Resource modification and utilization practices are to enhance specific recreation activities and to maintain vegetative cover and soil. Sights and sounds of humans are readily evident, and the interaction between users is often moderate to high. A considerable number of facilities are designed for use by a large number of people. Facilities are often provided for special activities. Facilities for intensified motorized use and parking are available.

**urban** - 1) High degree of modification. 2) Area is characterized by a substantially urbanized environment, although the background may have natural-appearing elements. Renewable resource modification and utilization practices are to enhance specific recreation activities. Vegetative cover is often exotic and manicured. Sights and sounds of humans, on-site, predominate. Large numbers of users can be expected, both on-site and in nearby areas. Facilities for highly intensified motor use and parking are available with forms of mass transit often available to carry people throughout the site.

ROS is used in two different contexts – either as an inventory tool or a management objective. As an inventory tool, ROS is used to describe the existing array of recreation settings. This application describes the existing recreation opportunities or condition on the Forest and is referred to as the ROS inventory. The second way ROS is used is to describe a set of recreation management objectives or desired future recreation settings, which is referred to as ROS class objectives.

**reforestation** - The restocking of a harvested or poorly stocked forest by either natural or artificial means.

**regeneration** - 1) The renewal of a forest, including the regeneration cut(s) and subsequent reforestation. 2) A young cohort of trees generally in the seedling stage. Obsolete term: reproduction. (See advanced regeneration, artificial regeneration, and reforestation.)

**regeneration method** - A cutting procedure by which a new age class is created; the major methods are clearcutting, seed tree, shelterwood, and selection.

**Regional Forester (RF)** - The official of the USDA Forest Service responsible for administering an entire region of the Forest Service.

**Regional Forester sensitive species (RFSS)** - Those plant and animal species identified by a Regional Forester for which population viability is a concern, as evidenced by (1) significant current or predicted downward trends in population numbers or density; or (2) significant current or predicted downward trends in habitat capability that would reduce a species' existing distribution. Sometimes referred to as a sensitive species.

**rehabilitation** - The process of repairing damage done to the ecosystem or a part of it, such that natural processes will again function in the repaired system. Contrast with restoration.

**residual trees** - The live trees remaining after a natural or artificial disturbance (e.g., a wind event or timber harvest).

**responsible official** - The USDA Forest Service employee who has been delegated the authority to carry out a specific planning action.

**restoration** - The process of modifying an ecosystem to achieve a desired, healthy, and functioning condition. Contrast with rehabilitation.

**revegetation** - The re-establishment and development of a plant cover by either natural or artificial means, such as re-seeding.

between the aquatic and terrestrial ecosystems. The riparian area is delineated by frequently or occasionally flooded soils, as defined by USDA county Soil surveys.

**riparian corridor** - A three-dimensional area of interaction between the aquatic and terrestrial ecosystem. The riparian corridor extends up and down streams and along shorelines, extends laterally up into the terrestrial ecosystem where the land-water interface occurs, and extends from below the water table to the canopy. It includes the riparian area and upland areas within the flood-prone, or 100 feet from the edge of the aquatic ecosystem or wetland, whichever is greater.

**riparian-dependent resources** - Resources that owe their existence to the riparian area.

**roadless area** - National Forest System lands evaluated for potential wilderness that meet one or more of the criteria in FSH 1909.12, Chapter 7.

**rotation** - In silviculture, the number of years required for establishment and growth of trees to a specified condition of maturity, at which point they are harvested. The term rotation applies to even-aged management and does not apply to two-age or uneven-age systems. (See cutting cycle.)

**roundwood** - Logs, bolts, or other round sections cut from trees for industrial manufacture or consumer use. (See sawtimber; poletimber-size.)

**run-off** - The portion of precipitation that flows over the land surface or in open channels.

## S

**sacred site** - Any specific, discrete, narrowly delineated location on federal land that is identified by an Indian tribe or Indian individual determined to be an appropriately authoritative representative of an Indian religion, as sacred by virtue of its established religious significance to, or ceremonial use by, an Indian religion.

**salvage harvest** - The harvest of dead trees or trees being damaged or killed by injurious agents other than competition, to recover economic value that would otherwise be lost.

**sapling** - A tree, at least 1.0 inch dbh, and less than 5.0 inches dbh.

**sawtimber** - Trees that contain at least one 12-foot, or two 8-foot logs that can be made into lumber, that are typically at least 11 inches dbh for hardwood species, and 9 inches dbh for softwood species. Also referred to as large roundwood or saw timber.

**scenery** - General appearance of a place or landscape, and a natural resource of the Forests and composed of existing natural features including vegetation, water, landforms, and geology.

**scenery management system (SMS)** - 1) A system of inventory, analysis, and management of scenery within an ecosystem context. 2) Tool incorporated into Forest Plans to determine the relative value and importance of scenery on National Forest System lands. The process involves classifying landscapes, and setting goals and objectives for maintaining, enhancing, restoring, and monitoring scenic integrity. SMS replaced the Visual Management System (VMS) as defined in Agriculture Handbook #462.

**scenery management** - The art and science of arranging, planning, and designing landscape attributes relative to the appearance of places and expanses in outdoor settings.

**scenic class** - A group of seven classes used in forest planning to rank the relative importance or value of landscape areas with similar characteristics of scenic attractiveness and landscape visibility. A level 1 area has the highest value and Level 7 has the lowest value.

**scenic integrity** -The state of naturalness, or conversely, the state of disturbance created by human activities or alteration. It is a measure of the degree to which a landscape is usually perceived to be “complete”. The degrees of deviation are used to describe the existing scenic integrity, proposed scenic integrity levels, and scenic integrity objectives.

**scenic integrity levels (SIL)** - They are the proposed management objectives that are presented in the alternative development of the Environmental Impact Statement. Usually they are described at the management prescription level. Scenic Integrity Levels (SILs) are defined by minimal acceptable levels or performance standards in each alternative. SILs are Very High, High, Moderate, Low, and Very Low. The SILs define the degrees of acceptable deviation in form, line, color, and texture that may occur at any given time. (Full description in Agricultural Handbook 701).

**scenic integrity objective (SIO)** - Scenic Integrity Objectives (SIOs) guide the amount, degree, intensity, and distribution of management activities needed to achieve desired scenic conditions. They are the management objectives that are adopted through the approval of the Forest Land and Resource Management Plan. Scenic integrity levels (SILs) becomes the objectives (SIOs) when the preferred alternative is selected. (Refer to the Forest's landscape character descriptions for a definition of the valued landscape character for each Management Area.)

**Very High Scenic Integrity:** *Unaltered-* The valued landscape character is intact with only subtle, if any, deviations. The existing landscape character and sense of place is expressed at the highest possible level. (Equivalent to Preservation in VMS)

**High Scenic Integrity:** *Appears unaltered-* The valued landscape character appears intact. Deviations may be present, but are not evident because they repeat the form, line, color, texture, and pattern common to the landscape character so completely and at the appropriate scale. (Equivalent to Retention in VMS)

**Moderate Scenic Integrity:** *Appears slightly altered-* The valued landscape character appears slightly altered. Noticeable deviations must remain visually subordinate to the landscape being viewed. (Equivalent to Partial Retention in VMS)

**Low Scenic Integrity:** *Appears altered-* Deviations from the valued landscape character may begin to dominate the landscape being viewed, but they should borrow valued attributes such as size, shape, edge effect and pattern of natural openings, vegetative type changes, or architectural styles that may occur elsewhere. (Equivalent to Modification in VMS)

**Very Low Scenic Integrity:** *Appears heavily altered-* The valued landscape character appears heavily altered. Deviations may strongly dominate the valued landscape character. They may not borrow from valued attributes such as size, shape, edge effect, pattern and scale of natural openings, vegetative type changes or architectural styles within or outside the landscape being viewed. However deviations should be shaped and blended with the natural terrain (landforms) so that elements such as unnatural edges, roads, landings, and structures do not dominate the composition. This is not a desirable management objective for scenery. (Equivalent to Maximum Modification in VMS)

**Unacceptably Low:** The valued landscape character being viewed appears extremely altered. Deviations are extremely dominant and borrow little if any form, line, color, texture, pattern or scale from the landscape character. Landscapes at this level of integrity need rehabilitation. This level should only be used to inventory existing integrity or for monitoring. It must not be used as a management objective. (Equivalent to Unacceptable Modification in VMS) (Full description available in Agricultural Handbook 701).

**scenic resource** - The composite of basic terrain, geological features, water features, vegetative patterns, and land-use effects that typify a land unit and influence the visual appeal the unit may have for visitors.

**Secretary of the Interior’s Standards for Rehabilitation and Guidelines for Rehabilitating Historic Buildings** - a series of standards developed by the Department of the Interior’s National Park Service addressing the most prevalent preservation treatment today: rehabilitation. Rehabilitation is defined as the process of returning a property to a state of utility, through repair or alteration, which makes possible an efficient contemporary use while preserving those portions and features.

**sediment** - Material, both mineral and organic, that is in suspension, is being transported, or has been moved from its site of origin by water, wind, ice or mass-wasting and has come to rest on the earth's surface.

**seedling** - A tree from the time of emergence from the seed, until it reaches sapling size (1 inch dbh). For silvicultural inventories, only established seedlings are counted. A hardwood seedling is considered established at one foot tall, and a softwood seedling at six inches tall.

**seed-tree** - A residual tree left after harvest as a seed source for the next cohort.

**seed tree regeneration method** - An even-aged regeneration method where all merchantable trees in a stand are removed in a single cut, except for a small number of widely dispersed trees retained for seed production.

**seep** - A wet area where a seasonal high water table intersects with the ground surface.

**sensitive species** – see Regional Forester’s sensitive species

**shelterwood** - 1) An even-aged regeneration method involving the cutting of most trees, leaving those needed to produce sufficient shade to produce an new age class in a moderated microenvironment, 2) residual trees left to provide shade for a new cohort.

**significant heritage resource** - Any such resource that meets the criteria for listing on the National Register of Historic Places.

**significant issue** - In planning, an area of unresolved conflict concerning management of the National Forest.

**silvicultural system** - A management process whereby forests are tended, harvested, and replaced, resulting in a forest of distinctive form.

**silviculture** - The theory, practice, art and science of controlling the establishment, composition, growth, and quality of forest stands and trees, in order to meet management objectives.

**single tree selection** - An uneven-aged regeneration method in which individual trees, or small groups of trees less than one-quarter acre in size, from certain size and age classes are removed across a stand to achieve desired stand structural characteristics. Also referred to as individual tree selection.

**site preparation** - A reforestation activity, normally following a timber harvest, that is designed to control vegetation that could interfere with the establishment of the desired species, or designed to expose mineral soil sufficiently for the establishment of the desired species. Site preparation treatments could include mechanical, manual, chemical, prescribed fire, or a combination of such treatments.

**skid road** - A temporary blade-constructed pathway having a road-like function and appearance, used to drag felled trees or logs to a landing. Several skid trails normally branch off of a skid road.

**skid trail** - A temporary nonstructural pathway used to drag felled trees or logs to a skid road or landing, resulting in some ground disturbance. One or more skid trails normally connect to a skid road.

**skidding** - The movement of logs by dragging from stump to a log landing.

**slash** - The residue left on the ground after timber cutting or resulting from a storm, fire, or other natural event. Slash includes unused logs, uprooted stumps, broken or uprooted boles, branches, bark and other material.

**slope stability** - The susceptibility of a slope to erosion and landslides.

**Slow-the-Spread** - A strategy developed to slow the expansion of insects and/or diseases from the generally infested area.

**snag** - A standing dead tree or a live tree with less than 10% crown.

**soil compaction** - A reduction of soil volume, which results in alteration of soil chemical, physical and biological properties and qualities.

**soil productivity** - The potential capability of a soil to supply the physical, chemical, and biological needs of plants over the long-term, as influenced by climate, parent materials, topographic on the landscape (including aspect), and land use history.

**soil survey** - The systematic examination, description, classification, and mapping of soils in an area.

**soil texture** - The relative proportions of sand, silt and clay in a soil.

**special forest products** - Includes edibles (e. g. mushrooms); medicinals (e.g. ginseng and St. John’s Wort); floral products (e. g. moss, grape vines and ferns); and specialty wood products (e.g. carvings and containers) removed from NFS lands for personal or commercial use.

**special use authorization** - A permit, term permit, temporary permit, lease, easement, or other written instrument that grants rights of privileges of occupancy and use subject to specified terms and conditions on National Forest System land.

**Spectrum** - A computer-modeling tool to address ecosystem management issues. It models alternative resource management scenarios applied to landscapes through time in support of strategic and tactical planning. This includes scheduling vegetation manipulation activities to achieve ecosystem management objectives; modeling resource effects and interactions within management scenarios; and exploring tradeoffs between alternative management scenarios in support of decisionmaking.

**spring** - A water source located where water begins to flow from the ground due to the intersection of the water table with the ground surface. Springs generally flow throughout the year.

**stage construction** - For analysis purposes, stage construction is used to address specific road segments of concern (i.e., stream crossings) during construction of a road project. The intent being is to require construction of a particular road segment of concern (potentially of high risk for environmental damages) as fully designed prior to proceeding further, so as to protect sensitive resources (e.g., water quality, aquatic habitats, and slope stability). This is in contrast to the more traditional definition commonly used to mean, “Construct to a lower standard initially, but returning at a later time to rise to a higher standard of construction.” For example, a road would be initially constructed without gravel surfacing, with application of gravel surfacing planned for the following year.

**stand** - 1) In silviculture, a contiguous group of trees sufficiently uniform in age-class distribution, composition, and structure, and growing on a site of sufficiently uniform quality, to be a distinguishable unit. 2) In ecology, a contiguous group of similar plants.

**stand improvement** - An intermediate treatment, not involving timber harvest, made to improve the composition, structure, condition, health, and growth of stands. Formerly known as timber stand improvement or wildlife stand improvement.

**standard** - Requirement found in a Forest Plan, which govern actions taken to meet objectives. Standards often preclude or impose limitations on management activities or resource uses, generally for environmental protection or public safety. Standards are mandatory, and deviation from a standard requires a Forest Plan amendment.

**stocking** - 1) In silviculture, an indication of growing-space occupancy of live trees relative to a pre-established standard. Common indices of stocking are based on percent occupancy, basal area, relative density, stand density index, and crown competition factor. 2) In wildlife and fisheries management, the intentional and deliberate placement of a species in a specific location.

**structure** - In ecology, the horizontal and vertical arrangement of ecological components. A study of an area's structure might reveal a mosaic of vegetation. In geology, one of the larger features of a rock mass, like bedding, flow banding, jointing, cleavage, and brecciation; also the sum total of such features.

**succession** - The natural replacement, in time, of one plant community with another. Conditions of the prior plant community (or successional stage) create conditions that are favorable for the establishment of the next stage.

**suitable for timber production** - Forest land where timber is produced on a scheduled basis. (See unsuitable for timber production; timberland.)

**suitability** - The appropriateness of the application of certain resource management practices to a particular area of land, as determined by an analysis of the economic and environmental consequences and the alternative uses foregone. A unit of land may be suitable for a variety of individual or combined management practices. For example, in this document, each prescription area has been identified as suitable or not suitable for timber production and management reflects the designation.

**suppression (gypsy moth)** - Reduction of gypsy moth populations in heavily infested areas.

**sustainability** - The ability of an ecosystem to maintain ecological processes and functions, biological diversity, and productivity over time.

**sustained yield** - The yield that a renewable resource can produce continuously at a given intensity of management.

## T

**take** - An Endangered Species Act term that means to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect a listed species or attempt to engage in any such conduct.

**thinning** - An intermediate treatment or harvest made to reduce tree density, primarily to improve growth, enhance forest health, or recover potential mortality. See non-commercial thinning, precommercial thinning.

**Threatened, and endangered species (T&E)** - A plant or animal species likely to become endangered throughout all or a specific portion of their range within the foreseeable future, as designated by the Secretary of the Interior or the Secretary of Commerce under the Endangered Species Act of 1973.

**Threatened, endangered, and sensitive species (TES)** – Combined list of threatened and endangered species and Regional Forester’s sensitive species.

**timber** - Trees or wooded land regarded as a source of wood; a renewable natural resource.

**timber harvest** - The sum of activities making up a logging operation, including the felling, skidding, decking, loading, and hauling of timber products from the sale area.

**timber management** - A broad term that includes all of the silvicultural and technical aspects of forestry related to timber production.

**timber production** - The purposeful growing, tending, harvesting, and regeneration of regulated crops of trees to be cut into logs, bolts, or other round sections for industrial or consumer use. Timber production does not include the production of fuelwood. Also referred to as wood fiber production.

**timber products** - Logs, bolts, or other round sections available for industrial or consumer use (roundwood), or secondary products produced from roundwood, such as lumber. (See roundwood.)

**timber sale** - A process that is initiated by a management decision to implement a silvicultural prescription for a timber harvest. The process includes the sale area layout, designation of the timber that is to be harvested, timber appraisal, advertisement, bidding, award of sale, implementation of the timber harvest, and the closing of the sale.

**timber stand improvement (TSI)** - Obsolete term. (See stand improvement.)

**traditional cultural property** - A property that is associated with cultural practices or beliefs or a living community that (1) are rooted in that community's history, and (2) are important in maintaining the continuing cultural identity of the community.

**travel route or travelway** - An established road or trail designed primarily as a means of access to an area.

**tree** - A woody perennial plant, typically large or capable of becoming large, with a well-defined stem or stems carrying a more or less definite crown. The USDA Forest Service identifies certain species as capable of becoming trees.

## U

**Underground Railroad** - The historic effort to assist persons held in bondage in North America to escape from slavery.

**understory** - The trees and other vegetation growing under a more or less continuous cover of branches and foliage known as the overstory.

**undertaking** - Any project, activity, or program that can result in changes in the character or use of any historic properties located in the area of potential effects (36 CFR 800.2). The project, activity, or program must be under the direct or indirect jurisdiction of a federal agency or licensed or assisted by a federal agency.

**uneven-aged management** - See uneven-aged silvicultural system.

**uneven-aged silvicultural system** - A planned sequence of treatments designed to maintain and regenerate a stand with three or more age classes- singly, in small groups, or in strips. (Also known as uneven-aged management.)

**unsuitable for timber production** - Forest land that is not managed for timber production. On the WNF, lands unsuitable for timber production may be further divided into two subcategories: lands where tree cutting, tree removal, or timber harvest may occur on an unscheduled basis to attain desired future conditions; or lands where timber harvest is not allowed. Determinations for suitability are based on the criteria in paragraphs (a) through (d) of 36 CFR 219.14. See suitable for timber production.

## V

**vegetation management** - Any activity that is designed primarily to alter or modify vegetation to meet desired conditions on land or water having vegetation cover.

**viability** - The tendency of a species to remain at population levels sufficient to assure its continued existence on the landscape, expressed as a likelihood of achievement.

**viable population** - A population that has the estimated numbers and distribution of reproductive individuals to insure that its continued existence is well distributed in the planning area.

**viewshed** - The total visible area from a single observer's position or from multiple observer positions. Viewsheds are accumulated seen-areas as travel routes or corridors, use areas, or water bodies.

**vista** - A confined view, especially one seen through a long passage, as between rows of trees or down a valley. A vista often focuses upon a specific feature in the landscape. Vistas are generally created/designed by humans for the specific purpose of viewing a unique feature in the landscape

**Visual Management System (VMS)** - The planning and design of visual aspects of multi-use land management. This system was replaced by the Scenery Management System.

**visual quality objective (VQO)** - An obsolete term used in scenery management to identify a set of measurable goals for the management of forest visual resources.

## W

**watershed** - 1) In general, the entire region drained by a waterway into a lake or reservoir. 2) More specifically, the land above a given point that contributes water to the stream flow at that point.

**wetland** - Area that is inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances does support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include, for example, swamps, marshes, bogs and similar areas.

**wild and scenic river (W&SR)** - A river, or river section, designated under the Wild and Scenic Rivers Act of 1964. A river can be classified under the following three categories:

**wild river** - Free of impoundments and generally inaccessible except by trail, and within watersheds or shorelines that are essentially primitive.

**scenic river** - Free of impoundments but accessible by roads, and within watersheds or shorelines that are still largely primitive and undeveloped..

**recreational river** – Readily accessible by roads, with some development along their shorelines and may have undergone some impoundment or diversion in the past.

**wilderness** - A Congressionally designated area that is essentially unaltered and undisturbed by humans. Management of this area preserves and protects its physical and biological characteristics.

**wildfire** - Now an obsolete term for a fire type, an unwanted wildland fire, or more specifically, a fire occurring on wildland that is not meeting management objectives and thus requires a suppression response. Wildfires can be ignited by humans or by natural events such as lightning. The term wildfire exists for use in promoting fire prevention.

**wildland fire** - Any non-structure fire, other than prescribed fire, that occurs in the wildland. The term encompasses fires previously identified as “wildfires,” which required a suppression response, and “prescribed natural fires,” which were used to meet resource objectives. Both of these terms are now considered obsolete and the appropriate response by fire personnel to “a wildland fire” cannot be discerned without additional information.

**wildland/urban interface** - The line, area, or zone where structures and other human development meet or intermingle with flammable natural fuels, such as leaf litter or logging slash.

**wildlife habitat diversity** - The number and variety of habitat types present in an area and their spatial distribution.

**wildlife-associated recreation** - Recreation closely associated with one or more plant or animal species. Wildlife-associated recreation is often divided into consumptive use or non-consumptive use of the resource (for example, hunting, fishing, collection of medicinal plants versus wildlife watching). See consumptive use and nonconsumptive use.

## X

**Xeric species** – Refers to plant species adapted to very dry soil conditions. Under these conditions, soil moisture is predictably inadequate for plant growth during the growing season.

## Y

## Z

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## Acronyms

### A

- ABB:** American Burying Beetle
- ACSI:** Appalachian Clean Streams Initiative
- AIM:** abandoned and inactive mine land inventory
- APD:** Application for Permit to Drill
- AMS:** Analysis of the management situation
- AQI:** Air Quality Index
- ASQ:** allowable sale quantity
- ARPA:** Archeological Resources Protection Act
- ATV:** All terrain vehicles

### B

- BA:** basal area; Biological Assessment
- BE:** Biological Evaluation
- BEA:** Bureau of Economic Analysis
- BEIG:** Built Environment Image Guide
- BF:** board foot
- BLM:** United States Bureau of Land Management
- BMP:** Best Management Practices
- BO:** Biological Opinion
- BP:** before present

### C

- CA:** candidate areas
- CBM:** coal bed methane
- ccf:** hundred cubic feet
- CE:** categorical exclusion

**CEQ:** Council on Environmental Quality

**cf:** cubic feet

**CFR:** Code of Federal Regulations

**CISC:** Continuous Inventory of Stand Condition

**CNEPA:** Comprehensive National Energy Policy Act

**CSU:** Controlled Surface Use

**CUA:** Concentrated use area

**CWA:** Clean Water Act

## **D**

**dbh:** diameter at breast height

**DCF:** Diverse Continuous Forest

**DCFO:** Diverse Continuous Forest with Off-Highway-Vehicles

**DEIS:** Draft Environmental Impact Statement

**DFC:** desired future condition

**DR:** District Ranger or Developed Recreation

## **E**

**EA:** Environmental Assessment

**EIS:** Environmental Impact Statement

**EPA:** Environmental Protection Agency

**ESA:** Endangered Species Act

**EWAP:** East-wide Watershed Assessment Protocol

## **F**

**FAI:** forest area of influence

**FDR:** Forest Development Road

**FEIS:** Final Environmental Impact Statement

**FFIS:** Foundation Financial Information System

**FIA:** Forest Inventory and Analysis

**FLT:** Forest Leadership Team

**FMO:** Fire Management Officer

**FMP:** Fire Management Plan

**FMT:** Forest management team

**FOF:** Future Old Forest

**FOFM:** Future Old Forest with Mineral Activity

**FONSI:** Finding of No Significant Impact

**FRCC:** Fire Regime Condition Class

**FS:** Forest Service

**FSH:** Forest Service Handbook

**FSM:** Forest Service Manual or Forest and Shrubland Mosaic

**FSMO:** Forest and Shrubland Mosaic with Off-Highway-Vehicles

## **G**

**GFM:** Grassland and Forest Mosaic

**GIS:** Geographic Information System

## **H**

**HABS:** Historic American Buildings Survey

**HAER:** Historic American Engineering Record

**HF:** Historic Forest

**HFO:** Historic Forest with Off-Highway-Vehicles

**HUC:** Hydrologic Unit Code

## **I**

**I&DC:** Insect and Disease Control

**ICO's:** issues, concerns, and opportunities

**ID:** interdisciplinary

**IDT:** interdisciplinary team

**IMPLAN:** Impact Analysis for Planning

**INFRA:** Forest Service “Infrastructure” Application

**IPM:** integrated pest management

## **K**

## **L**

**LAC:** Limits of acceptable change

**LBA:** lease by application

**LEIMARS:** Law Enforcement Information and Reporting System

**LEO:** Law Enforcement Officer

**LMP:** Land Management Planning

**LN:** Lease Notice

**LRMP:** Land and Resource Management Plan

## **M**

**MA:** Management Area

**MAI:** mean annual increment

**M&E:** monitoring and evaluation

**MBF:** thousand board feet

**MCF:** thousand cubic feet

**MCFGPD:** thousand cubic feet of gas per day

**MCRP:** Monday Creek Restoration Project

**MIS:** Management Indicator Species

**MMBF:** million board feet

**MMCF:** million cubic feet

**MOU:** Memorandum of Understanding

**MSDS:** Material Safety Data Sheets

## **N**

**NAA:** Not Administratively Available

**NAAQS:** National Ambient Air Quality Standard

**NAGPRA:** Native American Grave Protection and Repatriation Act

**NEPA:** National Environmental Policy Act

**NF:** National Forest

**NFC:** Need for Change

**NFMA:** National Forest Management Act

**NFS:** National Forest System

**NFSI:** National Forest System Inventory

**NFSR:** National Forest System roads

**NHPA:** National Historic Preservation Act

**NNIS:** Non-native invasive species

**NOI:** Notice of Intent

**NRHP:** National Register of Historic Places

**NRIS:** Natural Resource Inventory System

**NSO:** No-Surface-Occupancy

**NTFP:** Non-timber forest products

**NTL:** Notice to Lessees

**NVUM:** National Visitor Use Monitoring

## **O**

**ODNR:** Ohio Department of Natural Resources

**OHM:** off-highway motor vehicle

**OHPO:** Ohio Historic preservation Office

**OHV:** off-highway vehicle

**ORV:** off-road vehicle; outstandingly remarkable values

**OSM:** Office of Surface Mining

## **P**

**PAI:** Periodic annual increment

**PAO:** Public Affairs Officer

**PAOT:** Persons-at-one-time

**PIF:** Partners-in-Flight

**PILT:** Payment in Lieu of Taxes

**PIT:** Passport in Time

**PNF:** prescribed natural fire

**PNV:** present net value

**PSI:** Pounds per square inch

## **Q**

## **R**

**RARE II:** Roadless Area Review and Evaluation

**RC:** River Corridors

**RD:** Ranger District

**RF:** Regional Forester

**RFDS:** Reasonable Foreseeable Development Scenario

**RFSS:** Regional Forester Sensitive Species

**RNA:** Research Natural Area

**RO:** Regional Office

**ROD:** Record of Decision

**ROS:** Recreation Opportunity Spectrum

**ROW:** Right-of-way

**RPA:** Resource Planning Act

**RV:** recreation vehicle

**RVD:** Recreation visitor day

## **S**

**SA:** Special Areas

**SCORP:** State Comprehensive Outdoor Recreation Plan

**SHPO:** State Historic Preservation Offices  
**SIC:** Standard Industrial Code  
**SIL:** Scenic integrity levels  
**SIO:** Scenic Integrity Objective  
**SMS:** Scenery Management System  
**SMCRA:** Surface Mining Control and Reclamation Act  
**SO:** Supervisor's Office  
**SO<sub>2</sub>:** sulfur dioxide  
**SPM:** Semi-primitive Motorized  
**SPNM:** Semi-primitive Non-motorized  
**STARS:** Sale Tracking and Reporting System  
**SUPO:** Surface Use Plan of Operation  
**S & Gs:** standards and guidelines

## **T**

**tcfg:** trillion cubic feet of gas  
**TES:** Threatened, Endangered, and Sensitive Species  
**TL:** Timing Limitation Stipulation  
**TNC:** The Nature Conservancy  
**TRL:** Timbre Ridge Lake  
**TSI:** timber stand improvement

## **U**

**USACE:** United States Army Corp of Engineers  
**USDA:** United States Department of Agriculture  
**USDI:** United States Department of Interior  
**USFS:** United States Forest Service  
**USGS:** United States Geological Service  
**USFWS:** United States Fish and Wildlife Service

**UTM:** Universal Transverse Mercator system

**V**

**VMS:** Visual Management System

**VQO:** visual quality objective

**W**

**W&SR:** Wild and Scenic River

**WNF:** Wayne National Forest

**WO:** Washington Office, Office of the Chief of the Forest Service in Washington, D.C.

**X**

**Y**

**Z**

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## Appendix B

# Proposed/Probable Practices; Goods to be Produced

## Introduction

This appendix presents an estimate of the goods and services to be provided by implementation of the 2006 Forest Plan. Proposed (decade 1) and probable (decade 2) management practices and other information, including land classification, are also included in this appendix.

These estimated outputs, as well as proposed and probable management practices, are based on available inventory data. Some estimates are based on computer modeling. (NOTE: The outputs and amounts listed below are estimates and are subject to annual budgets for funding the various resource programs on the Forest. Actual amounts may vary from these and will be monitored.)

## Land Classification

Lands identified as suitable for timber production include producing timber as part of multiple use direction. These are lands that contribute to the timber sale program on a regularly scheduled basis. Table B - 1 shows how acres of these lands compare to the total acreage of NFS land administered by the Wayne National Forest.

**Table B - 1. Acres of Land Suitable for Timber Management.**

Classification	Acres
Total National Forest System land	238,053
Non-forest and water	8,679
Administratively withdrawn from timber production (Research Natural Areas, Special Areas and Candidate Areas)	8,644
Land not physically suited for timber production (low site index, regeneration not assured, etc.)	1,277
Inadequate inventory information (new acquisitions and incomplete inventory)	13,194
Land not appropriate for timber production due to other resource management (riparian areas, Developed Recreation, Timbre Ridge Lake, Future Old Forest, Future Old Forest with Mineral Activity, other unique areas, etc.)	44,507
Land suitable for timber management	161,752

## Allowable Sale Quantity (ASQ)

The allowable sale quantity of timber (ASQ) is the maximum amount of volume that may be offered and sold during a given decade of Forest Plan implementation from land identified as suitable for timber management. The amount of timber that may be sold annually may exceed 1/10 of the ASQ as long as the decadal ASQ is not exceeded.

Table B - 2 shows the volume of timber in million board feet (MMBF) that can be harvested in each decade on a long term, sustained yield capacity. In the first decade the ASQ is 83 MMBF or 14 million cubic feet (MMCF). In the second decade the ASQ is 88 MMBF or 15 million cubic feet (MMCF).

**Table B - 2. Allowable Sale Quantity, Decades 1 through 5**

Decade	MMBF	MMCF
1	83	14
2	88	15
3	148	25
4	148	25
5	148	25

## Estimated Average Annual Volume of Sawtimber and Pulp Produced – Decades 1 and 2

**Table B - 3. Estimated Average Annual Volume of Sawtimber and Pulp, Decades 1 and 2.**

	Decade 1	Decade 2
Sawtimber (average mmbf/year)	5.2	5.5
Pulp (average mmbf/year)*	3.1	3.3

\* Volume is shown in mmbf for comparison purposes. 2,000 pulp cords = 1 mmbf

## Estimated Management Practices for First and Second Decades

Table B - 4 lists the estimated acreage of silvicultural practices that would be used to work toward the wildlife habitat and other multiple-use desired conditions and objectives of the 2006 Forest Plan. The table displays the amount of each harvest treatment for the first and second decades of plan implementation based upon modeling. Actual treatments during plan implementation may vary from these modeled outputs. Even aged regeneration harvests set the tree stand back to age zero, meeting the 0-9 year old age class objective. As the name implies uneven-age treatments are intended to create and maintain an uneven-aged condition.

**Table B - 4. Estimated Management Practices, First and Second Decade.**

<b>Estimates of Management Practices*</b>	<b>First Decade Acres</b>	<b>Second Decade Acres</b>
Even-Aged Hardwood Regeneration Harvest	Up to 1,725	Up to 1,957
Even-Aged Pine Regeneration Harvest	Up to 200	Up to 300
Thinning	Up to 1,460	Up to 2,074
Uneven-Aged Harvest	Up to 14,556	Up to 14,780
Total harvest	Up to 17,941	Up to 19,111

\* All scheduled harvest planned in management areas: DCF, DCFO, FSM, GFM, HF, or HFO

Uneven-Aged treatment acres includes Historic Forest management prescriptions.

## Estimated Practices (Forest wide) – Decade 1

Table B - 5 lists other Forest management activities that are proposed to work toward the desired conditions and objectives during the first 10 years of plan implementation.

**Table B - 5. Estimated Practices (Forest-wide), Decade 1.**

Activity or Practice	Unit of Measure	Estimated Amount for First Decade
Control of non-native invasive species	acres	Up to 1,900
Prescribed fire to encourage oak regeneration (some of these acres are double counted since they may be burned more than once in the decade)	aces	Up to 46,215
Herbicide use for oak regeneration (treatment of individual stumps of maple and beech to prevent stump sprouting.)	acres	Up to 10,994
Wildlife openings maintained (some of these acres are counted more than once since they may be maintained every other, or every third year.)	acres	Up to 6,500
Development of new wildlife openings	acres	Up to 500
Restoration & Improvement of Aquatic/Riparian Habitat – Ponds and Lakes (some of these acres are counted more than once since they may have more than one restoration treatment in the decade)	acres	Up to 150
Restoration & Improvement of Aquatic/Riparian Habitat – Streams	miles	Up to 20
Reduction of Hazardous Fuels -Prescribed Fire	acres	Up to 21,904
Reduction of Hazardous Fuels –Mechanical	acres	Up to 10,181
Wetland Restoration and Enhancement	acres	Up to 150
Treatment of Acid Mine Drainage	acres	Up to 522
ORV Trails Construction (miles in addition to existing miles of ORV trail available)	miles	50 to 124
Hiking Trail Construction (miles in addition to existing miles of hiking trail available)	miles	Up to 30
Horse Trail Construction (miles in addition to existing miles of horse trail available)	miles	Up to 50
Mountain Bike Trail Construction (miles in addition to existing miles of mountain bike trail available)	miles	Up to 30
Potential NFS land affected by Private Surface Coal Mining Activities	acres	Up to 1,250
Oil and Gas well development	wells	Up to 234
Reclamation of depleted or Orphan wells	wells	Up to 128
Temporary Roads Construction	miles	Up to 50
Permanent Roads Constructed	miles	Up to 24
Permanent Road Reconstruction	miles	Up to 103
Roads Decommissioned	miles	Up to 10

## Appendix C

# Management Indicators

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## Management Indicator Species

National Forest Management Act regulations direct the Forest Service to select and track species that are of special interest or indicative of management trends. These are called management indicator species.

Eight bird species, in combination with three forest community types or habitats, were selected as management indicators (Table C - 1). This approach is consistent with 36 CFR 219.14(f). Emphasis was placed on selecting those management indicators that:

- Guided the development of the alternatives for the Revised Forest Plan
- Possess credible monitoring protocols
- Can be effectively and efficiently monitored.

By selecting a limited, but appropriate, set of management indicator species/habitats, resources for inventory and monitoring activity can be focused where needed.

Management indicator monitoring methods should account for situations where population trends of migratory or resident bird populations may respond not only to habitat management activities conducted on the WNF, but also to winter range conditions outside the Forest, weather or climate conditions, hunting pressure, disease, or cyclical phenomena. Because methodologies to determine population numbers and/or estimate trends vary by species, conclusions that relate management indicator species population trends to habitat conditions are also reached through a variety of methods. These include:

- Population trends can be determined through the use of 100-percent population counts or can be estimated through the use of population sampling designed to estimate actual population numbers. Although rarely used, 100-percent population counts can be feasible for some species, such as for populations in very restricted geographic areas. These are the most intensive and rigorous methods, usually reserved for some federally-listed species or some high risk globally-imperiled species selected as management indicators.

- Population trends can be estimated through the use of population indices. Indices are not estimates of actual population numbers, but are aimed at reflecting population trends or relative abundance for a species. Properly designed population indices are a well accepted method for assessing populations for many taxa. Examples could include state hunting/fishing information, track counts, and bird point counts. Population indices are commonly used in natural resource management.
- Population trends can be estimated using population occurrence data. This approach would be appropriate for a management indicator where the risk to local or broad extirpations is low to moderate (i.e., the cost of making a management decision that would adversely affect the species is low to moderate) and there is high correlation and understanding for a management indicator and its associated habitat(s) (i.e., there is a high likelihood the conclusions regarding population trends would be correct).
- When population data is not available, population trends may be inferred using species-habitat relationships information. This approach involves inferring population trends from trends in amount and condition of habitat over time, based on known relationships between species and habitat.

Site-specific monitoring or surveying of a proposed project or activity area is not required by the NFMA regulations. At the project-level, habitat analysis will be conducted to determine the effects, including cumulative effects, for each alternative on each management indicator selected for the project. The effects to management indicators for the project are put into perspective by discussing forest-wide management indicator species/habitat conditions and trends.

**Table C - 1. Management indicator species for the Forest Plan and the rationale for selection.**

Management Indicator	Habitat	North American Landbird Conservation Plan Ranking*	Rationale for Selection
Oak-hickory Forest	Forest stands dominated by oak and hickory species	N/A	Oak and hickory are considered keystone species in the central hardwood region. A number of species are dependent upon mast production, highly diverse herb layer, bark characteristics, and other structural characteristics of oak and hickory species.
Native Pine Forest	Forest stands dominated or partially comprised of one or more native pine species	N/A	Native pine forest was selected to supplement monitoring efforts of our management activities. Native pine occurs on only a small percentage of the WNF, but provides habitat for certain species.
Early Successional Forest	Forest stands less than 20 years of age	N/A	Approximately 35% of the terrestrial vertebrate species known to occur on the WNF use early successional forest habitat during some part of their life cycle. The herbaceous plants and shrubs provide dense cover that is necessary for predator avoidance, and they produce a variety of soft mast that is nutritionally important. This habitat component has declined significantly over time on the WNF and in the eastern U. S., and is recognized as a conservation issue in the North American Landbird Conservation Plan.
Pine Warbler	Mature pine and pine hardwood communities	Stewardship Species	The pine warbler relies upon pine habitat for breeding. Pine and mixed pine-hardwood comprises only a minor component of the WNF, yet there are some species that feed, hide or breed in these forest stands.
Pileated Woodpecker	Mature to overmature hardwood forest with snags and coarse woody debris on the forest floor	None	The pileated woodpecker is a primary cavity excavator that relies on the availability of dead and dying trees. Dead and dying trees in a forest community are important for many other species, including the Indiana bat. Many species that rely on dead and dying trees are considered cavity-dependant, and are secretive in nature and difficult to monitor. The pileated woodpecker is relatively easy to monitor because of its size, appearance, and vocalizations.
Cerulean Warbler	Mature interior hardwood forest with a heterogeneous canopy	Watch List Species	The needs of the cerulean warbler were considered in the development of the DCF, DCFO, HF, and HFO management areas. It requires large tracts of interior forest. It is a canopy nester that is generally associated with uplands and oak-hickory forest on the WNF with gaps in the canopy and taller trees exposed above the canopy.
Worm-eating Warbler	Mature interior hardwood or pine-hardwood forest on hillsides with a dense understory and coarse woody debris on the forest floor	Watch List Species	The needs of the worm-eating warbler were considered in the development of the DCF and DCFO management areas. It requires large tracts of interior forest, is a ground nester that favors mesic areas and ravines on the WNF, but depends on disturbance to create dense understory conditions.
Louisiana Waterthrush	Mature riparian forest corridors along headwater streams; healthy aquatic habitat	Stewardship Species	Louisiana waterthrush is sensitive to declining stream quality and loss of riparian forest. It was selected as a management indicator species because taxonomic experts involved in our species viability evaluations indicated this species could reflect stream quality because it relies on aquatic invertebrates for food, and thus may also be an indicator of riparian forest condition. It is an early ground nester, often initiating nesting in March.
Ruffed Grouse	Mosaic of early-, mid-, and, late-successional forest	None	The ruffed grouse is of great interest to hunters. The needs of the ruffed grouse were considered in the development of the FSM and FSMO management areas. Many species rely on oak-hickory forest during some aspect of their life cycle, and ruffed grouse in the Appalachian states exemplify this in that its population trends may be correlated to oak mast production. It is a species that not only relies on early successional forest for brood rearing; it needs mid and late successional oak forest located near early successional forest for food and cover during part of the year.

Management Indicator	Habitat	North American Landbird Conservation Plan Ranking*	Rationale for Selection
Yellow-breasted Chat	Early successional forest habitat	None	The needs of the yellow-breasted chat were considered in the development of the FSM, FSMO, and GFM management areas. It is an area-sensitive shrub-nesting species, meaning it needs larger tracts of early successional forest habitat to reproduce. Managing for shrub nesting birds often is compatible with actions to conserve American woodcock and other game species.
Henslow's Sparrow	Extensive grasslands	Watch List Species	The needs of the Henslow's sparrow were considered in the development of the GFM Management Area. It is area-sensitive and is considered a grassland obligate species. Grassland habitat did not naturally occur within the WNF, but it occurs now as a result of past surface mining.

\* Rich, T. D., C. J. Beardmore, H. Berlanga, P. J. Blancher, M. S. W. Bradstreet, G. S. Butcher, D. W. Demarest, E. H. Dunn, W. C. Hunter, E. E. Iñigo-Elias, J. A. Kennedy, A. M. Martell, A. O. Panjabi, D. N. Pashley, K. V. Rosenberg, C. M. Rustay, J. S. Wendt, and T. C. Will. 2004. Partners in Flight North American Landbird Conservation Plan. Cornell Lab of Ornithology. Ithaca, NY. 84 p.

## Appendix D

# Federally Listed Species/ Regional Forester Sensitive Species

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## Conservation Plan for Federally Listed Species

The Forest Service is committed to conserving, protecting, and maintaining habitat for Federally listed species. As a Federal agency, it has defined responsibilities in supporting recovery objectives for Federally listed species. Populations of these species will receive individualized attention. Management activities that may affect Federally listed species occur in consultation with the U.S. Fish and Wildlife Service (USFWS). If additional species that occur on the Wayne National Forest become listed, we will consult with the USFWS as appropriate (50 CFR 402.16).

A major purpose of the WNF's 2006 Forest Plan is fulfillment of the Forest's obligations under the Endangered Species Act, Section 7(a)(1), to conserve Federally listed species. Section 7(a)(1) of the Act mandates Federal agencies to take a proactive approach in the conserving of endangered species:

“All other Federal agencies shall, in consultation with and with the assistance of the Secretary, utilize their authorities in furtherance of the purposes of this Act, by carrying out programs for the conservation of endangered species and threatened species pursuant to Section 4 of this Act.”

The foundation of the Conservation Plan is the allocation of NFS lands into management areas that contain the ecological conditions needed by particular species. These management area allocations are also intended to conserve the biodiversity that will promote the recovery and maintenance of Federally listed species.

The prescriptions for the Diverse Continuous Forest and Diverse Continuous Forest with OHVs management areas call primarily for the use of uneven-aged vegetation management to create structurally diverse forest stands. The prescriptions for the Historic Forest and Historic Forest with OHVs management areas call primarily for the use of uneven-aged vegetation management combined with prescribed fire to create oak and hickory dominated forest communities with more open conditions. These

management areas were formulated, in part, to provide habitat conditions beneficial for the Indiana bat and American burying beetle.

The River Corridor and Timbre Ridge Lake management areas were developed, in part, with the bald eagle in mind and should provide long-term direct benefits to this species as it expands its range in Ohio. The purpose of the River Corridor Management Area is to retain, restore, and enhance the inherent ecological processes and functions associated with riverine systems on the Forest. The desired future condition of the Timbre Ridge Lake Management Area is excellent water quality in the 100-acre lake where a self-sustaining bass-bluegill fishery is encouraged. A landscape of wooded character surrounds the lake and provides feeding opportunities as well as suitable roosting or nesting habitat for the bald eagle.

Together, these and all other management areas provide well-distributed and diverse habitat for native and desired non-native plants and animals, including Federally listed species.

## Species List

The USFWS has identified nine Federally listed species as occurring on or near the Wayne National Forest:

Species	Status
American burying beetle ( <i>Nicrophorus americanus</i> )	Endangered
Bald eagle ( <i>Haliaeetus leucocephalus</i> )	Threatened
Fanshell ( <i>Cyprogenia stegaria</i> )	Endangered
Indiana bat ( <i>Myotis sodalis</i> )	Endangered
Northern monkshood ( <i>Aconitum noveboracense</i> )	Threatened
Pink mucket pearly mussel ( <i>Lampsilis abrupta</i> )	Endangered
Running buffalo clover ( <i>Trifolium stoloniferum</i> )	Endangered
Small whorled pogonia ( <i>Isotria medeoloides</i> )	Threatened
Virginia spiraea ( <i>Spiraea virginiana</i> )	Threatened

## Conservation Plan Relationship to Other Documents

Section 7(a)(2) of the Endangered Species Act states that Federal agencies shall consult with the USFWS.

“Each Federal agency shall, in consultation with and with the assistance of the Secretary, insure that any action authorized, funded, or carried out by such agency is not likely to jeopardize the continued existence of any endangered species or threatened species or result in the destruction or adverse modification of habitat of such species which is determined by the Secretary, after consultation as appropriate with affected States, to be critical, unless such an agency is granted an exemption for such action by the committee pursuant to subsection (h) of this section. In fulfilling the requirements of this paragraph each agency shall use the best scientific and commercial data available.”

To meet the consultation requirements under Section 7(a)(2) of the act, the Forest Service completed a Programmatic Biological Assessment for the 1988 WNF Land and Resource Management Plan in March 2001. It included a list of management activities with amounts expected to occur by September 2006. The USFWS responded with a Biological Opinion on the 1988 Forest Plan on Sept. 20, 2001.

The Biological Opinion provided non-discretionary, reasonable, and prudent measures as well as terms and conditions that would minimize the potential for incidental take of Federally listed species. It also recommended conservation measures that the WNF could implement to meet its responsibilities under Section 7(a)(1) for the Indiana bat, bald eagle and American burying beetle.

The non-discretionary, reasonable and prudent measures along with the recommended terms and conditions were incorporated into the 1988 Forest Plan (Amendment 13) as Forest-wide goals and standards, respectively. The discretionary conservation recommendations were also incorporated into the 1988 Plan (Amendment 13) as conservation recommendations. During the 2006 Forest Plan revision, these Forest-wide goals and standards, and conservation recommendations were reviewed with the USFWS, and slight modifications were made to incorporate the best available scientific information into the 2006 Forest Plan and to ensure clarity of 2006 Forest Plan direction.

Species-specific recovery plans provide additional guidance to conserve and recover each threatened or endangered species throughout its range. Each recovery plan has been developed by a team of scientists who are considered experts on the affected species. Not all recovery objectives may be applicable to the WNF since it encompasses only a portion of the range of nine endangered and threatened species.

## Format of the Conservation Plan

The Conservation Plan provides managers with a concise package of information about the protection and conservation of Federally listed species that occur on or near the Wayne National Forest. Forest-wide goals, objectives, standards and guidelines directly applicable to the recovery and conservation of listed species that are found in Chapter 2 of the 2006 Forest Plan are summarized in this Conservation Plan. Administrative and educational requirements carried over from the 1988 Forest Plan, as amended, have been included, as have the requirements for monitoring that were identified in the Biological Opinion for the 2006 Forest Plan. This Conservation Plan is arranged into two sections:

- Section I displays direction and guidance that is applicable to all nine Federally listed species.
- Section II outlines the direction and guidance specific for the Indiana bat, bald eagle, American burying beetle, and running buffalo clover. These are species that occur in the WNF, or are likely to be reintroduced to the WNF in the near future.

## Implementation of the Conservation Plan

In order to be exempt from the prohibitions of Section 9 of the Endangered Species Act, the WNF must comply with all standards and guidelines and monitoring outlined in the following sections of this Conservation Plan.

Responsibilities for implementation of the Conservation Plan rest primarily with WNF personnel. Some work, however, will be done cooperatively with the USFWS, Ohio Division of Wildlife, or other conservation partners.

## Conservation Accomplishments

All management accomplishments related to the conservation, protection, and recovery of Federally listed species will be disclosed in the annual WNF monitoring and evaluation report.

## Conservation Direction and Guidance for all Federally Listed Species

### Administrative & Technical Information

Consult with the USFWS to ensure activities planned and implemented on the WNF are in accordance with the Endangered Species Act.

To ensure that the exemption of incidental take is appropriately documented, the USFWS will implement a tiered programmatic consultation approach. As individual projects are proposed under the 2006

Forest Plan, the Forest Service shall provide project-specific information to the USFWS that:

- Describes the proposed action and the specific area to be affected, including latitude and longitude coordinates for the project area
- Identifies the species that may be affected and their known proximity to the project area
- Describes the manner in which the proposed action may affect Federally listed species, and the anticipated effects
- Specifies that the anticipated effects from the proposed action are similar to those anticipated in the programmatic Biological Opinion for the 2006 Forest Plan
- A cumulative total of incidental take that has occurred to date under the Tier I Biological Opinion
- Describes any additional effects, if any, not considered in the Tier I consultation.

The USFWS will review the information for each proposed project. If it is determined that an individual project is not likely to adversely affect listed species, the USFWS will complete its documentation with a concurrence letter that refers to the Biological Opinion for the 2006 Forest Plan (the Tier I programmatic document) and specifies that the agency concurs that the project is not likely to adversely affect listed species. If it is determined that a proposed project is likely to adversely affect listed species, then the USFWS and Forest Service will engage in formal consultation for the project. Formal consultation culminates with the USFWS providing a Tier II Biological Opinion with a project-specific incidental take statement if take is reasonably certain to occur.

Reinitiation of formal consultation is required when (1) the amount or extent of incidental take is exceeded; (2) new information reveals effects of the 2006 Forest Plan that may affect listed species in a manner or extent not considered under the Biological Opinion; (3) the 2006 Forest Plan is modified in a manner that causes an effect to the listed species not considered in the Biological Opinion; or (4) a new species is listed or critical habitat designated that may be affected by the 2006 Forest Plan. In instances where the amount or extent of incidental take is exceeded, any operations causing such take must cease pending reinitiation. The 2006 Forest Plan can be updated as necessary to incorporate new information or results of any reinitiation of formal consultation.

### Protection of Individuals

**Appendix H - Oil & Gas Leasing Notification 3** - For all Federal oil and gas lease projects, the Forest Service is responsible for assuring that the area to be disturbed is examined prior to allowing any surface disturbing

activities on lands covered by this lease type. The examination is to determine effects upon any plant or animal species listed, or proposed for listing, as Federally endangered or threatened and their habitats. If the findings of this examination determine that the operation(s) may have a detrimental effect on a species covered by the Endangered Species Act, the operator's plans may be denied or restrictions added.

The Forest Service has the responsibility to conduct the required examination. In cases where the Forest Service time frames cannot meet the needs of the lessee/operator, the lessee/operator may, at his discretion and cost, conduct the examination on the lands to be disturbed. This examination must be done by or under the supervision of a qualified resource specialist approved by the Forest Service. An acceptable report must be provided to the Forest Service identifying the anticipated effects of the proposed action on Federally endangered and threatened species, or their habitats.

### **Inventory, Analysis and Monitoring**

Coordinate and cooperate with the USFWS and experts from other agencies, universities, and organizations to conserve, protect, recover, and monitor populations and habitats of Federally listed species.

### **Education and Awareness**

Provide training opportunities for employees on the identification, biology, and habitat requirements of Federally listed species along with monitoring techniques.

## **Species-specific Conservation Direction and Guidance**

### **Indiana Bat**

Additional resource management direction and guidance found in the 2006 Forest Plan and should be considered during project planning and implementation, as needed, to promote recovery of this species.

### **Administrative & Technical Information**

Preferred Indiana bat roost trees include the following species: shagbark hickory, shellbark hickory; bitternut hickory; silver maple; green ash; white ash; eastern cottonwood; northern red oak; post oak; white oak; slippery elm; American elm; black locust; pignut hickory; red maple; sugar maple; and black oak. This list of trees is based on review of literature and data on Indiana bat roosting requirements. Other species may be added, as identified.

When identifying existing Indiana bat roosting habitat (SFW-TES-10(a)), the trees that are hollow, have major splits, or have broken tops need to have characteristics that provide maternity habitat for one or more Indiana

bats. In other words, these trees must possess crevices into the hollow area or where the split or broken top occurred for it to provide habitat for this species. Furthermore, trees with broken tops should be 6 inches dbh or greater where the broken top occurs.

Discovery of dead bats of undetermined species on the WNF should be reported immediately to the USFWS - Reynoldsburg Field Office, and the remains transported on ice to that office. The USFWS will make the final species determination of any dead or moribund bats found on the WNF. If an Indiana bat is identified, the USFWS will contact the appropriate USFWS law enforcement office.

No attempt should be made to handle any live bat, regardless of its condition. This does not apply to individuals who are permitted, as agents of the State, to conduct work on Federally listed bat species.

Report bats that appear to be sick or injured to USFWS - Reynoldsburg Field Office.

### Protection of Individuals

**Goal 5.1.1** – Retain or develop Indiana bat roosting and foraging habitat; protect all known Indiana bat hibernacula.

**Objective 5.1.1a** – If additional Indiana bat hibernacula are discovered on NFS land, install bat-friendly gates to prevent unauthorized entry.

**SFW-TES-1** – Deter human access to areas surrounding known hibernacula by closing or relocating trails that lead to, or pass within easy viewing distance of hibernacula.

**SFW-TES-2** – Establish a one-quarter mile buffer around all known hibernacula. Within this one-quarter mile buffer:

- Prohibit new trail and road construction
- Do not conduct prescribed burning during the fall swarming period (generally mid-August to mid-October) or during the hibernation period (September 15th through April 15th)
- Do not permit surface occupancy for exploration or development of Federally owned minerals
- Implement vegetation management only to maintain or improve Indiana bat roosting, swarming, or foraging habitat.

**GFW-TES-3** – Establish a one-quarter mile buffer around all mine openings that are known Indiana bat fall swarming sites, but where actual Indiana bat hibernation has not been established. Reduce or eliminate human disturbances within the buffer. Implement vegetation

management only to maintain or improve Indiana bat roosting, swarming, or foraging habitats.

**SFW-TES-4** – Develop prescribed burning plans that specify weather conditions that would prevent smoke dispersal into known hibernacula.

**SFW-TES-5** – Before backfilling any mine openings, such as portal entrances or subsidence depressions with developed openings, conduct surveys for potential bat presence during the fall swarming period (generally mid-August to mid-October).

**GFW-TES-6** – Conduct pre-gating and post-gating mist net surveys at mines where bat-friendly gates are installed.

**SFW-TES-13** – Prohibit the cutting of standing dead trees for firewood.

**SFW-MIN-10 (and Appendix H, Stipulation 10)** – Within management areas where surface occupancy is generally permitted, apply the No Surface Occupancy stipulation for Federal leases where the following conditions occur:

- Areas within ¼ mile of Indiana bat hibernacula

**Appendix H, Stipulation 12 (Federal oil and gas leases)** – No cutting of snags (trees with less than 10% live canopy), shagbark or shellbark hickories, or trees that are hollow and/or have major splits or broken tops, except during the bat hibernation season (September 15th – April 15th). If such trees are a safety hazard, they may be cut anytime they pose an imminent threat to human safety, but if cut in the non-hibernation season, the Forest biologist must be notified in advance. This stipulation applies only to trees over six inches in diameter.

### Habitat Protection & Improvement

**Goal 5.1.1** – Retain or develop Indiana bat roosting and foraging habitat; protect all known Indiana bat hibernacula.

**Objective 5.1.1a** – If additional Indiana bat hibernacula are discovered on NFS land, install bat-friendly gates to prevent unauthorized entry.

**SFW-TES-7** – When even-aged regeneration methods are used, retain forested flight corridors within and between early successional habitat patches. These flight corridors may include forested corridors along ephemeral, intermittent, and perennial streams; and where present, clumps of snags and trees of varying size classes in the early successional habitat. When present, leave larger-sized trees on the edges of early successional patches for future maternity roosts.

**SFW-TES-8** – Within hardwood cutting units with uneven-aged vegetation management prescriptions, maintain an average of at least 60 percent canopy cover.

**GFW-TES-9** – Retain all shagbark and shellbark hickory trees greater than or equal to 6 inches dbh, unless removal is necessary to protect human safety or to avoid adverse impacts to steep slopes, erodible soils, floodplains or wetlands (e.g., cut a hickory rather than relocating a skid trail onto a steep slope).

**SFW-TES-10** – During the non-hibernation season (April 15<sup>th</sup> – September 15<sup>th</sup>), do not cut, unless they are a safety hazard:

- a. Trees of any species 6 inches dbh or greater that are hollow, have major splits, or have broken tops that provide maternity habitat.
- b. Snags 6 inches dbh or greater that have Indiana bat roost tree characteristics. Consider any tree with less than 10 percent live canopy to be a snag.

When removal of hazard trees is necessary in a recreation area during the non-hibernation season (e.g., developed recreation sites, access roads, trails), conduct emergence surveys at the identified hazard trees that possess the characteristics identified above, and at any hazard trees that possess large areas of loose bark providing maternity habitat.

**SFW-TES-11** – Schedule any summer prescribed burning after August 15<sup>th</sup> to reduce potential effects on Indiana bat reproduction.

**SFW-TES-12** – With all hardwood timber harvests, retain a minimum of 12 live trees per acre (averaged over the cutting unit) of any species that are 6 inches dbh or greater with large areas of loose bark, unless they pose a safety hazard.

In addition to these, retain live preferred roost trees, when present to provide a supply of future roost trees (i.e., large, overmature trees) as shown in the following table. Refer to the Administrative & Technical Information section above for a list of tree species preferred as roost trees by Indiana bats. Consult with the USFWS regarding exceptions that may be needed to minimize adverse effects to other resources or human health and safety.

Indiana Bat Preferred Roost Tree Size Class	Number of live trees to retain (average per acre over the cutting unit)
>20 inches (dbh)	3*
>11 in (dbh and < 20 in (dbh)	6

\*If there are few or no live Indiana bat roost trees > 20 inches dbh in the stand, retain three live trees > 16 inches dbh and < 20 inches dbh per acre (averaged across the cutting unit). If there are no live trees > 16 inches dbh, retain nine additional live trees > 11 inches dbh and < 16 inches dbh per acre (averaged across the cutting unit).

**SFW-TES-13** – Prohibit the cutting of standing dead trees for firewood.

**GFW-TES-14** – Provide water sources that promote aquatic insect production and provide drinking sources for Indiana bats along suitable flight paths, especially in upland areas, and off/away from recreation sites, and designated trails and roads.

**Appendix H, Stipulation 12 (Federal oil and gas leases)** – No cutting of snags (trees with less than 10% live canopy), shagbark or shellbark hickories, or trees that are hollow and/or have major splits or broken tops, except during the bat hibernation season (September 15th – April 15th). If such trees are a safety hazard, they may be cut anytime they pose an imminent threat to human safety, but if cut in the non-hibernation season, the Forest Service biologist must be notified in advance. This stipulation applies only to trees over six inches in diameter.

### Education & Awareness

Provide refresher training to employees, as needed, to ensure proper identification of Indiana bat roosting habitat. Such training should include how to recognize potentially suitable maternity roosts from other non-maternity roost trees.

Provide training to employees on the proper methods for conducting emergence surveys.

### Inventory, Analysis & Monitoring

- a. Emphasis will be placed on collecting information associated with Indiana bat recovery objectives. This may include, but is not limited to, monitoring population trends of known hibernacula; monitoring of microclimate conditions in known hibernacula, and assessing our understanding of Indiana bat winter and summer distributions on the WNF, including any maternity colonies.
- b. Monitor and report annually and evaluate every five years the answers to the following monitoring questions, as required in Chapter 4 of the Forest Plan:
  - i. How many acres of potentially suitable Indiana bat habitat were protected or improved?
  - ii. How many bat-friendly gates were installed on known Indiana bat hibernacula?
- c. The implementing regulations for incidental take require that Federal agencies must report the progress of the action and its impact on the species (50 CFR 402.14(i)). To meet this mandate,

the following will be monitored and reported as follows (from the Biological Opinion):

- i. As projects are proposed, the cumulative total of incidental take that has occurred to date under the Biological Opinion for the 2006 Forest Plan, in addition to project-specific information identified under Conservation Direction and Guidance for all Federally Listed Species (under the Administrative and Technical Information section), will be reported to the USFWS. Incidental take will be monitored using the number of acres/miles in the following table:

Activity	Measure
Permanent Road Construction & Reconstruction	392 acres
Temporary Road Construction	146 acres
Skid Trails and Log Landings	740 acres
Utility Development	50 acres
Fire Lines	74 miles

- ii. On an annual basis, the cumulative acreage of specific management activities implemented under the 2006 Forest Plan will be reported to the USFWS. The anticipated activities and acreages planned for implementation during the first decade of the 2006 Forest Plan are shown in the following table:

Activity	Acreage
Even-aged Hardwood Timber Harvest	1,725
Even-aged Pine Timber Harvest	200
Uneven-aged Timber Harvest	14,556
Thinning	1,460
Crop Tree Release	2,113
Grape Vine Control	2,683
Site Prep for Native Pine	200
Reforestation (planting)	500
Prescribed Fire	
Oak Regeneration	46,215
NNIS	200
Herbaceous Habitat	1,500
Hazardous Fuels	21,904
Herbicide Application	
Oak Regeneration	10,994
NNIS	600
Development of Permanent Forest Openings	500
Maintenance of Permanent Forest Openings and other Herbaceous Habitats (mechanical)	5,000

Activity	Acreage
Control of NNIS	
Mechanical	1,000
Biological	100
Wetland Restoration & Enhancement	150
Waterhole Construction	15
Fishing Pond/Lake Construction	15
Restoration & Improvement of Aquatic/Riparian Habitat	
Lentic	150
Lotic	20 miles
Installation of Bat-friendly Gates	20-30 gates
OHV Trail Construction	150
Hiking Trail Construction	18
Horse Trail Construction	61
Mountain Bike Trail Construction	36
Recreational Facility Construction (including Parking Lots)	60
Temporary Road Construction	146
Permanent Road Construction	74
Permanent Road Reconstruction	318
Road Decommissioning	29
Skid Trails and Landings (outside cutting units only)	740
Surface Coal Mining Activities	1,250
Reclamation of Depleted or Orphan Wells	70 (128 wells)
Oil & Gas Well Development (Federal leases only)	42 (80 wells)
Utility Corridor Development & Maintenance	50
Agricultural Crop Production & Grazing	50
Treatment of Acid Mine Drainage	270
Surface Mine Reclamation	20
Closure of Open Mine Portal/Subsidence	232
Stabilization of Disturbed Areas	100
Reduction of Hazardous Fuels (mechanical)	10,181
Land Acquisition	Up to 40,000
Land Exchange	400

- iii. On an annual basis, a tally of hickory trees that were removed during implementation of management activities to enable the project to proceed without causing adverse effects to other resources important to the Indiana bat (see GFW-TEs-9) will be reported to the USFWS.

## Bald Eagle

Additional resource management direction and guidance found in the 2006 Forest Plan and should be considered during project planning and implementation, as needed, to promote recovery of this species.

### Administrative & Technical Information

By June 1 of each year, provide an annual report to the USFWS and the Ohio Division of Wildlife, which includes the following:

- Results of any winter searches for communal bald eagle night roosts and concentrations, including mid-winter bald eagle surveys conducted in cooperation with the USFWS and the Ohio Division of Wildlife;
- Discovery of any bald eagle nesting territories on the WNF. If no surveys have been conducted and no territories discovered on the WNF during an annual reporting period, an annual report should be submitted with a statement to this effect;
- Documented cases of a prescribed fire that behaved contrary to predicted movement patterns and which resulted in a confirmed adverse impact to bald eagles.

For any prescribed fire that could potentially impact bald eagles, provide the USFWS with the opportunity to review burn plans with the WNF Fire Management Officer prior to the burn plan's approval.

### Protection of Individuals

**Goal 5.1.2** – Protect bald eagle communal night roosts, daytime concentration sites, and occupied breeding territories.

**SFW-TE5-16** – Protect any bald eagle communal night roosts and concentrations (including nests) discovered during winter surveys or during any additional field surveys or proposed project areas, following guidelines outlined in the Northern States Bald Eagle Recovery Plan.

**SFW-TE5-17** – Report discovery of bald eagle nests immediately to the USFWS and the Ohio Department of Natural Resources, Division of Wildlife.

**SFW-TE5-19** – Allow no prescribed fire within one-half mile of occupied bald eagle sites. Consider all bald eagle communal night roosts, daytime concentration sites, or occupied breeding territories as occupied sites. To prevent smoke inversion from occurring at occupied bald eagle sites, and to minimize smoke drifting toward them from prescribed fires outside the one-half mile radius of occupied sites, require burn plans to take into account of wind direction, speed, and mixing height as well as transport winds.

**Appendix H, Stipulation 12** – Protect known nests and roosts as described in the Bald Eagle Recovery Plan, or as directed by the USFWS.

### Habitat Protection & Improvement

**SFW-TES-18** – Protect supercanopy trees, or other identified congregation roost trees, along major river corridors and lakes in addition to following Forest-wide riparian area standards and guidelines.

**Appendix H, Stipulation 12** – Protect all supercanopy trees or other identified congregation roost trees for bald eagles along major river corridors and lakes.

### Education & Awareness

Provide field training for new employees so they will be able to recognize bald eagle signs at night roosts, even when eagles are absent.

### Inventory, Analysis & Monitoring

**Objective 5.1.2a** – Conduct a minimum of three annual winter searches to locate any previously unknown communal night roosts or bald eagle concentrations.

**SFW-TES-15** – Focus winter bald eagle searches in areas that eagles are known to frequent or where concentrated food sources occur near NFS land. Conduct searches during early-, mid-, and late-winter. Follow search criteria outlined in the Northern States Bald Eagle Recovery Plan.

**SFW-TES-20** – If the bald eagle is found nesting on the Wayne National Forest, monitor populations according to the recovery plan. At such time as the bald eagle is de-listed, use the de-listing monitoring plan.

In addition to these Forest-wide objectives and standards, monitor and report annually and evaluate every five years the answers to the following monitoring questions, as required in Chapter 4 of the Forest Plan:

- How many winter bald eagle searches were conducted?
- How many bald eagles were observed?

## American Burying Beetle

Additional resource management direction and guidance found in the 2006 Forest Plan and should be considered during project planning and implementation, as needed, to promote recovery of this species.

### Protection of Individuals

**Goal 5.1.3** – Cooperate in efforts to reintroduce the American burying beetle.

**GFW-TES-21** – Discourage the use of bug zappers by campers in dispersed or developed recreation sites within 10 air miles of known occupied American burying beetle habitat.

**GFW-TES-23** – During the American burying beetle activity period, use bait-away methods prior to and during the implementation of major earth disturbing activities that occur in known occupied American burying beetle habitat.

**GFW-TES-26** – Restrict the use of insecticides within known occupied American burying beetle habitat.

### Habitat Protection & Improvement

**GFW-TES-22** – Limit ground compaction to the minimum area possible during major earth disturbing activities (including, but not limited to new road and trail construction, mineral resource exploration and development, or new facilities) that occur in suitable American burying beetle habitat within 10 air miles of known occupied American burying beetle habitat.

**GFW-TES-24** – In occupied American burying beetle habitat, design new roads with the minimum safe width necessary for planned use of the road.

**GFW-TES-25** – Within 10 air miles of known occupied American burying beetle habitat, keep ground disturbance to a minimum during the reconstruction and maintenance of existing roads. Limit width of road, ditches, and surface materials to the minimum necessary for the planned use.

### Inventory, Analysis & Monitoring

Cooperate in efforts to determine the extent of occupied habitat on the WNF as reintroduction efforts continue on NFS lands and non-Federal lands.

Monitor and report annually and evaluate every five years the answers to the following monitoring question, as required in Chapter 4 of the Forest Plan:

- What cooperative efforts were accomplished to achieve the reintroduction of the American burying beetle?

### Running Buffalo Clover

Additional resource management direction and guidance found in the 2006 Forest Plan and should be considered during project planning and implementation, as needed, to promote recovery of this species.

#### Protection of Individuals

**Goal 5.1.4** – Actively manage known populations of running buffalo clover to maintain appropriate habitat conditions.

**SFW-TES-27** – Implement measures to protect known running buffalo clover populations during prescribed fire activities. These may include, but are not limited to wetting down the occupied area, raking off fuels from the occupied area, or constructing firelines around the occupied area.

**SFW-TES-28** – Avoid mechanical construction of firelines in known occupied RBC habitat. Mechanical fireline construction adjacent to known RBC populations must maintain appropriate light conditions in known occupied habitat.

**GFW-TES-29** – Restrict the application of herbicides within 25 feet of known running buffalo clover populations.

#### Habitat Protection & Improvement

**Objective 5.1.4a** – Maintain partial to filtered sunlight over and adjacent to occupied habitat.

**SFW-TES-30** – Protect and maintain known RBC populations during road and trail construction, reconstruction, and maintenance by locating ground disturbance outside the occupied habitat. The appropriate light conditions must be maintained in the occupied habitat during such activities.

**GFW-TES-31:** Conduct surveys for running buffalo clover in suitable habitat prior to implementing ground or canopy disturbing activities.

#### Education & Awareness

Ensure employees are familiar with locations of known running buffalo clover populations on the WNF.

Conduct annual refresher training on running buffalo clover identification for all field-going employees.

### Inventory, Analysis and Monitoring

**Objective 5.1.4b** – Conduct annual monitoring of known running buffalo clover populations and adjacent areas to identify potential risks or management needs.

Monitor and report annually and evaluate every five years the answers to the following monitoring question, as required in Chapter 4 of the Forest Plan:

- What running buffalo clover population and habitat monitoring efforts were accomplished?

## Regional Forester Sensitive Species

Regional Forester sensitive species are plant and animal species for which population viability is recognized as a concern, as evidenced by a downward trend in population or habitat capability. Regional Forester sensitive species are so designated and considered to be at risk if:

- They are candidates for listing under the Endangered Species Act
- Have been delisted by the USFWS within the last five years
- Have The Nature Conservancy species status ranks of G1-G3, T1-T3, N1-N3
- Are considered to be at risk based upon their State status ranks (S1-S3) and their respective forest risk evaluation.

Species listed as Regional Forester sensitive species must have at least one documented occurrence within the proclamation boundary of a Region 9 National Forest.

The following management direction applies to all management activities on the Wayne National Forest, and is in addition to the Forest-wide goals, objectives, standards and guidelines identified in the Revised Forest Plan.

- Maintain a Regional Forester sensitive species list for the Wayne National Forest following direction in FSM 2670, Region 9 Supplement 2600-2001-1.
- Ensure the public has access to the most current Regional Forester sensitive species list for the WNF.
- Coordinate and cooperate with experts from other agencies, universities and organizations to conserve, protect, and monitor populations and habitats of Regional Forester sensitive species.

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## Appendix E

# Vegetation Management for Oak Ecosystem Maintenance

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## Introduction

This appendix briefly describes the problems of maintaining and perpetuating the mixed oaks on the landscape. It also offers possible solutions, including the most commonly prescribed techniques, and discusses the effectiveness of these treatments.

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## Overview

Oaks are not regenerating where they have been for many years, and other species are taking their place. Oak regeneration problems are not confined to southeast Ohio but are a concern over most of the species range in the eastern United States. Research has found that oak regeneration problems are not related to the decline of the American chestnut or to forest fragmentation (Lorimer, 1992).

### Acorn Production and Predation

Because successful oak regeneration usually depends on the existence of seedlings in the understory before harvest, poor seed crops and high rates of consumption by animals can significantly limit the ability of oaks to compete with other tree species. Unfavorable weather and insect damage can also lead to poor acorn crops. Most eastern upland oak species have good seed crops at intervals of three to five years. Intervals between good seed years in white oak may be longer, but local factors occasionally can contribute to regeneration failures from this cause.

Destruction of acorns by insects, rodents, and deer are an important factor in most areas; the loss of 90 percent of an acorn crop is not unusual. In a recent Pennsylvania study, rodents removed virtually every unprotected acorn on the ground surface and 78 percent of the buried acorns. Insects destroyed 63 percent of the surface acorns protected from rodents. (Lorimer, 1992)

Deer browsing can retard oak regeneration, and the substantial growth of deer populations in many areas around the 1930s coincided with the beginning of widespread oak problems. However, the occurrence of oak regeneration failures in places where deer are not especially numerous has

led a number of researchers to see deer as more of an aggravating, rather than a primary limiting, factor. (Lorimer, 1992)

## Shade Effects

The effect of a shaded forest floor resulting from closed crown canopies and dense understory vegetation is one factor that helps explain the slow growth and high mortality of understory oak seedlings. The growth strategy of oak species directs energy from photosynthesis to promote seedling root growth at the expense of shoot development. Seedlings can develop a substantial taproot, and if an adequate amount of sunlight is available, a seedling can persist for many years despite repeated shoot dieback. When an opening in the crown allows more light into the understory, seedlings with an extensive root system can grow rapidly. (Lorimer, 1992)

Shade-tolerant species such as maples often have an advantage over oaks because they can grow significantly in height despite a closed canopy (in more shade than an oak can develop). Maples can steadily increase in both size and number until a nearly continuous subcanopy or a multi-storied layer of vegetation develops. These added layers of foliage beneath a closed upper canopy intercept so much light that often less than one percent of full sunlight reaches the seedling layer. As a result, oak seedlings often die once acorn reserves are exhausted. Even among the survivors, a vigorous root system doesn't ordinarily develop. The ability to persist under dense shade appears to vary among oak species. White oak and chestnut oak, for example, are often considered to be moderately shade-tolerant. However, the shade tolerance of oaks is markedly less than for many of its mesic competitors. The average 5-year mortality rate for large, overtopped saplings in a dry-mesic stand in southern New York was 45 percent for northern red oak and 26 percent for chestnut oak, but only 11 percent for red maple. On a dry-mesic site in central Massachusetts, overtopped red oak had a 19-year mortality rate of 90 percent compared to only 16 percent for red maple (Lorimer, 1983).

On mesic sites, advanced oak reproduction that can compete does not accumulate in mature stands because of the deep shade under the closed canopy. The advanced oak reproduction cannot develop into a size that would be competitive if it were released by overstory removal. Rather, it cycles in and out of the system with new seedling establishment after good acorn crops followed by mortality. Interrupting this cycle of establishment and mortality to enhance survival and growth of advanced oak reproduction requires a silvicultural treatment that alters stand structure so that more light is available to the seedlings in the understory. (Loftis, 2004)

Advanced oak regeneration in large numbers will not necessarily assure acceptable oak regeneration even if released by complete clearcutting. Even though the overstory is removed, small oak seedlings may still have

to compete with a dense understory of larger and usually more shade tolerant seedlings, saplings, and sprouts. These species usually have well-developed root systems and ample foliage which enable them to respond faster to release than small oak seedlings. If, at the time of release, the oak seedling does not have a large root system and adequate shoot height, shoot growth will be slow until the root system develops. Therefore, the mere presence of oak seedlings does not mean that oaks, if released, will become part of the future stand. On mesic sites, competition also can be expected from shade intolerant plants such as yellow-poplar and cherry.

In summary, an oak seedling can become a dominant part of the new forest type if it has developed a strong root system, and when released to adequate sunlight, it is not encumbered by an established shade-intolerant, mesic tree seedling.

### The Role of Oak Stump Sprouts

Sprouts that develop from harvested trees can contribute to the stocking of the regenerated stand after harvests. Oak species vary in their capacity to sprout, but the diameter of the stump seems to be a larger factor in determining the number of sprouts that appears after a harvest. Table E - 1 shows the ability of different species to sprout at different size classes. As can be seen, white oak and black oaks are not reliable sprouters after they reach a stump diameter approaching 16 inches and larger. So, if a stand has a large number of trees greater than 16 inches at the stump for these species, the future stand will be regenerated mostly by advanced regeneration. (Sander, Johnson, Watt)

**Table E - 1. Expected percentage of oak stumps that will sprout after cutting.**

Diameter of Parent Tree in inches	Black Oak	Scarlet Oak	Northern Red Oak	White Oak	Chestnut Oak
2 – 5	85	100	100	80	100
6 – 11	65	85	60	50	90
12 – 16	20	50	45	15	75
17 +	5	20	30	0	50

(Sander, Johnson, Watt)

Although decay in stump sprouts has sometimes been a concern, when the sprouts originate at or below ground level, the probability of becoming infected via the parent stump is low.

### Effects of Fire on Tree Growth and Regeneration

Fire has numerous functions which alleviate some of the problems outlined above. Applied at the appropriate time and place, fire can improve oak regeneration.

Fire removes excessive litter buildup from the forest floor, thereby preparing a favorable seedbed. Squirrels and bluejays prefer areas of thin

litter for acorn burial. Also, jays collect and disperse only sound nuts. This important ecological finding implies that acorns which escape predation can result in well-established first-year seedlings.

Seedlings from freshly germinated acorns cannot emerge through a heavy litter cover. Germination and first-year survival are best when acorns are buried about three centimeters deep in mineral soil. While removal of thick litter may expedite germination by encouraging squirrels and jays to cache acorns, some humus layer needs to be retained. The humus layer keeps the soil surface porous, so that uncached acorns can more easily penetrate the soil, retain moisture, and provide support for the new seedling. (Van Lear, Watt, 1992)

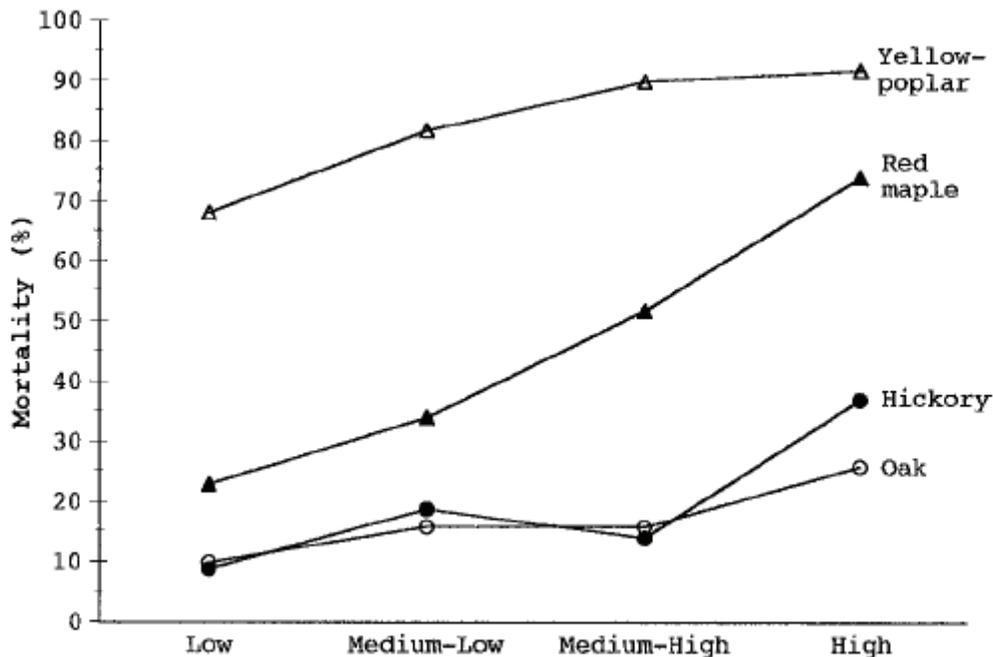
Fire helps to control insect predators of acorns and new seedlings. Insect pests act as primary invaders, secondary invaders, parasites, or scavengers on or in acorns. Many of these insects spend all or part of their lives on the forest floor. Infestations, which can vary from year to year and even from tree to tree in some areas, are a major contributor to the oak regeneration problem. Annually, about 50 percent of the acorn crop in Ohio is destroyed by the larvae of *Curculio* weevils, acorn moths, and gall wasps. However, recent studies indicate that prescribed burning may reduce populations of oak insect pests when conducted under proper conditions. A reduction in insect predation would allow more acorns to be scattered and buried by jays and squirrels. This enhances the probability of successful germination and helps subsequent seedlings become established. Burning may also reduce rodent habitat, eliminating another source of acorn predation. (Van Lear, Watt, 1992)

A regime of frequent burning over a long period creates a more open understory. In hardwood stands, long-term burning tends to eliminate small understory stems outright and gradually reduces the midstory and overstory canopies through mortality resulting from fire wounds. Increased light reaching the forest floor in these open stands will maintain the vigor of oak advanced regeneration. Frequent fires result in a slightly drier site by removing some of the fuels and small shrubs on the forest floor as well as by exposing the site to greater solar radiation through canopy reduction. (Van Lear, Watt, 1992)

The absence of fire since the early 20<sup>th</sup> century has allowed fire-intolerant species to become established and grow to sizes with bark thick enough to resist fire. At greater than five centimeters (2 inches) dbh, yellow-poplar becomes almost as fire resistant as oaks. Fire suppression over the years has allowed shrubby understory species to occupy drier sites where fire was once frequent and oak more dominant. Yellow-poplar produces an abundance of seed almost annually. Although the seed has low viability, many remain viable in the litter and duff layer for several years. Yellow-poplar seed germinate readily after some of the fuels on the ground are burned. However, in a regime of frequent fire, small yellow-poplar

seedlings are likely to be killed and the reservoir of stored seed in the duff gradually depleted. Thus, frequent fires would, to a large degree, help control this major competitor of oaks on high-quality sites. (Van Lear, Watt, 1992)

The graph in Figure E - 1 shows the percentage of mortality for hickory, oak, red maple, and yellow-poplar advanced regeneration as fire intensity increases during prescribed burns of shelterwood stands in the spring (Van Lear, David H. and Brose, Patrick H, 1998). Note that the mortality rates experienced by yellow-poplar and red maple are much higher for all intensities than for oak or hickory.



**Figure E - 1. Mortality (%) of hickory, oak, red maple, and yellow-poplar as fire intensity increases during prescribed burns of shelterwood stands in the spring.**

When repeated burning occurs in stands with mixed advanced regeneration, oaks have an advantage over less fire-resistant vegetation which is killed by fewer fires of lower intensity. This loss usually exceeds species gain through invasion, since the frequency of the fires is as important to reduction of fire-susceptible species as the intensity of the fire.

Thus, a regime of frequent understory burns, perhaps including both growing-season and winter burns during a period of 5 to 20 years prior to harvest, should promote a favorable root/shoot ratio during oak seedling establishment (Van Lear, Watt, 1992). This fire frequency would replicate fire-returns from the mid-1800s to 1925 that are likely an important reason why mature oaks are here now, as discussed in this document earlier. With a fire regime based on historical norms, the harvest of the overstory should

release the established seedlings from the dense shade of the overstory, and oak seedlings could then develop into a future oak stand.

The timing of the burns would depend on the observed vigor of the oak advanced regeneration and its competitors. A series of burns over an indefinite preharvest period will likely be required to favor oak regeneration. The first burn may be detrimental to oak advanced regeneration because small rootstocks may be killed. However, over the long-run, oaks will be less adversely affected than competitors and will, therefore, enjoy a competitive advantage that will enable them to favorably respond to subsequent release. (Van Lear, Watt, 1992)

Herbicides may be required to remove midstory trees that have grown too large to be killed by low-intensity fire. Herbicides provide initial selectivity of midstory stems to be eliminated prior to burning. A combination of herbicide treatment and frequent fire may be required to secure oak regeneration and allow it to maintain its vigor in mixed hardwood forests which have not been burned for decades. (Van Lear, Watt, 1992)

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## Forest Regeneration

### Even-aged Management

Even-aged forests occur naturally after a major disturbance initiates the processes of stand regeneration. Even-aged stands generally have one age class, although two age classes can be found in some two-layered natural or managed stands. These stands generally have a well-developed canopy with a regular top at a uniform height.

Purely even-aged stands generally have a nearly bell-shaped diameter distribution. This means that most trees are in the average diameter class. However, diameter distributions should be viewed cautiously because diameter can be a poor criterion for age. The smallest trees in natural even-aged stands are generally spindly with vigor suppressed by the overstory.

### Clearcutting

In a clearcut system the stand overstory is generally removed in one harvest.

If adequate numbers of advanced oak seedlings over 4½ feet tall are vigorous and have well-developed root systems, clearcutting is the most effective method to regenerate the stand to species dominated by oak and hickory. Although understory species may appear to dominate the stand

for about 10 years following clearcutting, the oaks and other overstory species begin to assert dominance, and by age 10-15 the understory species are generally in a subdominant position. (Sander, Graney, 1992)

Clearcut stands should be a minimum of two acres in size. If the existing advanced oak reproduction potential is not adequate and the stand is clearcut, the new stand will be dominated by a varying mixture of species, but oaks and hickories likely will not dominate the site. With the exception of yellow-poplar, the species that dominate the advanced reproduction will be predominant in the new stand. Yellow-poplar will also be abundant if it is present in the overstory, and some oaks will probably be present. (Sander, Graney, 1992)

If the clearcut stand is on southeast or northwest middle and upper slopes, we can expect at about age 20 to have a stand that can be molded by thinning into an essentially pure oak stand. On north and east aspects and lower slopes, the stand composition may be highly variable. Yellow-poplar will likely be abundant. Other species such as white ash, black cherry, and red and sugar maples will also be present. However, if the oak advanced regeneration is adequate, expect to have a predominantly oak stand 20 years after clearcutting. (Sander, Graney, 1992)

In practice, the Wayne National Forest will not normally prescribe true clearcuts, in which *all* merchantable trees would be cut from an area. The Wayne is likely to prescribe “clearcutting with reserves,” a method in which varying numbers of reserve trees are left standing to attain goals other than regeneration. Overstory trees to be retained, called reserve trees, may be small or large trees, or combinations of small and large trees. These will be retained for future growth, certain species components, current or future den trees, future sources of snags or coarse woody debris, or some level of visual quality.

## Shelterwood

In general, a shelterwood treatment is the cutting of most of the trees, but leaving those needed to produce seedlings in a moderated microclimate (The Dictionary of Forestry). In particular on the Wayne and in the central hardwoods, when the regeneration potential of the existing oak advanced reproduction is not adequate to replace the stand, the shelterwood method can be used to develop the required advanced reproduction. The minimum number of advanced reproduction is determined by inventorying the area to discover the amount and size of oak seedlings and estimating the number of stump sprouts after cutting. The procedure is outlined in the USDA General Technical Report NC-23, “A Guide for Evaluating the Adequacy of Oak Reproduction” (Sander, Johnson, Watt).

When oak advanced reproduction is small, scarce, or absent, the shelterwood regeneration method will most likely produce the best results. However, for successful seedling establishment and early seedling growth,

this method must be tailored to produce the micro-environments required by oaks. (Sander, Graney, 1992)

Without treating the micro-climate of the forest floor, such as providing more sunlight or controlling competition, oak advanced reproduction is most likely to be inadequate on the middle and lower north- and east-facing slopes. South-facing slopes and ridge tops may develop advanced oak regeneration without specific treatments because of the dry and open microclimate. (Sander, Graney, 1992)

When applying the shelterwood method to develop oak regeneration, following are some general practices that should be considered (Sander, Graney, 1992). Depending on site-specific conditions some or all of these treatments are probable:

- Control the understory by cutting or preferably killing the non-oak species that will compete with the small oaks by prescribed burning or applying herbicides.
- Reduce the overstory to 40 to 80 percent stocking. Leave the best dominant and co-dominant oaks as uniformly spaced as possible.
- If possible, apply the understory and overstory treatments before seedfall in a good seed year.
- Monitor seedling establishment and growth; make additional light cuts to keep the overstory from restricting growth.
- Apply additional understory control if the understory redevelops to a point where it restricts the oak reproduction growth. This control may be desirable 5 to 10 years after the original treatment; treatment could be prescribed burning or application of herbicides.
- When the regeneration potential of the oak reproduction is adequate to replace the stand, remove the remaining overstory sufficiently to allow the oaks to develop fully. After the shelterwood harvest and associated treatments are initiated, 10 to 20 years will likely be needed to establish enough oak seedlings and grow them to adequate sizes so that oaks would likely develop into dominant or co-dominant components of the future forest.

More than one burn may be prescribed if oak regeneration is not adequate after one burn. In many situations within the Central Hardwood Region and beyond, decades of fire exclusion have allowed oak competitors to become so firmly established that oak regeneration may not be as plentiful as desired. Oak dominance of the advanced regeneration should increase with repetitive burning. (Van Lear, D.H., 2004)

Another silvicultural treatment that has proved effective on more mesic sites is to remove mid-canopy and some lower-canopy trees and leaving a

main canopy with no large gaps, the survival and growth of small oak advanced reproduction increases. This treatment allows the population of small oak advanced reproduction to develop after a few years into a population of larger advanced reproduction, making oaks more competitive after release. Plus, this process also reduces competition from other species. Potential sprouts from mid-canopy and lower-canopy trees are treated with herbicides or prescribed fire, thereby directly reducing competition from these trees both before and after overwood removal. The reduction in competition from yellow-poplar is more subtle. First, while the residual canopy with no canopy gaps is sufficient to allow oak seedlings to develop, it is not sufficient to allow the establishment and development of yellow-poplar. Secondly, new yellow-poplar seedlings that become established after overwood removal will be in an inferior competitive position, at least on a patch-wise basis, because of the development of large advanced reproduction of oaks and other species. (Loftis, 2004)

## Two-aged Management

The two-aged system regenerates a timber stand and maintains two age classes (The Dictionary of Forestry). Various other publications refer to this type of management scenario to deferment cutting, irregular shelterwood, or a shelterwood with reserves. As applied on the Wayne, harvest objectives would include the need to develop early-successional wildlife habitat, while at the same time retaining an important overstory component. The Forest would retain 15 to 20 square feet of basal area per acre of the original overstory; the selection of the “leave trees” would be based on wildlife habitat needs. For example, if the average diameter of the retained trees was 18 inches, this would be approximately 9 to 12 trees per acre. To regenerate the two-aged areas to an oak-hickory forest type, the same adequate numbers of healthy and well distributed oak seedlings must exist as was discussed for clearcut harvests prior to applying the two-aged harvest.

The Northeastern Area – State and Private Forestry reports the following observations regarding the development of two-aged stands after a regeneration cut in the central Appalachians (Perkey, Miller and Schuler, 1999).

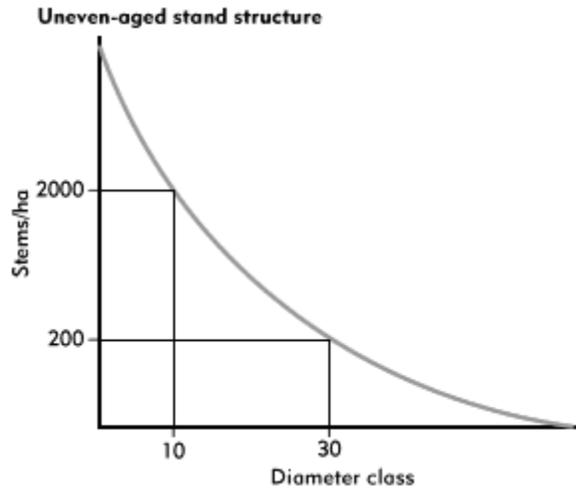
- Leaving 12 to 15 residual overstory trees per acre and cutting all other trees 1-inch dbh and larger resulted in hardwood reproduction similar to that expected after clearcutting.
- In the Fish Trough treatment area, a sample of 10 yellow-poplar overstory crop trees was remeasured at about age 94 to determine if they were still growing well; they were. During the first 16 years of the study they grew at a rate of 2.9 inches per decade. During the last 3 years they grew at a rate of 3.2 inches per decade.

- Residual overstory trees (the older age class) were still free to grow, with an average of 20 feet of growing space between adjacent crowns; these trees were scattered over the area, not left in clumps or corridors.
- At 10 years, 70 to 85 percent of co-dominant reproduction had the potential to become timber crop trees. Three of the four treatment areas can be regarded as successfully regenerated with acceptable quality stems.
- The canopy of the younger age class was nearly closed after 10 years.
- Frequently, grapevine control work is needed in the younger age class of two-aged stands, just as it is needed in young stands regenerating after a clearcut.

Tree regeneration in the two-age harvest areas would be adequate if implemented as described. Experimental harvests on the Monongahela national Forest applied from 1979 to 1983 indicated that the reproduction that developed included a wide variety of species, similar to that observed after clearcutting. Also, the experiments found that 89 percent of the larger trees left uncut had survived, 76 to 100 percent of the survivors maintained their initial grade, and diameter growth increased for most species. (Miller, Johnson, Baumgras, 1997)

## Uneven-aged Management

Uneven-aged management treatments work towards the goal of creating and maintaining an area in an uneven-aged condition. An uneven-aged stand has trees of three or more distinct age classes, either intimately mixed or in small groups (The Dictionary of Forestry). Also, uneven-aged stands have an uneven and highly broken or irregular canopy (often with many gaps). This broken canopy allows for greater light penetration and encourages deeper crowns and greater vertical structure in a stand. Most stems occur in the smallest age/size class, as regeneration quickly fills the canopy gaps. The number of small trees declines through normal species competition as age/size classes increase, to the point where the large trees are low in number and scattered (although distribution may be highly regular). In its ideal form, where diameters approximate age, distribution of diameters in uneven-aged management will approach the classic inverted-J form. Progressing through the diameter classes, the number of stems per acre drops in an inverted geometric fashion, giving a dipping curves relationship which looks like the mirror image of a "J" without the top. The graph in Figure E - 2 shows the distribution of trees in an uneven-aged condition. Note that there are a large number of very small trees and very few large trees per acre.



**Figure E - 2. Distribution of trees in an uneven-aged condition.**

In managing an uneven-aged stand of trees, the forest manager often uses a formula to mold the stand's structure according to the relative numbers of trees of various sizes. This formula is often referred to as a Q-Factor. The Q-Factor describes the distribution of size classes and is expressed in terms of the ratio between numbers of trees in successive 2-inch diameter classes. For example a Q-Factor of 1.5 means that there would be 1.5 times as many 10-inch trees as there are 12-inch trees, and 1.5 times as many 12-inch trees as there are 14-inch trees. The lower the Q-factor, the more larger trees there would be in relation to small trees.

Initially, to convert an even-aged stand to an uneven-age stand, the objective is to develop new age classes, but not to immediately create a structure as pictured in Figure E - 2. Eventually, a more formalized uneven-aged regulation method can be implemented to supplement and guide the retention of given levels of stocking in the different age classes. Although a q-based (or similar) approach is essential for maintaining an uneven-aged structure after the uneven-aged structure is established, q is not applicable when initially converting even-aged stands into an uneven aged stand.

Conversion of a stand to an uneven-aged structure cannot be accomplished in the same manner as the maintenance of stand structure in an existing uneven-aged stand. Generally with the objective of changing the stand's structure to uneven-aged, the first harvest in the stand would be a reduction across the stand of one-third but no more than 60 percent stocking. Depending on the stand's age or species mix, the cutting could target different trees. Considerations would include such concerns as whether the stand has a component of short-lived trees which could not survive through the time that would be required to develop the uneven-aged structure. Therefore, the exact prescription must be tailored to each stand. (Loewenstein and Guldin 2004)

## Single-tree selection system

Single-tree selection methods are most appropriate for stands in which the desired species composition is to consist primarily of such shade-tolerant species as beech and maple. Single tree selection, therefore, is generally considered inappropriate for regenerating oak forests. (Hicks, 1998)

The establishment and development of oak regeneration is not as probable or as consistent with the single-tree selection system. While harvesting single trees to achieve and maintain a specific diameter distribution does not provide the microclimate needed for oak regeneration, it does provide the conditions needed for the establishment and growth of shade-tolerant species. (Sander, Graney, 1992) Over time, single-tree selection in a mature oak stand will convert the area to predominantly shade-tolerant species such as beech and maple.

However, empirical and experimental data suggest that under certain conditions, oak stands can be managed using uneven-aged methods. (Loewenstein and Guldin, 2004) By applying oak advanced regeneration techniques, such as controlling mesic seedlings, the resulting uneven-aged stand's oak component can be increased. It is unlikely, however, that oak and hickory will be majority components of the stands in the long term. If the more shade tolerant and mesic species are controlled, the more xeric parts of the stand, such as south-facing slopes and ridgetops, may have significant oak and hickory components. Then the mesic parts of a stand, such as the lower elevations, coves and north slopes, will likely be occupied by more mesic species such as yellow-poplar, maple, and beech.

Oak seedlings have been found to show greatest response and successful establishment in the centers of forest clearings. A retardation of oak seedling growth, however, is found on the edges of openings. High levels of sun light are required for the survival and growth of advanced oak regeneration, and these light conditions cannot be achieved by the single tree selection method. (Fischer, 1979)

## Group Selection Systems

The objective of group selection is creation of an uneven-aged stand by cutting and regenerating small parts or “groups” in a stand. The entire stand continues to be managed as a single unit, including both the groups that have been cut and the uncut portions in between. Individual groups are not managed as individual stands. As applied on the WNF to regenerate oak-hickory types, a group should be up to two acres in size. When the objective is to regenerate shade tolerant species, such as maple and beech, the groups should have a diameter of approximately up to the height of two mature trees (0.4 to 0.7 acres).

Group selection can be used to reproduce oaks satisfactorily, assuming (Sander, Graney, 1992):

- The oak advanced reproduction is adequate
- Culls and small trees within the groups are cut or killed, unless specifically retained for wildlife or other purposes.

The growth and development of the reproduction by group selection will resemble responses that follow clearcutting, except the influence of the surrounding stand will retard reproduction growth in a large part of the open area. (Sander, Graney, 1992)

If the oak advanced reproduction is not adequate, cutting the trees to create the opening will not result in oak reproduction. The opening will be filled by the species present in the understory and by species with seeds on the site, such as yellow-poplar. Without adequate advanced oak regeneration, the procedures for developing it, as described above for the shelterwood, could be implemented first if oak is an objective for the future stand (Sander, Graney, 1992).

Frequently, as groups are cut to create a young age-class, other parts of the stand will be thinned to enhance oak reproduction establishment and growth throughout the stand.

### **Oak Management in the Historic Forest Management Area**

One of the main visions portrayed in the desired future condition for the Historic Forest management area is land that eventually mimics the conditions of several hundred years ago when oak dominated the landscape. Treatments likely to help achieve that condition include:

- Intensive thinning (to maintain a 50% to 60% stocking)
- Frequent prescribed burns (to control the more mesic species and promote oak regeneration)
- Herbicide treatment.

Herbicide treatment may be necessary initially, when the land is being transformed into the desired conditions, because mesic species such as maples and poplars will be too large to control with prescribed burns. Once the land has been transformed and the number of maples and poplars are minimal and their sizes small, periodic fires will likely control them.

For the first two or three decades, the stands treated in this management area will likely need to be thinned as the crowns of trees expand to a degree that do not contribute to attainment of desired conditions. After the historic forest system is in place and functioning (in 30 to 50 years), some periodic timber removal may be necessary to release seedlings to grow.

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## Intermediate Silvicultural Treatments

### Effects Of Cleaning Treatments And Precommercial Thinning

Cleanings are release treatments performed during the sapling stage to free selected trees from competition of overtopping trees of comparable age (or woody vines and shrubs). Cleanings also favor trees needed to meet wildlife habitat or other management objectives.

It is better to wait until the stand is well into the sapling stage and has a closed canopy before making decisions regarding future crop trees. This delay will also assure that stump sprouts will not overtake desirable trees. Simply cutting most broadleaved trees and shrubs will normally stimulate sprouting, often with increased vigor. To prevent this, herbicide may be applied. (Nyland, 1996)

Benefits of release from cleaning vary with species, age, degree of suppression, and completeness of a treatment. Generally, cleaning works best in young stands while the preferred trees still have sufficient vigor to respond to release.

Timber crop tree management can provide high-quality timber products from individual trees growing at a rapid rate. The limiting factors in managing for crop trees are:

- The existing number of good-quality trees
- Increasing their growth while retaining their valuable characteristics.

Crop tree selection criteria:

- Select dominant/co-dominant trees at least 20 feet tall with large healthy crowns. On the WNF, this height would be attained when the regeneration is from 10 to 20 years old.
- Select low-origin stump sprouts with U-shaped connections. Stump sprouts that originate close to the ground are suitable crop tree candidates if they are stable and have good form.
- Select trees with no epicormic branches. For most species, dominant/co-dominant trees with large crowns and good vigor are not likely to epicormic branch to a significant degree.
- Select trees without leans or forks.

## Grape Vine Control

When wild grapevines grow into tree crowns, especially in young trees, they can damage trees by breaking the tops and limbs, twisting and bending the tree boles, even uprooting trees. Wild grapevines grow best on moist soils and in full sun. Prolonged shade reduces growth and will kill the vines. Vines sprout prolifically when cut, however.

Since grapevines are intolerant of shade, the vines will generally die or not be a problem if they are cut near ground level and the crown of the surrounding stand has closed so that the ground is well shaded.

If grapevines are present in the stand before harvest, and an even-aged harvest is planned, grapevines likely will be a problem in the regenerating stand. The combination of sprouting vines and multiple seedlings after harvest, plus the increase in available sunlight, will promote grapevine growth. Grape seed remains viable for many years.

Common solutions to a grapevine problem include (Smith, H. Clay, 1984):

- After an even-aged or group selection harvest, in the first 10 years after the forest floor has become shaded, sever the grapevines at ground level; the vines will resprout, but will die because of the shaded conditions.
- At least four to five years before an even-aged or group selection harvest, sever the grape vine at ground level; the vines will resprout, but will die before the harvest.
- If a harvest is planned within four years, treat the vines with herbicide. (Note: If the area is treated before the harvest, a post-harvest treatment may be necessary, particularly on better than average sites. Herbicide may also be needed to treat seedlings that start from seed already on the forest floor. However, the growth rate of the vines from seedlings would be much less than from established roots. Their damage would be less.)

All grape vines will not be eliminated from an area. Any sensitive or rare species of grape will be retained. Grape arbors (large concentrations of vines in a small localized area) will be left untreated. The impact on wildlife habitat will be considered before any control is begun.

## Commercial Thinning

As trees in a stand of timber grow, they compete with each other for nutrients, water, space, and sunlight. Each tree attempts to grow as fast and large as possible to remain competitive in the quest for food, water, and sunlight. As time passes, however, some limiting factor will prevent many trees from reaching their full potential. The species or genetic make-up of some individuals may pre-dispose them to be less effective

competitors. Trees that do not grow as fast as others become weakened rendering them even less competitive for sunlight, water, nutrients, and/or space. Because these trees are shorter than their less vigorous competitors, they cannot reach direct sunlight and have smaller live crowns. They are also more vulnerable to damage from insects and diseases and less likely to live a normal life span.

Also, even trees that have succeeded in becoming dominant or co-dominant often have different natural life spans. For example, on the WNF individual white oak trees can live to be 200 to 600 years old, whereas scarlet oak trees normally live only 100 to 150 years. These ages are for individual trees; like people, some die young while others live beyond their averages. As in the contrast between the longevity of scarlet and white oak, however, some species tend to live longer than others.

In otherwise comparable stands of trees, healthier and larger individuals will be found on sites with less tree density. Available nutrients, water, space, and sunlight are shared by fewer individuals on the less dense site.

Thinning a forest, or reducing tree density, is usually done to accomplish one or more of these objectives:

- Improve growth of the remaining trees
- Enhance the overall health of the forest's trees so they can withstand insects and diseases
- Recover potential mortality
- Favor the species of trees that will best meet the objectives of the area
- Increase light to the forest floor to encourage advanced oak reproduction.

Relative stand density is determined by using one of several stocking guides or charts developed for eastern hardwoods. The stand's relative density is then compared to management stocking levels. Acceptable growing stock (AGS) is defined as trees of acceptable species, form, and quality that could be selected as crop trees. A common method of quantifying and comparing relative stocking follows the graph in Figure E - 3 developed by Gingrich in 1967. A stocking level of 80 percent defines the upper management zone (sufficient mortality increase, growth decline, and volume present to thin). The lower management zone is 60 percent or B-level stocking (minimum residual level to thin to). Stands between 60 and 80 percent stocked usually do not need to be thinned. (Gottschalk, 1993)

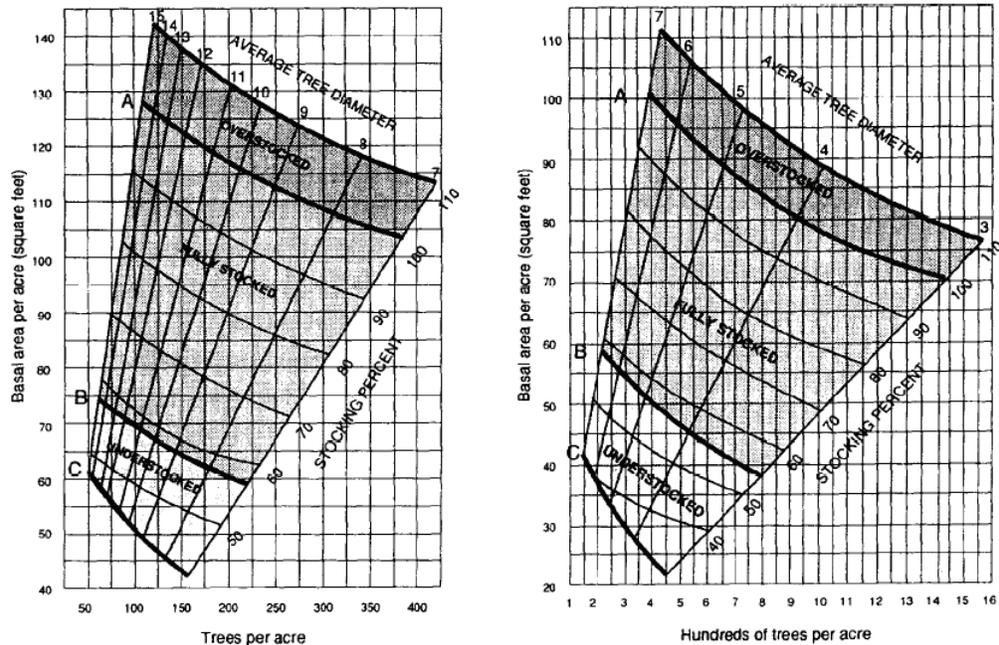


Figure E - 3. Relative stand density for upland hardwood stands, including oak.

Oak and other stands could be thinned when they have greater than B-level density of acceptable growing stock that is more than 15 years from maturity and with more than 80 percent relative density. Under normal management, they would receive a commercial thinning from below. Commercial thinning would reduce relative stand density to 60 percent, but not remove more than 35 percent in any one cut. It should remove unacceptable growing stock, harvest some of the anticipated mortality, increase the growing space for residual trees, increase in average stand diameter, and improve stand quality. (Gottschalk, 1993)

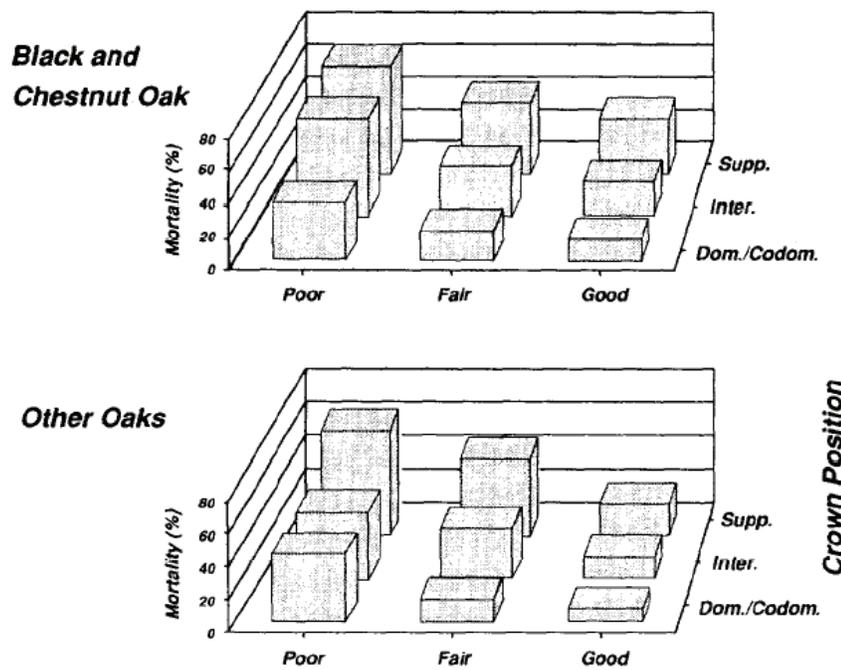
### Gypsy Moth Control

As described previously, the gypsy moth (a non-native) is advancing across the northeastern United States. Infestation has reached the northeastern edge of the WNF and will likely spread across the remainder of the Forest in the next 10 to 15 years.

To preserve the health and future composition of the Forest, several treatments, such as the “Slow-the-Spread” campaign will likely be instituted by different agencies such as the USDA Forest Service and the Ohio Department of Natural Resources. In addition to these tactics, thinning the Forest before and after the gypsy moth infestations can help minimize the damage and guard against significant impacts to the oak component of the WNF. Presalvage thinning is designed to reduce damage by removing highly vulnerable (high hazard) trees before they are defoliated and die; the major objective is to reduce stand vulnerability. Secondary objectives of treatment (Gottschalk, 1993) include:

- Improved stand and tree vigor as well as crown condition
- Removal of structural features that offer refuge to gypsy moth larvae and pupae
- Promotion of gypsy moth predator and parasite habitat.

The likelihood of oak tree death after gypsy moth infestation is tied to the health and position of the tree's crown. Graphs in Figure E - 4 show rates of tree mortality based on crown health and position. As illustrated, crown in the suppressed crown position and with poor crown health conditions most often die after an infestation. (Gottschalk, 1993)



**Figure E - 4. Rate of tree mortality based on crown health and position of tree crown.**

To be effective, a presalvage thinning before arrival of the gypsy moth must vary slightly from the normal thinning prescription. In stands with more than 50 percent of their basal area in gypsy moth-preferred food species, as is the case for most of the WNF, normal thinning prescriptions will not reduce the preferred food species significantly enough to reduce a stand's susceptibility. Presalvage thinning focuses on reducing vulnerability.

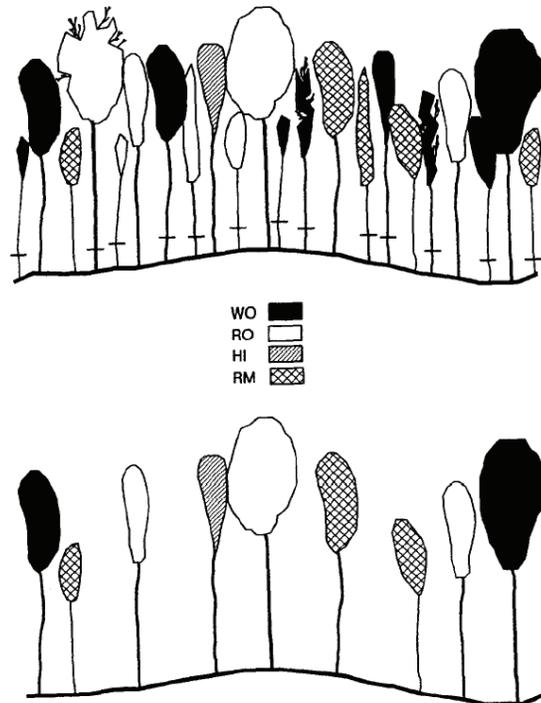
Presalvage thinning is necessary one to three years before defoliation, because the stand will need time to recover from the stress and disturbance caused by thinning. The stress induced by thinning may temporarily expose a stand to attack by certain damaging agents. For example,

presalvage thinning may provide favorable conditions for increasing populations of shoestring root rot and twolined chestnut borer. However, these risks are gradually reduced by the increased tree growth and vigor that eventually occur. (Gottschalk, 1993)

As a supplement to normal thinning guidelines (such as removing unacceptable growing stock and targeting a specific density), priorities for marking trees to be removed are (highest to lowest):

- Oaks with poor crowns
- Non-oak species with poor crowns
- Oaks with fair crowns
- Non-oak species with fair crowns.

Figure E - 5 depicts a presalvage thinning in an older stand, showing marking priorities (-) before and result of thinning afterward (WO = white oak, RO = red oak, HI = hickory, RM = red maple).



**Figure E - 5. Marking priorities in a presalvage thinning of an older stand.**

## Sudden Oak Death (SOD)

Sudden Oak Death (SOD) is a new disease that has spread rapidly since 1995 in California. It is caused by a newly discovered pathogen (*Phytophthora ramorum*). The disease has been found in nursery stock in the eastern United States, so infection of natural stands is possible. Fire suppression has been effective where SOD has emerged in the west. Analysis by Moritz and Odion demonstrates a strong and consistent negative relationship between locations of confirmed SODS and areas that have been burned since 1950. The potential for fire to influence the growth of spores and mycelia of fungal pathogens through direct effects of heat and/or smoke has long been known. (Moritz and Odion, 2005)

## Oak Decline

Periodic occurrences of decline and death of oaks over widespread areas have been recorded since 1900. The condition is often caused by a complex interaction of stresses and pests. Generally trees are weakened by environmental stresses such as droughts, frosts, or pests such as defoliating or sucking insects. Weakened trees are then invaded by other insects or diseases and the trees subsequently die. Healthy trees can withstand secondary pests, but in a weakened condition, they lack sufficient energy reserve to survive. Usually, the progression of decline is slow, occurring over several years. Control of oak decline is generally considered to involve keeping the trees healthy, and thus able to withstand pests and diseases. Certain causal factors such as drought and frost cannot be controlled, but management actions such as thinning can reduce competition for moisture and nutrients and thus promote a better physiological condition of the remaining trees. (Wargo, Houston, LaMadeleine, 1983)

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## Summary Of Effectiveness Of Management Practices

### Effects of Fire on Tree Growth and Regeneration

Prescribed fire is very effective in maintaining and restoring oak in areas that have adequate light reaching the forest floor. Primarily, fire's effects enhance the development of advanced oak seedlings. Prescribed fire also controls tree species such as maple and yellow-poplar that would out-compete oak seedlings.

### Herbicide Treatment of Non-oak

Controlling non-oak competitors in the understory with herbicide is very effective in maintaining and restoring oak. Some larger trees in the understory are less likely to be killed by prescribed fire. Fire treatments alone would leave them free to out-compete the oaks. Also, if successive

years of unacceptable burning weather results in a backlog of areas needing to be burned, herbicide treatment can allow managers to “catch-up” in promoting the conditions for advanced oak regeneration.

### **Clearcutting and Two-aged Management (Even-aged Management)**

These two even-aged management techniques for regenerating timber stands are effective in maintaining and restoring oak, provided the following conditions exist:

- An adequate amount of vigorous advanced oak regeneration exists and has large root development
- The advanced reproduction of more competitive species, such as maples and yellow-poplar, are not in large numbers

Given these conditions, a predominantly oak forest would be regenerated.

### **Shelterwood Cutting (Even aged Management)**

A shelterwood harvest can be very effective in creating conditions in which oaks will develop in the understory so that the subsequent regeneration harvest can release the oaks to fully develop. Note that other treatments will often be necessary in conjunction with the shelterwood harvest, such as prescribed burns and/or herbicide treatments.

### **Single Tree Selection (Uneven aged Management)**

This method of cutting is unlikely to be effective in maintaining the predominantly mixed-oak stand conditions. More shade-tolerant species are more likely to occupy the site in the future because not enough light reaches the forest floor to allow the oak seedlings to develop and compete successfully. Treatments such as prescribed burning and/or herbicide application would increase the oak component of the future stand, but the oak component would likely be well below the existing oak component.

### **Group Selection (Uneven aged Management)**

This method of cutting would likely result in the oak component of the future stand to be greater than under single tree selection, but likely less than the component created with even-aged treatments. One reason for the less effective oak regeneration is the large amount of edge in each group. The more mesic and shade-tolerant species would have an advantage along these shaded edges, while the oaks may thrive in the centers and northern edges of each group. Eventually, the amount of oak in the entire stand will decrease so that only the dry south slopes and ridgetops would be stocked with significant numbers of oaks.

### **Precommercial Thinning**

Precommercial thinning would allow managers to favor oaks when releasing the stand or part of a stand. Therefore, the oaks of the future

stand would be better able to establish themselves as dominant and co-dominant trees. Also, the stand will be healthier.

### Grapevine Control

Grapevine control would allow the oaks and all other species to grow without being broken or deformed by vigorous grape vines.

### Commercial Thinning

Reducing the stocking through a commercial sale would have the same effect as described under precommercial thinning. A healthy tree can withstand insects and diseases and not die or become weakened and then vulnerable to other problems, such as other insects, disease, or drought. As discussed earlier, the gypsy moth will eventually affect the WNF, and oak trees are the moth's preferred host. So, the ill effects of the moth on the oak component will be less lethal if the trees already enjoy robust health.

### No Treatment

If no silvicultural treatments are done, the current stands of oak and hickory will likely be replaced by species such as maple and beech. The stress induced by the overstocking will decrease the health and vigor of the forest, inviting disease and insect attacks. Very dry ridgetops and south-facing slopes will likely retain some oak trees, but without treatments, the oak-hickory forest will eventually disappear.

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## Appendix F

# Soil Limitations to Vegetation Management

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## Introduction

The suitability and capability of the various soil mapping units on the Wayne National Forest for vegetation management, are assessed for preliminary project planning using two primary sources:

- USDA Soil Survey Manual
- The SSURGO (Soil Survey Geographic Database) database stored within the Forest's geographic information system.

These data sources were originally designed at the county level; the WNF also utilizes customized dataset based on SSURGO that allows for consistent analysis across county boundaries.

Tables within these databases contain information that aid in harvest design, regeneration, and silvicultural activities. As an example these tables may include information pertaining to limiting factors on soil types for haul roads, skid trails and log landings. The limiting factors usually pertain to soil materials and drainage characteristics and are often described as slight, moderate, or severe to provide an indication of potential issues when assessing a project. The information is not intended to provide specific design information which requires on-site investigation. However, it should provide some preliminary design information.

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## Appendix G

# Stocking Levels Needed to Meet Oak-Hickory Objectives

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## Tracking Composition Objectives

Figure G - 1 and Table G - 1 were developed to determine whether Forest-wide and management-area composition objectives are being met. Oak-hickory composition objectives in regenerated stands will be evaluated at early ages. If overall, the Forest and management area's oak-hickory composition objectives are not being met, precommercial thinning can be considered to favor the oak-hickory regeneration. As a result, the final percentage of oak-hickory stems should be adequate to meet composition objectives. As long as the number of oak-hickory stems does not fall below the level associated with the dashed line in Figure G - 1, an oak-hickory stand type could be achieved through thinning.

Data used to develop the chart and table below were obtained from:

- Ashley, Burl, 1979. Determining adequacy of regeneration
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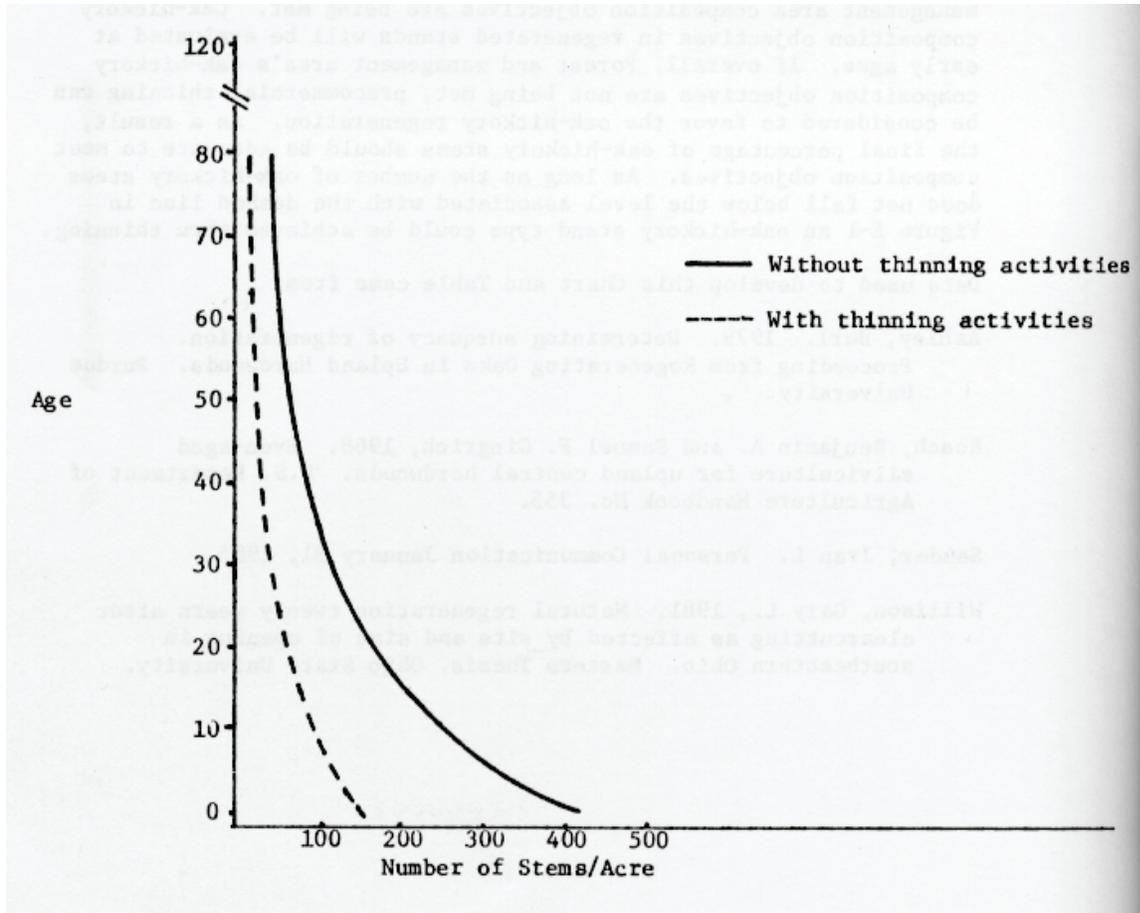


Figure G - 1. Stocking levels required to meet oak-hickory objectives.

Table G - 1. Minimum number of dominant and co-dominant oak-hickory.

Age	Stems Per Acre <sup>1/</sup>	
	Number of Stems W/O Thinning	Number of Stems With Thinning
5	325	120
10	255	90
15	221	80
20	164	70
25	140	60
30	126	50

<sup>1/</sup> "C" level upland central hardwoods, 5 inch dbh, 51% of total stems per acre.

## Appendix H

# Lease-specific Oil and Gas Notifications/Stipulations

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## Introduction

The following notifications and stipulations implement the standards and guidelines of the Wayne National Forest’s 2006 Land and Resource Management Plan (Forest Plan). These are in addition to the standard lease terms for oil and gas leases (BLM Form 3100-11). Not all of these notifications and stipulations are applied to every lease, rather, only those that are relevant based on site conditions. These notifications and stipulations are necessary to protect specific resource values on the lease area. They may be made less restrictive or modified for site-specific situations if such change is found to be in the public interest. These notifications and stipulations may be made less restrictive or modified only after a formal analysis has been completed and specifically approved in writing by a Forest Service line officer.

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## Notifications

### Special Notification #1

Operations under this lease will be consistent with all the standards and guidelines found in the Wayne National Forest’s 2006 Land and Resource Management Plan and are hereby incorporated into this lease in its entirety. Forest Plan standards and guidelines may restrict location, timing, and methodology of oil and gas lease operations. Special surveys for protection of National Forest System land and resources will be required. A copy of the WNF’s 2006 Land and Resource Management Plan is available from the following website <http://www.fs.fed.us/r9/wayne/> or by writing to:

Forest Supervisor  
Wayne National Forest  
13700 US HWY 33  
Nelsonville, OH 45764

## Notification #1

### Cultural Resources

The Forest Service is responsible for assuring the area to be disturbed is examined for cultural resources prior to allowing surface disturbing activities on lands covered by this lease. Important cultural resource values may be present on portions of a lease. Surface disturbing activities must avoid these areas unless the authorized officer agrees to the mitigation measures.

The lessee/operators may, at their discretion and cost, conduct the examination on the lands to be disturbed. This examination must be done by or under the supervision of a qualified resource specialist approved by the Forest Service. An acceptable report must be provided to the Forest Service identifying the anticipated effects of the proposed action on cultural resource values.

If items of substantial archaeological or paleontological values are discovered during operations, or a known deposit of such items is disturbed, the lessee (or operator) will cease work in the affected area. The lessee (or operator) will then notify the Forest Service and will not resume excavation until the Forest Supervisor gives written approval.

## Notification #2

### Floodplains

Any activities proposed in, or likely to affect a floodplain will be subject to:

- Analysis and identification of alternate sites
- Public notification and comment period
- Provisions of any other Federal, State or local laws and regulations as required under presidential Executive Order 11988, Protection of Floodplains.

### Notification #3

#### Protection of Federally Listed Endangered and Threatened, and Regional Sensitive Species and Their Habitats

The Forest Service is responsible for assuring that the area to be disturbed is examined prior to allowing any surface disturbing activities on lands covered by this lease. The examination is to determine effects upon any plant or animal species listed, or proposed for listing, as Federal endangered or threatened, regional sensitive, and their habitats. If the findings of this examination determine that the operation(s) may have a detrimental effect on a species covered by the Federal Endangered Species Act, the operator's plans may be denied or restrictions added. The presence of regional sensitive species may also require some restrictions of the operation(s).

The Forest Service has the responsibility to conduct the required examination. In cases where the Forest Service time frames cannot meet the needs of the lessee/operator, the lessee/operator may, at his discretion and cost, conduct the examination on the lands to be disturbed. This examination must be done by or under the supervision of a qualified resource specialist approved by the Forest Service. An acceptable report must be provided to the Forest Service identifying the anticipated effects of the proposed action on Federal endangered or threatened species, regional sensitive species, or their habitats.

### Notification #4

#### Compliance with Public Laws and Federal Regulations

Operators are required to comply with all public laws and Federal regulations that apply to National Forest System lands and the Wayne National Forest's 2006 Land and Resource Management Plan.

### Notification #5

#### Steep Slopes and/or Unstable Soils

The area of this lease contains a considerable amount of land with steep slopes and/or unstable soils. Accordingly, the opportunity to locate access roads, drilling sites, pipelines, storage tanks and other improvements may be extremely limited.

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## Management Areas Requiring Special Stipulations

### Stipulation #1

#### No Surface Occupancy – Future Old Forest

No surface occupancy allowed on the entire lease or on designated areas of the lease (see lease map) for the protection of the Future Old Forest resources.

On National Forest System land in Future Old Forest Management Areas, the Forest Service will issue leases for Federal oil and gas only with a No Surface Occupancy (NSO) stipulation. In the case of Federal leases issued pursuant to the Comprehensive National Energy Policy Act of 1992, the Forest Service will recommend to the Bureau of Land Management that operations be allowed to continue provided that all activities comply with Forest guidance. When the existing well (or wells) is depleted, all facilities must be removed and the site rehabilitated to Forest Service standards. No new wells will be allowed, nor will existing wells be allowed to be drilled to deeper formations. The NSO stipulation does not apply to reserved or outstanding mineral rights.

### Stipulation #2

#### No Surface Occupancy – Research Natural Areas

No surface occupancy within designated areas of the lease (see lease map) for the protection of natural processes or research, historical, or educational values.

On National Forest System land in Research Natural Area Management Areas, the Forest Service will issue leases for Federal oil and gas only with a No Surface Occupancy (NSO) stipulation. In the case of Federal leases issued pursuant to the Comprehensive National Energy Policy Act of 1992, the Forest Service will recommend to the Bureau of Land Management that operations be allowed to continue provided that all activities comply with Forest guidance. When the existing well (or wells) is depleted, all facilities must be removed and the site rehabilitated to Forest Service standards. No new wells will be allowed, nor will existing wells be allowed to be drilled to deeper formations. The NSO stipulation does not apply to reserved or outstanding mineral rights.

### Stipulation #3

#### No Surface Occupancy – Special Areas

No surface occupancy within designated areas of the lease (see lease map) to protect natural processes or research, historical or educational values.

On National Forest System land in Special Interest Management Areas, the Forest Service will issue Federal oil and gas leases only with a No Surface Occupancy (NSO) stipulation. In the case of Federal leases issued pursuant to the Comprehensive National Energy Policy Act of 1992, the Forest Service will recommend to Bureau of Land Management that operations be allowed to continue provided that all activities comply with Forest guidance. When the existing well (or wells) is depleted, all facilities must be removed and the site rehabilitated to Forest Service standards. No new wells will be allowed, nor will existing wells be allowed to be drilled to deeper formations. The NSO stipulation does not apply to reserved or outstanding mineral rights.

### Stipulation #4

#### No Surface Occupancy – Candidate Areas

No surface occupancy within designated areas of the lease (see lease map) for the protection of natural processes or research, historical or educational values.

On National Forest System lands in Candidate Research Natural Management Areas, the Forest Service will only issue Federal oil and gas leases that have a No Surface Occupancy (NSO) stipulation. In the case of Federal leases issued pursuant to the Comprehensive National Energy Policy Act of 1992, the Forest Service will recommend to Bureau of Land Management that operations be allowed to continue provided that all activities comply with Forest guidance. When the existing well (or wells) is depleted, all facilities must be removed and the site rehabilitated to Forest Service standards. No new wells will be allowed, nor will existing wells be allowed to be drilled to deeper formations. The NSO stipulation does not apply to reserved or outstanding mineral rights.

## Stipulation #5

### No Surface Occupancy - Administrative Sites, and Developed Recreation Areas, Trails and Associated Trailheads

No surface occupancy within designated areas of the lease (see lease map) to protect special management units such as developed recreation areas, trails and associated trailheads, water supply facilities, administrative site, etc.

On National Forest System land within administrative sites, developed recreation areas, trails and associated trailheads, the Forest Service will issue leases for Federal oil and gas only with a No Surface Occupancy (NSO) stipulation. The NSO designation will include a buffer zone, which will be determined in accordance with the Implementation Guide for Scenery Management. In the case of Federal leases issued pursuant to the Comprehensive National Energy Policy Act of 1992, the Forest Service will recommend to the Bureau of Land Management that operations be allowed to continue provided that all activities comply with Forest guidance. When the existing well (or wells) is depleted, all facilities must be removed and the site rehabilitated to Forest Service standards. No new wells will be allowed, nor will existing wells be allowed to be drilled to deeper formations. The NSO stipulation does not apply to reserved or outstanding mineral rights.

## Stipulation #6

### No Surface Occupancy – Timbre Ridge Lake

No surface occupancy within designated areas of the lease (see lease map) for the protection of the Timbre Ridge Lake Management Area.

On National Forest System land in the Timbre Ridge Lake Management Area, the Forest Service will issue Federal oil and gas leases only with a No Surface Occupancy (NSO) stipulation. In the case of Federal leases issued pursuant to the Comprehensive National Energy Policy Act of 1992, the Forest Service will recommend to Bureau of Land Management that operations be allowed to continue provided that all activities comply with Forest guidance. When the existing well (or wells) is depleted, all facilities must be removed and the site rehabilitated to Forest Service standards. No new wells will be allowed, nor will existing wells be allowed to be drilled to deeper formations. The NSO stipulation does not apply to reserved or outstanding mineral rights.

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## Resources Requiring Special Stipulations

### Stipulation #7

#### No Surface Occupancy – Cultural Resource Areas of Known Significance

No surface occupancy is allowed within archaeological or historical sites of known significance (see lease map). At the time of any new proposed lease developments, a Forest Service archeologist shall determine the need for any setbacks or restrictions for the protection of objects of historic or scientific interest.

### Stipulation #8

#### No Surface Occupancy – Slopes in Excess of 55 Percent

No surface occupancy is allowed on slopes in excess of 55 percent (see lease map) to protect soil and water from erosion and mass failure hazards because of steep slopes.

### Stipulation #9

#### No Surface Occupancy – Areas of Mass Soil Instability

No surface occupancy is allowed for the exploration and development of energy minerals on areas with mass soil instability, as defined by the USDA County Soil Surveys (see lease map).

### Stipulation #10

#### No Surface Occupancy – Hibernacula

No surface occupancy within ¼ mile of all known Indiana bat hibernacula.

### Stipulation #11

#### Controlled Surface Use – Areas of Land with a Scenic Integrity Objective of ‘High’ or ‘Moderate’

At the time of any new proposed lease developments, the responsible line officer shall determine the need for any visual quality mitigation. Some examples of mitigation may include special design and reclamation measures, transplanting trees and shrubs, fertilization, mulching, special erosion control structures, irrigation, site recontouring to match the original land contour, low profile equipment and painting to minimize contrast. Surface occupancy may also be limited or denied in sensitive areas, such as unique geologic features and rock formations, visually prominent areas such as designated trails and developed recreation sites.

## Stipulation #12

### Controlled Surface Use – Known Locations of Federally Listed Species

No cutting of snags (trees with less than 10% live canopy), shagbark or shellbark hickories, or trees that are hollow and/or have major splits or broken tops, except during the bat hibernation season (September 15 through April 15). If such trees are a safety hazard, they may be cut anytime they pose an imminent threat to human safety, but if cut in the nonhibernation season the Forest Service biologist must be notified in advance. This stipulation applies only to trees over six inches in diameter.

Protect all supercanopy trees or other identified congregation roost trees for bald eagles along major river corridors and lakes. Protect known nests and roosts as described in the Bald Eagle Recovery Plan, or as directed by the U.S. Fish and Wildlife Service.

Prior to any surface disturbing activities a Forest Service biologist will conduct an assessment for potential American burying beetle habitat and occurrence. Occupancy restrictions will be determined at the time of the evaluation.

## Stipulation #13

### Controlled Surface Use – Known Locations of Regional Forester Sensitive Species.

Controlled surface use may include setbacks or restrictions from portions of the lease to ensure protection of habitat for regional sensitive species. At the time of any new proposed lease developments, the responsible line officer shall determine the need for any setbacks or restrictions, or the need for timing-related stipulation in accordance with the aquatic and terrestrial wildlife and botanical resources standards and guidelines.

The leaseholder and Forest Service inspector shall work together to identify locations for development and production facilities in order to protect the structural integrity of large old trees found on a portion of the tract.

## Stipulation #14

### Controlled Surface Use – Managed Wildlife Openings

At the time of any new proposed lease developments, the responsible line officer shall determine the extent of the surface use restrictions necessary to maintain habitat integrity for plant and animal species dependent on such habitats.

**Stipulation #15****Controlled Surface Use – Riparian Areas**

At the time of any new proposed lease developments, the responsible line officer shall determine the appropriate surface use restrictions necessary to maintain the structural and ecological integrity of riparian areas, and aquatic and riparian-dependent species viability.

**Stipulation #16****Controlled Surface Use – Portions of Floodplains Outside Riparian Areas**

Oil and gas activities may be allowed within that portion of a floodplain outside riparian areas. Mineral activities will be evaluated on a case-by-case basis, and appropriate mitigation measures will be applied. The leaseholder and Forest Service inspector shall work together to identify locations for roads, pipelines, well pads and production facilities.

**Stipulation #17****Controlled Surface Use - Slopes Between 35 and 55 Percent**

Oil and gas activities will be allowed on slopes from 35 to 55 percent on a case-by-case basis with appropriate mitigation. New road construction and maintenance shall be planned to disturb the least amount of ground. The leaseholder and Forest Service inspector shall work together to identify locations for roads, pipelines, well pads, and production facilities.

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## Appendix I

# Scenery Management

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## Introduction

This appendix provides direction to protect and enhance the scenery resource of the Wayne National Forest. The appendix includes the following sections:

- Existing Landscape Character Description
- Landscape Character Objectives
  - Diverse Continuous Forest
  - Diverse Continuous Forest with OHVs
  - Historic Forest
  - Historic Forest with OHVs
  - Forest/Shrubland Mosaic
  - Grassland/Forest Mosaic
  - Future Old Forest
  - Future Old Forest with Minerals
  - River Corridors
  - Developed Recreation
  - Timbre Ridge Lake
  - Special Areas
  - Research Natural Areas
  - Candidate Areas
- Scenery Management Guidelines
  - General
  - Facilities
  - Permanent Openings
  - Utilities
  - Aquatic and Riparian Habitats
  - Signs
  - Roads and Trails
  - Minerals
  - Vegetation Management
  - Fuels Management
  - Recreation Areas
- Scenic Integrity Objective by Management Area
- Glossary

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## Existing Landscape Character Description

### Setting

Southeastern Ohio is a land of visual contrasts. Areas of significant natural beauty and cultural history contrast with areas of significant environmental abuse. Abandoned mined lands, acid mine drainage seeps, roadside trash dumps, and illegal motorized vehicle use too often spoil the scenic countryside.

The Wayne National Forest lies within Ohio's oldest landscape, the unglaciated Appalachian Plateau. A network of streams and rivers winds through deep valleys surrounded by rolling, forested hills often highlighted by striking bluffs and rock shelters. Human-made lakes, remnants of past strip mining, punctuate the forested surface. Rivers and major streams wind through the Forest, often paralleled by narrow roads, eventually draining into the Ohio River.

### Topography

Forested hilltops highlight the rugged, natural-appearing topography. Private farms and pastureland interlace the hilly landscape, giving a rural feel. A long series of narrow ridges and U-shaped valleys dissect the countryside. Topographic relief varies from a minimum of 500 feet to a maximum of over 1,000 feet. Slopes are typically benched or segmented by alternating sections of steep or moderate slope gradients. Local relief (the difference in elevation between the top of a ridge and the bottom of its adjacent valley) varies as little as 50 feet in some areas to as much as 500 feet in others. Slope gradients commonly range from 15 to 80 percent, but dominant slope gradients range between 25 and 55 percent.

### Roads

Compared with many National Forests, the Wayne is well roaded with a transportation system maintained by local governments and the State of Ohio. Major arteries running near or through the Forest include: U.S. Highways 23, 33, 35, 50, and 52 and State Highways 7, 26, 32, and 93.

Townships and counties maintain hundreds of miles of roads within the Forest proclamation boundary. Many of the county roads are paved. In contrast, many of the township roads are single-lane, aggregate surfaced, low-standard roads.

## Vegetation

Where solid blocks of National Forest System land occur, continuous, deciduous forests (primarily oak-hickory) dominate the view, especially in the Athens and Marietta Units. A large ice storm in February 2003 somewhat altered the generally closed-canopy forest aspect on the Ironton District. The storm damaged, to varying degrees, an estimated 40,000 acre swath of trees across the district (east to west). This will lead to a large influx of new vegetation in the understory in coming years.

Virtually no timber has been harvested on the WNF over the last several years due to litigation, appeals, and consultation with the U.S. Fish and Wildlife Service on appropriate conservation measures for the Indiana bat. Prior to the mid-1990s, extensive timber harvests, including clearcutting, took place on the WNF. The Forest is currently attempting to reactivate its timber sale program. The 1988 Forest Plan as amended permitted only partial harvesting methods (thinning and selection).

Minor infestations of the gypsy moth have caused some small openings in the Forest canopy. The gypsy moth infestation is expected to spread gradually over the Forest from northeast to southwest in the coming decade, and extensive, periodic defoliations and tree mortality will likely increase. Agricultural operations, timber harvesting, and residential developments on private or State-owned lands account for most large openings currently within the proclamation.

Native stands of Virginia pine and pitch pine are scattered in small stands throughout the Forest. Small planted stands of shortleaf pine and white pine also occur. These conifers add variety and interest to the scenery.

## Scenery

Autumn is a beautiful time to enjoy the Wayne National Forest. With the onset of clear, sunny days and cool, crisp nights, the hardwoods begin to display a spectacular array of colors. This showy season usually peaks around the second week in October.

Cultural features such as historic barns, log structures, iron furnaces, covered bridges, and mineral developments are sprinkled across the landscape which has evolved over time.

Mineral developments, although part of the character of the area, dominate the landscape in some areas and have created unsightly mounds of coal mine wastes, spoil banks, and streams stained yellow-orange by acid runoff. Batteries of storage tanks, wells, pumps, and bright orange transmission lines give evidence of past and ongoing oil and gas development across the landscape.

National Forest System (NFS) lands, however, are moderately free of human disturbance, making current conditions visually pleasing. On about 50 percent of the Forest, management activities are little noticed or do not draw the attention of WNF visitors. The remaining 50 percent of the Forest has been modified by management activities to varying degrees. The effects of timber harvests, road and trail construction, utility lines, mineral developments, and developed recreation areas dominate the landscape.

The rugged, hilly nature of the landscape favors most recreation activities on the Forest. The WNF has become a traditional hunting area for many residents of Ohio and neighboring states. Turkey, grouse, deer, and squirrels are favorite species.

The hilly terrain and proximity to population centers also contributes to the area's popularity as a motorcycle riding area. Riders from across the country come to southeast Ohio to enjoy the area's scenic beauty. In the Ironton and Athens regions, motorcycle and OHV riding is an expanding element in a culture that values freedom of travel. This type of recreation is not as popular in the Marietta area, however.

Several population centers exist in WNF counties. In the Ironton district, a string of nine communities stretches from Portsmouth on the west to Gallipolis on the east, significantly influencing use of NFS land. In addition, many people from Ashland, Ky., Parkersburg and Huntington, W.Va., use the Forest. The Athens District contains the cities of Athens and Marietta. The nearest metropolitan city, Columbus, the capital of Ohio, lies approximately 70 miles northwest of the WNF headquarters.

## Landscape Character Objectives

A landscape character objective describes the overall desired scenic character of an area. It also portrays the social and cultural landscape within each management area.

### Desired Forest Landscape

The desired landscape characteristic for the Wayne National Forest is generally “natural appearing.” This term denotes a landscape altered by past or present human activities that retains a natural appearance. The placement of forests, farm lands, roads, structures, etc., harmonizes with the environment.

The mostly homogenous topography of the three WNF administrative units (Athens, Marietta, and Ironton) consists of rolling, forested hills separated by ravines, coves, streams/rivers, and roads. The small to medium sized farms that dot the hilly landscape are concentrated near the fertile bottomlands.

The forest cover contains a variety of vegetation native to southeast Ohio. Soil type, landform, aspect, and slope position usually determine an area's vegetation. Oak-hickory dominates the forest cover of mid-slopes and ridgetops. Maple-beech-poplar forest generally covers the lower slopes and bottomlands. The WNF's Ecological Classification Handbook (1997) lists specific types of vegetation commonly found on each of the three administrative units.

The WNF also contains numerous indications of past mining activities. Many mining pits and catch basins have been converted to small fishing ponds. Mineral excavation areas have been rehabilitated to permanent wildlife openings or grasslands.

The Forest will continue to offer a wide variety of recreation opportunities such as hiking, horseback riding, mountain biking, OHV riding, hunting, fishing, camping, picnicking, and wildlife viewing. Cultural features such as historic barns, log structures, iron furnaces, and covered bridges will also play an important role in attracting visitors from across the country to southeast Ohio.

The Recreation Opportunity Spectrum (ROS) is also closely linked to scenery in terms of a visitor's expectation and experience. For example, a visitor looking for a primitive recreation experience will look for a natural setting with high scenic integrity (i.e., a seemingly undisturbed/unaltered landscape, rustic structures, etc.). Three ROS classes have been identified on the WNF: Semi-primitive Non-motorized, Roaded Natural, and Rural. Due to the extensive network of roads and/or motorized trails on the Forest, the majority of management areas on the WNF were assigned the ROS classification Roaded Natural. The Future Old Forest and Timbre Ridge Lake Management Areas were assigned the ROS class Semi-primitive Non-motorized, while the Develop Recreation Management Area was given the ROS class Rural. Table I - 1 provides a summary of the desired setting characteristics for the respective ROS classes.

Table I - 1: Summary of Desired Recreation Opportunity Spectrum Characteristics

ROS	Mgt. Areas	Setting	Setting Description
Semi-Primitive Non-Motorized	FOF TRL	Physical	<p><b>Theme:</b> Predominately natural/natural appearing; rustic improvements protect resources.</p> <p><b>Size*:</b> 2,500 + acres</p> <p><b>Infrastructure:</b></p> <p><b>Access</b> - Non-motorized trails are present. Closed and temporary Roads may be present but not dominant on the landscape.</p> <p><b>Fishing sites</b> – Rivers, lakes and reservoirs;</p> <p><b>Camp/Picnic sites</b> – Not developed, leave no trace</p> <p><b>Sanitation</b> – No facilities; leave no trace</p> <p><b>Water supply</b> – Undeveloped natural</p> <p><b>Signing</b> – Rustic, constructed of natural materials</p> <p><b>Interpretation</b> - Through self discovery, at trailheads</p> <p><b>Water crossing</b> – Rustic structures or bridges made of natural materials</p> <p><b>Vegetation:</b> Predominately natural, treatment areas exist to enhance forest health but are few and widely dispersed.</p>
		Managerial	Minimum or subtle signing and regulations, some encounters with rangers. Motorized travel prohibited
		Social	High probability of solitude, closeness to nature, self-reliance high to moderate challenge and risk; some evidence of others
Roaded Natural	RC DCF DCFO FSM FOFM GFM HF HFO RNA SA CA	Physical	<p><b>Theme:</b> Natural Appearing with nodes and corridors of development such as campgrounds, picnic areas, and trailheads</p> <p><b>Size:</b> n/a</p> <p><b>Infrastructure**:</b></p> <p><b>Access</b> – Classified Road System for highway vehicle use</p> <p><b>Fishing sites</b> – Rivers, lakes, reservoirs with some facilities</p> <p><b>Camp/picnic sites</b> – Identified dispersed and developed sites</p> <p><b>Sanitation</b> – Developed outhouses that blend with setting</p> <p><b>Water supply</b> – Often developed</p> <p><b>Signing</b> – Rustic with natural materials to more refined using a variety of materials such as fiberglass, metal, etc.</p> <p><b>Interpretation</b> – Simple roadside signs, some interpretive displays</p> <p><b>Water crossing</b> – Bridges constructed of natural materials.</p> <p><b>Vegetation:</b> Changes (treatments) to the natural vegetation patterns are evident but in harmony with natural setting.</p>
		Managerial	Opportunity to be with other users in developed sites; some obvious signs (information and regulation) and low to moderate likelihood of meeting Forest Service rangers.
		Social	Moderate evidence of human sights and sounds; moderate concentration of users at campsites; little challenge or risk.
Rural	DR	Physical	<p><b>Theme:</b> Altered landscapes with natural appearing backdrop. Farms and the most developed recreation sites are the major components of this ROS class.</p> <p><b>Size:</b> n/a</p> <p><b>Infrastructure:</b></p> <p><b>Access</b> – Travel routes highly developed, classified roads. Trails are constructed for ease of movement. Majority of routes are concrete, paved or graveled.</p> <p><b>Camp/Picnic sites</b> – Developed and designed for user comfort, variety of construction materials used that blend with setting. May have hookup amenities such as hot water, electricity, and sewage disposal.</p> <p><b>Sanitation</b> – Developed and designed for user comfort</p> <p><b>Water supply</b> – Developed and designed for user comfort</p> <p><b>Signing</b> – Natural and synthetic materials are appropriate</p> <p><b>Interpretation</b> – Roadside exhibits, interpretive programs, etc;</p> <p><b>Water crossing</b> – Bridges constructed of various materials, in harmony with landscape</p> <p><b>Vegetation:</b> Treatments blend with landscape.</p>

ROS	Mgt. Areas	Setting	Setting Description
		<b>Managerial</b>	Obvious signing (regulation and information), education and law enforcement staff available. Motorized and mechanized travel common and often separated.
		<b>Social</b>	High interaction among users is common. Little challenge or risk associated with being outdoors.

As in the past, natural disturbances such as ice storms, high winds, fire, insect infestation, etc., as well as resource management activities will continue to change and influence the Forest’s landscape character. Consistently implementing the Forest’s scenery management guidelines, however should mitigate adverse effects to scenery, thus maintaining and/or enhancing the Forest’s “natural appearing” landscape.

**Desired Forest Landscape by Management Area**

**Diverse Continuous Forest**

The goal of this management area is to provide managed, mature forest habitat conditions with a continuous forest canopy. Uneven-aged management techniques, with some even-aged management, should maintain forest structure and composition. The mosaic of hardwood and conifer forest is interspersed with small water bodies and open lands. The dominant forest type is oak-hickory. All age classes of trees are found in this management area, but mature trees are prevalent. Stands of irregular size and shape blend together, interlaced by many small openings of brushy or herbaceous cover. The result is a “natural appearing” look.

Roads within and on the perimeter of this management area provide access to resource management, mineral development, and recreational activities. Some temporary roads may also be needed for resource management.

Resource management practices, such as vegetation management, are evident, but in harmony with the natural-appearing environment.

Moderate amounts of non-motorized recreation opportunities are provided. Hiking, horse, and mountain bike trails are provided. Dispersed recreational activities such as hunting, fishing, viewing scenery and wildlife, and the gathering of forest products are examples of recreation activities that may occur in these areas.

Structures and utility corridors, as well as mineral exploration and extraction, are usually evident only when viewed directly from on-site or at a distance in broken terrain.

**Diverse Continuous Forest with OHVs**

Same as the Diverse Continuous Forest Management Area except OHV use on designated trails is permitted.

### Historic Forest

Restoring the historic oak-hickory component on the WNF, with a lower mixture of related central hardwoods and scattered pine, is the goal of this management area. This restoration will involve some timber harvest, intensive use of prescribed fire, and hand application of herbicides to achieve a balance of species. Continuous forest canopy conditions are found throughout the area.

Structures and utility corridors, as well as mineral exploration and extraction, may be observed with this management area. Roads within and on the perimeter of this management area provide access to resource management, mineral development, and recreational activities.

Moderate amounts of non-motorized recreation opportunities are provided. These include viewing scenery, hunting, fishing, trapping, and hiking. In some areas, trails may provide access for non-motorized activities, such as hiking, horseback riding, or mountain biking.

### Historic Forest with OHVs

Same as the Historic Forest Management Area except OHV use is permitted on designated trails.

### Forest/Shrubland Mosaic

The goal of this management area is a mosaic of early to late successional habitat conditions. Even-aged management techniques, with some minor amounts of uneven-aged management, will be used to produce desired habitat conditions. This area is a mosaic of hardwood and conifer forests marked by small water bodies and open lands. Oak-hickory is the dominant forest type.

Roads within and on the perimeter of this management area provide access for a variety of recreational activities, transport of forest products, and provide access for resource management.

Trails for hiking and horseback riding may be provided. Hunting, hiking, horseback riding, fishing, viewing scenery and wildlife, and the gathering of forest products are among the recreational activities that may occur.

Structures and utility corridors, as well as mineral exploration and development, may be evident.

### Grassland and Forest Mosaic

The goal of this area is a mosaic of large grasslands (generally 30 to 250 acres or larger but includes existing grasslands greater than 5 acres) within a buffer of varying successional forest stages. Brushy forest edge and mature forestland buffer this area providing unique habitat not common on most of the WNF. Even-aged management of the forested buffer should create habitats of early, mid, and late successional forest ranging from 5 to 30 acres.

Utility corridors are permitted. Mineral activities (primarily oil and gas exploration and extraction) may occur. Roads within and on the perimeter of this management area are used largely to provide access for resource management. Roads also provide access for recreational activities such as hunting and gathering forest products.

Grasslands may be found where a natural-appearing environment exists, despite past human activities. These areas may be of sufficient size to allow for management of grassland species.

### Future Old Forest

The goal of this area is to refrain from intervening in the natural succession of tree growth. Extensive stands of old central hardwoods dominate the landscape. Shade tolerant tree species, such as sugar maple and American beech, dominate these stands. Large, mature trees visually dominate stands of mixed tree sizes.

In some areas, designated trails provide the only access for hiking, viewing wildlife, fishing, and other non-motorized forms of recreation. There are few roads, and most Forest Service roads are closed to private motor vehicles.

Considerable isolation from the sights and sounds of people is highly probable in this area.

Few man-made structures and utility corridors are evident. No surface occupancy of National Forest System land is allowed for the exploration and development of Federally owned minerals, except on existing leases.

### Future Old Forest with Mineral Activity

Similar to Future Old Forest except there is evidence of mineral (predominantly oil and gas surface occupancy is allowed) activity and the probability of isolation from sights and sounds of people is low in this area. Facilities, structures, utility corridors, and mineral development are present and noticeable.

### River Corridors

These are major streams that run through or along the Forest. The goal is to manage this area for scenic quality, provide large-stream riparian habitat for species and communities dependant on such conditions, and improve water quality. Vegetation is characterized by a continuous tree canopy and a variety of tree sizes. Habitat management emphasizes large hardwood trees and their associated wildlife.

Extensive evidence of human activities is apparent, particularly on privately owned land within this management area. On National Forest System land, most human activities are in harmony with the natural-appearing environment. Viewing scenery, hunting, trapping, canoeing, hiking, picnicking, and camping are key recreation activities. Roads within and on the perimeter of this management provide access to recreation opportunities, forest management, and mineral activities.

Facilities, structures, and utility corridors, as well as mineral exploration and development, are usually evident only when on-site. But they are fairly common.

### Developed Recreation

These areas provide opportunities for recreation along lakes and rivers for camping, swimming, picnicking, group activities, and other intensive recreation opportunities in highly developed sites. They include the Lake Vesuvius Recreation Complex, the Leith Run-Capitol Christmas Tree Complex, Burr Oak Cove Campground, and Lamping Homestead Campground.

Developed areas contain high density, self-contained, destination-type recreation developments within a forest environment. Vegetation management ensures the long-term viability, safety, and attractiveness of the area.

Highly developed recreation sites (i.e., campgrounds, day-use areas, beaches, etc.) provide intensive recreation opportunities. More undeveloped areas provide opportunities for boating, fishing, hunting and hiking.

Recreation facilities and structures may dominate the landscape in developed areas. Building materials and design, along with placement of facilities and structures, harmonize with the environment.

Roads and trails provide access within the more developed areas. Hiking trails allow access to lakesides and riverbanks. Roads and trails are designed to accommodate the high density recreation use and related activities associated with this area.

Growth of high-quality, mature hardwoods is emphasized. Vegetation management is limited to increasing visitor safety by minimizing tree hazards and to improving forest health.

Utility corridors and other special uses may be present, as long as they are compatible with the character of the area. Mineral exploration opportunities come with major restrictions. No surface occupancy is allowed for the exploration and development of Federally owned minerals except on existing leases.

### **Timbre Ridge Lake**

The goal of this area is to:

- Protect and maintain water quality in Timbre Ridge Lake and its watershed
- Protect and maintain the semi-primitive, remote-like setting
- Promote a natural appearing landscape.
- Provide semi-developed and/or dispersed recreation opportunities uniquely tied to the lake.

Non-motorized forms of recreation will be emphasized. Developed areas contain low-density, dispersed recreation developments within a forest environment. Vegetation management will be minimal.

Roads and trails provide access within the more developed recreation areas. Hiking trails allow access to the lakeside. Roads and trails will be designed to accommodate low-density recreation use and related activities.

Recreation facilities and structures may dominate the landscape in some developed areas. Building materials and design, as well as placement of facilities and structures, harmonize with the environment. Utility corridors and other special uses may be present, as long as they are compatible with the character of the area. No surface occupancy is allowed for the exploration and development of Federally owned minerals except on existing leases.

### **Special Areas**

These areas have been analyzed and designated as Special Areas for various reasons. Found throughout the forest, these areas may contain significant cultural remains or unique terrain, climate, soil, water, flora or fauna. Such significance is recognized by State or Federal authority and will be so designated.

These areas include a wide range of forest conditions. Vegetation will vary depending upon local characteristics. These areas are not actively managed for timber production.

A system of hiking trails may provide access for administrative purposes and recreational activities. The design and structure of any facilities will be compatible with their natural surroundings. Evidence of human activities will vary but generally will be controlled to reduce adverse effects.

The size of these areas will vary but boundaries will be located to protect only significant resource areas.

No surface occupancy is allowed for the exploration and development of Federally owned minerals except on existing leases.

### Research Natural Areas

Designated as Research Natural Areas, these areas may be found anywhere on the Forest where terrain, climate, soil, water, and vegetation possess unique characteristics for scientific study. Sizes of these areas will vary, depending upon their purpose. Vegetation size and type may also vary, depending on the location selected. This area is not actively managed for timber production.

Some forms of non-motorized recreation may occur, such as hiking and viewing wildlife. Roads provide access to study areas. The design and structure of any facilities will be compatible with the natural surroundings.

No surface occupancy is allowed for the exploration and development of Federally owned minerals except on existing leases.

### Candidate Areas

This management area emphasizes the preservation of potentially unique natural areas. These areas possess potentially significant natural or historic characteristics. More analysis is needed before a decision can be made to designate, however. Management is directed at protecting these lands until the areas can be studied for designation as research natural areas, special areas, or other specific management.

Their primary benefit is the scientific value that may be derived from protected examples of unique ecosystems. Other benefits may include hiking, hunting, and nature study. No surface occupancy is allowed for the exploration or development of Federally owned minerals except on existing leases.

## Scenery Management Guidelines

Guidelines for scenery management were developed for the primary purpose of restoring, maintaining, and enhancing the Forest’s scenic values and to help achieve its scenic integrity objectives (SIO).

## SIO by Management Areas and Scenic Classes

**Table I - 2: SIO by Management Areas and Scenic Classes**

Management Areas	Scenic Class				
	1	2	3	4	5
Developed Recreation	H	H	H	H	H
River Corridors	H	H	H	M	M
Timbre Ridge Lake	H	H	H	H	H
Diverse Continuous Forest	H	M	M	M	L
Diverse Continuous Forest with OHV	H	M	M	M	L
Historic Forest	H	M	M	M	L
Historic Forest with OHV	H	M	M	M	L
Forest-Shrubland Mosaic	H	M	M	M	L
Grassland-Forest Mosaic	H	H	M	M	L
Research Natural Areas	H	H	M	M	M
Special Areas	H	H	M	M	M
Candidate Areas	H	H	M	M	M
Future Old Forest	H	H	M	M	L
Future Old Forest with Mineral Activity	H	H	M	M	L
H – High Scenic Integrity Objective M – Moderate Scenic Integrity Objective L – Low Scenic Integrity Objective See Forest Plan Appendix A – Glossary for definitions of Scenic Class and High, Moderate, and Low Scenic Integrity Objectives.					

**Table I - 3: WNF Concern Level 1 and 2 and High SIO Sites**

<b>WNF Unit</b>	<b>Concern Level 1 or High SIO Sites</b>	<b>Concern Level 2 Sites</b>
<b>Athens</b>	North Country Trail/Trailheads	All OHV Trails/Trailheads
	Wildcat Hollow Hiking Trail/Trailhead	Utah Ridge Pond/Picnic Area
	Stone Church Horse Trail/Trailheads	Sand Run Picnic Area
	All trails within the Future Old Forest Management Areas	Payne Cemetery
	All Trails within the Developed Recreation Management Areas	State Routes: 13, 56, 155, 312, 328, 668, 691
	Burr Oak Cove Campground	State Route 93 (North of Shawnee and West of NCT)
	State Routes: 78, 93, 216, 278, 595, and 685	
	U.S. Highway 33	
<b>Marietta</b>	North Country Trail/Trailheads	State Routes: 78, 145, 255, 536, and 565
	All hiking trails/trailheads	State Route: 260 (North of St. Rt. 565)
	All horse trails/trailheads	
	All trails within the Future Old Forest Management Areas	
	Developed Recreation Management Areas	
	All developed recreation sites	
	Little Muskingum River	
	State Routes: 7, 26, and 800	
	State Route: 260 (From Ohio River to junction of St. Rt. 565)	
<b>Ironton</b>	Developed Recreation Management Area	Dean State Connector Horse Trail
	Timbre Ridge Lake Management Area	Symmes Creek
	All Trails within the Future Old Forest Management Areas	All horse trails east of Township Road 198
	Morgan Sisters and Symmes Creek Hiking Trails	State Routes: 93, 140, 141, 233, 373, 522, 650, 775, and 790
	State Route 522 (Between St. Rt. 93 and Darby Creek)	All OHV Trails/Trailheads
	State Route 775 (½ mile north and ½ south of main entrance to Timbre Ridge Lake)	
	FDR 605 (Timbre Ridge Lake Road)	

See Forest Plan Appendix A – Glossary for definitions of Concern Level.

## Appendix J

# Scientific Names

## Scientific Names for Common Names Used

Common Name	Scientific Name
American basswood	<i>Tilia americana</i>
American beech	<i>Fagus grandifolia</i>
American bison	<i>Bison bison</i>
American burying beetle	<i>Nicrophorus americanus</i>
American chestnut	<i>Castanea dentate</i>
American elm	<i>Ulmus americana</i>
American ginseng	<i>Panax quinquefolius</i>
American goldfinch	<i>Carduelis tristis</i>
Amur honeysuckle	<i>Lonicera maackii</i>
Asian bittersweet	<i>Celastrus orbiculatus</i>
Asian longhorned beetle	<i>Anoplophora glabripennis</i>
Autumn olive	<i>Elaeagnus umbellata</i>
Bald eagle	<i>Haliaeetus leucocephalus</i>
Banded darter	<i>Etheostoma zonale</i>
Banded sculpin	<i>Cottus carolinae</i>
Basil bee balm	<i>Monarda clinopodium</i>
Basswood	<i>Tilia americana</i>
Bay laurel	<i>Umbellularia californica</i>
Beaver	<i>Castor canadensis</i>
Belted kingfisher	<i>Ceryle alcyon</i>
Bicknell's Panic Grass	<i>Panicum bicknellii</i>
Bigleaf maple	<i>Acer macrophyllum</i>
Bitternut hickory	<i>Carya cordiformis</i>
Black bear	<i>Ursus americanus</i>
Black cherry	<i>Prunus serotina</i>
Black oak	<i>Quercus velutina</i>
Black snakeroot	<i>Sanicula marilandica</i>
Blackberry	<i>Rubus spp.</i>
Blanchard's cricket frog	<i>Acris crepitans blanchardi</i>
Bloodroot	<i>Sanguinaria canadensis</i>
Blotchside logperch	<i>Percina burtoni</i>
Blue grosbeak	<i>Passerina caerulea</i>
Blue phlox	<i>Phlox divaricata</i>
Blue Scorpionweed	<i>Phacelia ranunculacea</i>
Blueberry	<a href="#"><u>Vaccinium</u></a> spp.
Bluegill	<i>Lepomis macrochirus</i>
Bluejay	<i>Cyanocitta cristata</i>
Blue-winged warbler	<i>Vermivora pinus</i>
Bobcat	<i>Lynx rufus</i>

Common Name	Scientific Name
Brown thrasher	<i>Toxostoma rufum</i>
Bulblet fern	<i>Cystopteris bulbifera</i>
Butterfly pea	<i>Clitoria mariana</i>
Butternut	<i>Juglans cinerea</i>
California buckeye	<i>Aesculus californica</i>
Canada cinquefoil	<i>Potentilla canadensis</i>
Canada thistle	<i>Cirsium arvense</i>
Canadian clearweed	<i>Pilea pumila</i>
Canadian wild ginger	<i>Asarum canadense</i>
Carolina thistle	<i>Cirsium carolinianum</i>
Cerulean warbler	<i>Dendroica cerulea</i>
Channel catfish	<i>Ictalurus punctatus</i>
Chestnut oak	<i>Quercus prinus</i>
Chinese privet	<i>Ligustrum sinense</i>
Chokeberry	<i>Phytolacca spp.</i>
Cinnamon vine	<i>Dioscorea batatas</i>
Clearweed	<i>Pilea pumila</i>
Common buckthorn	<i>Rhamnus cathartica</i>
Common privet	<i>Ligustrum vulgare</i>
Common reed grass	<i>Phragmites australis</i>
Common yellowthroat	<i>Geothlypis trichas</i>
Cottonwood	<i>Populus deltoides</i>
Creamy violet	<i>Viola striata</i>
Crown-vetch	<i>Coronilla varia</i>
Dodder	<i>Cuscuta species</i>
Dwarf iris	<i>Iris verna</i>
Eastern cottonwood	<i>Populus deltoides</i>
Eastern hellbender	<i>Cryptobranchus alleganiensis</i>
Eastern hemlock	<i>Tsuga canadensis</i>
Eastern meadowlark	<i>Sturnella magna</i>
Eastern sand darter	<i>Etheostoma pellucidum</i>
Eastern towhee	<i>Pipilo erythrophthalmus</i>
Emerald ash borer	<i>Agrilus planipennis</i>
Eulalia	<i>Miscanthus sinensis</i>
Eurasian water-milfoil	<i>Myriophyllum spicatum</i>
Evening bat	<i>Nycticeius humeralis</i>
Fanshell	<i>Cyprogenia stegaria</i>
Featherbells	<i>Stenanthium gramineum</i>
Featherbells	<i>Stenanthium gramineum</i>
Field penny-cress	<i>Thlaspi arvense</i>
Field sparrow	<i>Spizella pusilla</i>
Flathead catfish	<i>Pylodictis olivaris</i>
Florist's fern	<i>Dryopteris spinulosa sensulato</i>
Flowering dogwood	<i>Cornus florida</i>
Four-toed salamander	<i>Hemidactylium scutatum</i>
Fowl mannagrass	<i>Glyceria striata</i>
Fragile fern	<i>Cystopteris fragilis sensu lato</i>
Freshwater drum	<i>Aplodinotus grunniens</i>

Common Name	Scientific Name
Garlic mustard	<i>Alliaria petiolata</i>
Garter snake	<i>Thamnophis sirtalis sirtalis</i>
Giant knotweed	<i>Polygonum sachalinense</i>
Gill-over-the-ground	<i>Glechoma hederacea</i>
Glossy buckthorn	<i>Rhamnus frangula</i>
Goldenrods	<i>Solidago spp</i>
Goldenseal	<i>Hydrastis canadensis</i>
Golden-winged warbler	<i>Vermivora chrysoptera</i>
Grasshopper sparrow	<i>Ammodramus savannarum</i>
Great blue heron	<i>Ardea herodias</i>
Green ash	<i>Fraxinus pennsylvanica</i>
Green salamander	<i>Aneides aeneus</i>
Green sunfish	<i>Lepomis cyanellus</i>
Green-faced clubtail	<i>Gomphus quadricolor</i>
Greenside darter	<i>Etheostoma blennioides</i>
Grizzled Skipper	<i>Pyrgus wyandot</i>
Ground hog	<i>Marmota monax</i>
Gypsy moth	<i>Lymantria dispar</i>
Heart-leaved groundsel	<i>Senecio aureus</i>
Henslow's sparrow	<i>Ammodramus henslowii</i>
Honewort	<i>Cryptotaenia canadensis</i>
Hooded warbler	<i>Wilsonia citrina</i>
Horned lark	<i>Eremophila alpestris</i>
Horsechestnut	<i>Aesculus hippocastanum</i>
Huckleberry	<i>Vaccinium ovatum</i>
Indian cucumber root	<i>Medeola virginiana</i>
Indian strawberry	<i>Duchesnea indica</i>
Indiana bat	<i>Myotis sodalist</i>
Indigo bunting	<i>Passerina cyanea</i>
Jack-in-the-pulpit	<i>Arisaema triphyllum</i>
Japanese barberry	<i>Berberis thunbergii</i>
Japanese honeysuckle	<i>Lonicera japonica</i>
Japanese knotweed	<i>Polygonum cuspidatum</i>
Japanese stilt-grass	<i>Microstegium vimineum</i>
Japanese wisteria	<i>Wisteria floribunda</i>
Juniper sedge	<i>Carex juniperorum</i>
Kirtland's warbler	<i>Dendroica kirtlandii</i>
Kudzu	<i>Pueraria lobata</i>
Lady fern	<i>Athyrium felix-femina</i>
Large white trillium	<i>Trillium grandiflorum</i>
Large whorled pogonia	<i>Isotria verticillata</i>
Largemouth bass	<i>Micropterus salmoides</i>
Lilliput	<i>Simpsonaias ambigua</i>
Lined sedge	<i>Carex striatula</i>
Little brown bat	<i>Myotis lucifugus</i>
Little headed nutrush	<i>Scleria oligantha</i>
Little spectaclecase	<i>Toxolasma parvus</i>
Lizard's tail	<i>Saururus cernuus</i>

Common Name	Scientific Name
Logperch	<i>Percina caprodes</i>
Louisiana waterthrush	<i>Seiurus motacilla</i>
Madrone	<i>Arbutus menziesii</i>
Manzanita	<i>Arctostaphylos manzanita</i>
Marshes St. John's wort	<i>Triadenum tubulosum</i>
Mayapple	<i>Podophyllum peltatum</i>
Mile-a-minute	<i>Polygonum perfoliatum</i>
Mink	<i>Mustela vison</i>
Morrow (Fly) honeysuckle	<i>Lonicera morrowi</i>
Mottled sculpin	<i>Cottus bairdi</i>
Mountain maple	<i>Acer spicatum</i>
Mourning dove	<i>Zenaida macroura</i>
Mud salamander	<i>Pseudotriton montanus</i>
Multiflora rose	<i>Rosa multiflora</i>
Musclewood	<i>Carpinus caroliniana</i>
Muskrat	<i>Ondatra zibethicus</i>
Narrow-leaved cattail	<i>Typha angustifolia</i>
New York fern	<i>Thelypteris noveboracensis</i>
Northern beech fern	<i>Thelpteris phegopteris</i>
Northern bobwhite	<i>Colinus virginianus</i>
Northern harrier	<i>Circus cyaneus</i>
Northern monkshood	<i>Aconitum noveboracense</i>
Northern panic grass	<i>Dichanthelium. boreale</i>
Northern red oak	<i>Quercus rubra</i>
Northern watersnake	<i>Natrix sipedon sipedon</i>
Oak fern	<i>Gymnocarpium dryopteris</i>
Ohio lamprey	<i>Ichthyomyzon bdellium</i>
Olympia marble	<i>Euchloe olympia</i>
Opossum	<i>Didelphis virginiana</i>
Ovenbird	<i>Seiurus aurocapilla</i>
Pale straw sedge	<i>Carex albolutescens</i>
Partridgeberry	<i>Mitchella repens</i>
Peregrine falcon	<i>Falco peregrinus</i>
Periwinkle or myrtle	<i>Vinca minor</i>
Persimmon	<i>Diospyros virginiana</i>
Philadelphia panic grass	<i>Dichanthelium bicknellii</i>
Pigeon grape	<i>Vitis cinerea</i>
Pignut hickory	<i>Carya glabra</i>
Pileated woodpecker	<i>Dryocopus pileatus</i>
Pine warbler	<i>Dendroica pinus</i>
Pink mucket pearly mussel	<i>Lampsilis abrupta (=orbiculata)</i>
Pinxter flower	<i>Rhododendron nudiflorum</i>
Pitch pine	<i>Pinus rigida</i>
Post oak	<i>Quercus stellata</i>
Prairie warbler	<i>Dendroica discolor</i>
Princess tree	<i>Paulownia tomentosa</i>
Purple loosestrife	<i>Lythrum salicaria</i>
Rabbit	<i>Sylvilagus floridanus</i>

Common Name	Scientific Name
Raccoon	<i>Procyon lotor</i>
Rapids clubtail	<i>Gomphus viridifrons</i>
Red elder	<i>Sambucus pubens</i>
red maple	<i>Acer rubrum</i>
Red-headed woodpecker	<i>Melanerpes erythrocephalus</i>
Reed canary grass	<i>Phalaris arundinacea</i>
River otter	<i>Lutra canadensis</i>
Roanoke darter	<i>Percina roanoka</i>
Rock skullcap	<i>Scutellaria saxatilis</i>
Round hickorynut	<i>Obovaria subrotunda</i>
Royal fern	<i>Osmunda regalis</i>
Ruby-throated hummingbird	<i>Archilochus colubris</i>
Ruffed grouse	<i>Bonasa umbellus</i>
Running buffalo clover	<i>Trifolium stoloniferum</i>
Russian olive	<i>Elaeagnus angustifolia</i>
Salamander mussel	<i>Villosa lienosa</i>
Sassafras	<i>Sassafras albidum</i>
Sauger	<i>Stizostedion canadense</i>
Savannah sparrow	<i>Passerculus sandwichensis</i>
Scarlet oak	<i>Quercus coccinea</i>
Serviceberry	<i>Amelanchier arborea</i>
Shagbark hickory	<i>Carya ovata</i>
Sharp-shinned hawk	<i>Accipiter striatus</i>
Sheepnose	<i>Plethobasus cyphus</i>
Shellbark hickory	<i>Carya laciniosa</i>
Shingle oak	<i>Quercus imbricaria</i>
Shortleaf pine	<i>Pinus echinata</i>
Silver maple	<i>Acer saccharinum</i>
Slippery elm	<i>Ulmus rubra</i>
Small Carpgrass	<i>Arthraxon hispidus</i>
Small whorled pogonia	<i>Isotria medeoloides</i>
Smallmouth bass	<i>Micropterus dolomieu</i>
Smooth beardtongue	<i>Penstemon laevigatus</i>
Smooth brome	<i>Bromus inermis</i>
Snubnose darter	<i>Etheostoma simoterum</i>
Solomon's seal	<i>Polygonatum biflorum</i>
Song sparrow	<i>Melospiza melodia</i>
Sour gum	<i>Nyssa sylvatica</i>
Sourwood	<i>Oxydendrum arboreum</i>
Southern arrowwood	<i>Viburnum dentatum</i>
Southern blue monkshood	<i>Aconitum uncinatum</i>
Sparse-lobed grape fern	<i>Botrychium biternatum</i>
Spotted bass	<i>Micropterus punctulatus</i>
Stonecrop	<i>Sedum ternatum</i>
Striped gentian	<i>Gentiana villosa</i>
Striped maple	<i>Acer pensylvanica</i>
Sugar maple	<i>Acer saccharum</i>
sugar maple	<i>A. saccharum</i>

Common Name	Scientific Name
Sycamore	<i>Plantanus occidentalis</i>
Tall nut rush	<i>Scleria triglomerata</i>
Tangerine darter	<i>Percina aurantiaca</i>
Tatarian honeysuckle	<i>Lonicera tatarica</i>
Timber Rattlesnake	<i>Crotalus horridus</i>
Tree of heaven	<i>Ailanthus altissima</i>
Trumpet creeper	<i>Campsis radicans</i>
Umbrella magnolia	<i>Magnolia tripetala</i>
Upright carrion flower	<i>Smilax ecirrata</i>
Virginia knotweed	<i>Polygonum virginianum</i>
Virginia pine	<i>Pinus virginiana</i>
Virginia Spiraea	<i>Spiraea virginiana</i>
Wabash river cruiser	<i>Macromia wabashensis</i>
Walleye	<i>Stizostedion vitreum</i>
Warmouth	<i>Lepomis gulosus</i>
Water milfoil	<i>Myriophyllum heterophyllum</i>
Western lake chubsucker	<i>Erimyzon sucetta</i>
White ash	<i>Fraxinus americana</i>
White clover	<i>Trifolium repens</i>
White oak	<i>Quercus alba</i>
White snakeroot	<i>Eupatorium rugosum</i>
White sweet-clover	<i>Melilotus alba</i>
White-footed mouse	<i>Peromyscus leucopus</i>
White-tailed deer	<i>Odocoileus virginianus</i>
Whorled yam	<i>Dioscorea quaternata</i>
Wild ginger	<i>Asarum canadensis</i>
Wild grape	<i>Vitis spp.</i>
Wild turkey	<i>Meleagris gallopavo</i>
Wineberry	<i>Rubus phoenicolasius</i>
Winged burning bush	<i>Euonymus alatus</i>
Wingstem	<i>Verbesina spp</i>
Wintercreeper	<i>Euonymus fortunei</i>
Witch hazel	<i>Hamamelis virginiana</i>
Wood duck	<i>Aix sponsa</i>
Wood nettle	<i>Laportea canadensis</i>
Wood thrush	<i>Hylocichla mustelina</i>
Worm-eating warbler	<i>Helmitheros vermivorus</i>
Yellow birch	<i>Betula alleghaniensis</i>
Yellow buckeye	<i>Aesculus octandra</i>
Yellow crownbeard	<i>Verbesina occidentalis</i>
Yellow gentian	<i>Gentiana alba</i>
Yellow poplar	<i>Liriodendron tulipifera</i>
Yellow sweet-clover	<i>Melilotus officinalis</i>
Yellow-breasted chat	<i>Icteria vireus</i>
Yellow-fringed Orchid	<i>Platanthera ciliaris</i>
Yellowish gentian	<i>Gentiana alba</i>
Zebra mussel	<i>Dreissena polymorpha</i>