**April, 2002**

# MANAGEMENT PLAN FOR KUMBRABOW STATE FOREST

by the
West Virginia Division of Forestry

## TABLE OF CONTENTS

# FOREST MANAGEMENT PLAN FOR KUMBRABOW STATE FOREST

## I. GENERAL DESCRIPTION OF THE FOREST

## INTRODUCTION

West Virginia's State Forests were established as areas to demonstrate proper forest management. A managed forest can provide many benefits not realized in an unmanaged forest. Management practices enable foresters to maintain tree vigor at optimum levels. Vigorously growing trees are better able to withstand stresses such as insect and disease attacks; they are better producers of oxygen, and consumers of carbon dioxide, and they provide more food for wildlife.

Managed forests contain road systems which enable better protection from fire and afford better chances of detecting insect and disease problems. These roads provide linear habitat important to some species of wildlife. Road systems also enhance recreational potential for an area such as hiking, biking and horseback riding and provide access for hunters and nature enthusiasts. A managed forest provides habitat necessary to sustain certain plant and wildlife species.

West Virginia's State Forests were first inventoried in the 1950's, and again in the late 1960's. Management plans were prepared in 1971. The first ten year plan primarily focused on timber management aimed at improving the overall potential to achieve multiple uses of the forest resource. As these forests develop, and other broad management objectives become achievable, more emphasis is placed on other aspects of the forest, and the coordinated use and development of these resources. Consideration is now being given to both the economic and social benefits of the various forest resources with emphasis on sustaining and increasing the diversity of the forest. This forest resources improvement plan will be in effect from 2001 to 2011; with periodic updates incorporating changes as necessary during this period.

## A. HISTORY OF THE FOREST

This forest had a history rich in timber harvest and utilization, prior to its acquisition by the State from the Midland Corporation, December 29, 1934. No less than four major sawmill companies cut timber from the area. Spur railroad lines (right-of-way remnants are still quite obvious) were constructed up each main tributary to remove the timber. The Alexander Boom and Lumber Company started operation in 1880, at Alexander. The J. Natwick Company completed the last operation in 1920. Fires followed these early harvests.

The forest was named after three prominent men who were responsible for the purchase of the area by the state. They were Governor Herman G. Kump, Spates Brady and Hubert Bowers -- Kum-Bra-Bow.

Two Civilian Conservation Corps (CCC) camps were established on or near the forest to develop the area. They were at Elkwater near the forest, and the head of Mill Creek (Camp Bowers), on the forest. The CCC enrollees were responsible for building nine miles of access roads through the forest and seven miles of horse trails. They also built five rustic log cabins, eight table and bench combinations, three stone fireplaces, and picnic shelters. Most of these remain as monuments to the "Three C's".

During the late 1950's and the early 60's some timber was harvested from the forest under a vague and open ended contract with Benson Lumber Company at Adolph. Due to some criticism from competing firms and dissatisfaction with the contract by the parties involved, the contract was canceled. The areas actually logged were in the Phillips Camp and Beech Run drainages. This early logging was well done and most areas have since been cut again.

From the end of the first logging activity until the mid 70's, growth was spectacular. Around 1975 it was decided that some new silvicultural prescriptions were needed. In 1977 the first of many timber harvests was completed. The first harvest area, known as the Trout Run Harvest, was a pioneer effort in the management of state forest timber. As a result of the success of this project, a comprehensive program of silvicultural work was initiated as an integral part of the management of all state forests with the exception of Kanawha State Forest.

As of 2001, seven timber harvests had been completed following the 1970 comprehensive forest management plan. These harvests averaged about 200 acres each in size and were about 1.2 million board feet each. Several clearcuts were done as parts of these prescriptions. They varied in size from 1 acre to 15 acres. A large area of the forest is covered with timber types which have black cherry as a major component. Many of the management practices used on Kumbrabow are designed to retain, enhance, and encourage the development of this and other shade intolerant species. Species which are intolerant of shade, tend to be the more valuable species for forest products, wildlife food, forage and shelter.

## B. RECREATIONAL ASPECTS OF THE FOREST

All of our state forests support recreational activities to one degree or another. Kumbrabow supports the needs of several recreational activities. The largest capital commitment to recreation is represented by the operation of six rustic cabins, one of these newly constructed to current access standards. These cabins are rented to the public during all but the winter months, closing for the season just after Christmas. The popularity of the cabins is evident in the fact that reservations are necessary usually a year in advance, and many of the renters are repeat customers. The rustic nature of the cabins blends well with the remote location of the forest.

Some day use of the facility is also available for the local population. Picnic and playground facilities are a favorite of the residents of the area. These facilities are also used by the cabin guests, and users of the campgrounds. The campgrounds are located within easy access of Mill Creek as are the cabins.

Mill Creek provides an excellent opportunity to sample the area's native brook trout fishing. All fish in the forest's section of Mill Creek are natives. A project initially financed in part by the Division of Forestry and coordinated by the Fisheries Section of the Division of Natural Resources is currently introducing limestone fines into the stream to improve the fertility of the water and enhance the growth of the fish. This project has been very successful to date and will be continued as long as it is beneficial to the stream. Other forest streams are being evaluated for treatment with the same goals.

A major recreational activity pursued on Kumbrabow is hunting. The forest provides excellent opportunities to hunt deer, bear, and turkey, along with grouse, raccoons, gray squirrels, and other small game. A significant number of the recreationists, that venture outside of the improved recreation are, are pursuing hunting related activities.

Some hiking, biking, and birdwatching, occurs, but at present only to a limited extent. The popularity of these activities is on the increase.

## C. MANAGEMENT RESPONSIBILITIES

Responsibility for the management of the state forest varies according to the particular facet of management being considered. The existence of Memoranda of Understanding, agreements and cooperation between agencies facilitate the management effort.

The West Virginia Division of Natural Resources, Land and Real Estate Section holds title to the property and has the responsibility for leases, agreements and ownership authority involving the forest.

The Division of Natural Resources, Wildlife Resources Section, has the responsibility to manage and maintain wildlife habitat, which includes fisheries management in area

streams and rivers, maintaining food plots, manipulating open areas, conducting research and data collection, some limited law enforcement, and advising other agencies with regard to wildlife needs.

The Division of Natural Resources, Parks and Recreation Section is responsible for the management of the developed facilities dedicated to recreation. These include the cabins, campgrounds, and picnic areas along with their accompanying acreages totaling 482 acres. The superintendent of the forest has a wide array of law enforcement powers on the facility. Since the Parks personnel live on the forest and work there daily, they handle many patrol, maintenance and emergency duties.

The Division of Highways is responsible for maintenance of all forest roads which are included on their county road inventory. These are County Routes 45 (Turkeybone Road), 219/16 (main forest access road), and 219/26 (cabin access road).

The Division of Forestry has within its jurisdiction and supervision the **state forests**, other forests and woodland areas, the protection of forest areas from injury and damage by fire, disease, insects and other pestilences and forces, the management of forest areas for natural resources, conservation and undeveloped recreational activities, ...(§19-1A-3)

The Division of Forestry is charged by law to manage the forest for "silviculture and scientific research, developed and undeveloped outdoor recreation; propagation of forest trees, fish and wildlife; wildlife and fish management; aesthetic preservation; hunting and fishing; timber production; and demonstration of state-of-the-art forestry management" i.e. multiple-use management (§19-1A-1).

Additional duties of the Division of Forestry include road maintenance as needed, development of recreational opportunities beyond the improved recreation area and maintaining the painted boundary.

## D. PHYSICAL FEATURES

### 1.) Area, Location, and Boundaries

Kumbrabow is located in the southwestern section of Randolph County, the state's largest county. Randolph County is located in the east-central portion of West Virginia, along the western edge of the Allegheny Highlands. The forest covers 9,165 acres atop Rich Mountain, the last major ridge to the west of the Appalachian Mountain Range.

The closest settlements are Helvitia to the northwest, Pickens to the west, Monterville to the south, Valley Head to the southeast, and Huttonsville to the northeast. Access is by US. Route 219 from Huttonsville or Valley Head to County Route 219/16, or by County Route 45 from State Route 15 at Monterville. From Upshur County in the west County Route 45 is met by State Route 20.

Precipitation which falls within the boundaries of the forest drain into the Back Fork of Elk River, the Left Fork of the Buckhannon River, the Middle Fork River, Mill Creek (a major tributary of the Tygart Valley River), or the Elkwater Fork of the Tygart Valley River. This area is truly one of the primary divide locations in the state.

### 2.) Topography, Geology, and Climate

The elevation of Kumbrabow varies from a low of 2300' at the mouth of Mowry Run on Elkwater Fork of the Tygart Valley River, to a high of 3930' at Whitman Knob on the divide between the Back Fork of Elk River, Buckhannon River, and the Tygart Valley River drainage. The majority of the forest rests at elevations of 3000'-3500'. As a result the forest of Kumbrabow exhibits a definite northern character.

The property is centered on the Mill Creek drainage. There are several large streams which feed Mill Creek. The topography of this area consists of mostly moderate slopes culminating in long flat ridges. More severe slopes exist on the portions of the forest which descend toward the primary river drainage basins. Much of the area is covered with large surface rocks and an occasional talus slope.

Mowry Run drains into Elkwater Fork, Clay Run flows directly into the Tygart Valley River below Elkwater Fork, as does Mill Creek. Glade Run, Trout Run, Barkswitch, Meatbox, Potatohole, and Oxley Run all feed into Mill Creek. Beech Run, Phillips Camp, and Morgans Camp Runs flow into the Left Fork of the Buckhannon River. The Back Fork of Elk River heads up against the Turkey Bone Road near Whitman Knob. The Middle Fork River heads up against the peak of Spanoak Corners.

The backbone of this area is Rich Mountain which is the major divide between the Tygart Valley and the west. Rich Mountain is also the last major ridge of the Appalachian Mountains going west. Other prominent ridges on the forest include Mill Ridge, Piney Ridge, and Beech Mountain. High points include Cherry Knob, Spanoak Corners, Buck Knob, Whitman Knob, and a high point on Mill Ridge sometimes referred to as Haystack.

Below Cherry Knob on Mill Creek, in the cabins area, is a 6 to 8 foot falls with a nice pool at the bottom. Above the campground on Mill Creek is a rock outcrop known as the Raven Rocks. This formation offers some limited vistas. On Rich Mountain, two reclaimed mine openings provide some mountain meadow type habitat. Near Whitman Knob, at the site of a one time CCC camp, an area of about 30 acres provides an upland glade habitat. Beavers inhabit this area from time to time, as they do a couple of other sites especially in the head of Potatohole Fork.

Kumbrabow State Forest, due to its position along the first major ridge from the west of the Appalachians, and situated above Pickens, the wettest reporting station in the state, has earned the forest its reputation as the wettest of the state forests. The average annual rainfall reported for Pickens is in excess of 66 inches. The average rainfall on the forest is 64 inches. The highest recorded snow fall for West Virginia, 301 inches, was recorded

on the forest in 1959. Temperature extremes for this area range from approximately 30° below 0°F to near 100°F. The temperatures are almost always lower on the forest than in the rest of the state. The frost free season usually runs from May 10, to September 30. In recent years this area has been hit by severe storms, which result in down or damaged trees, about once every five years.

### 3.) Minerals

According to the deeds the state owns in fee 6,780 acres. A reserve of coal under 2,650 acres of the forest is located south and west of the divide between Mill Creek and the other drainage basins. Mining was done in this area in the past, and from time to time companies become interested in prospecting the area again. Drilling proposals are more frequent than actual drilling, however. It seems that the coal is not of the best quality and the seams exhibit erratic formation, making mining risky. No interest in possible oil and gas development has been evident. Limestone underlies much of the forest, but has never been explored. No other known resources of this nature are present on the forest property.

When mineral exploration does occur, the Division of Forestry works with the other agencies involved insuring that the principles of multiple-use are followed. The Division of Natural Resources, Land and Real Estate Section holds title to all the surface property and the portion of minerals held in fee. All arrangements with license agreements and leases are handled through that office. Access roads and other surface disturbances are overseen by the Division of Forestry. Road lay out and location approval is controlled by Forestry personnel. The timber to be removed for necessary exploration and extraction work is designated and appraised by the Division of Forestry and the company involved is invoiced for the timber value. Reclamation, including choices of seed mixtures are decided in cooperation with the Wildlife Resources section of the Division of Natural Resources.

### 4.) Soils

The soils of Kumbrabow have been classified and described by the Soil Conservation Service (now known as the Natural Resources Conservation Service) of the U. S. Department of Agriculture. These soils, typical of upland sites in this area, are generally fertile, but due to various limitations, best suited for woodland. They have been grouped according to their natural associations and are described as follows:

a.) Buchanan and Ernest Complex

One of two soil families which cover the majority of the forest; the Buchanan and Ernest soils are mapped together because they have no major differences in their use or management, and are often found in association. These soils have moderate available water capacity. Primarily located along stream courses within the forest, these soils can extend up slope in coves sites as water channels develop. They have a high potential for tree production. Erosion is of some concern, but use of Best

Management Practices (BMP's) and limitation of activity during wet periods generally prevents problems.

Site indexes range from 75-85 for oaks and black cherry, to 85-95 for yellow poplar. Annual growth estimates for these soils are 320 board feet per acre per year for oaks and 440 board feet per acre per year for yellow poplar. The windthrow hazard is slight. The natural stands common in these soils include the high value cove hardwoods and the better shade tolerant species. These soils developed from acid materials.

b.) Gilpin - Dekalb Complex

The other primary soils association on the forest is the Gilpin-Dekalb complex. This complex generally occurs on the steeper more exposed slopes of the mountains. These soils are intermingled and demonstrate similar characteristics. In spite of the high rainfall in this area these soils have low to moderate available water capacities. They are strongly acid having developed from acid materials and often have shallow depths of two to four feet limiting root development.

The high potential for trees is divided among good to very good sites. Erosion is a major concern and due to slope restrictions, the use of BMP's is mandatory to avoid problems. Site indexes range from 65-85 for oak and cherry, to 75-95 for yellow poplar. Estimates for average annual growth per acre range from 250-320 board feet for oaks to 265-440 board feet for yellow poplar. Windthrow hazard is slight to moderate on these soils. Seedling mortality can be severe on the poorer aspects. Black cherry, maple and beech dominate the natural stands.

Several other soil types are present on Kumbrabow. They include Belmont, Berks, Brinkerton, Calvin, and Cookport soils.

## E. PROTECTION (HISTORICAL-CURRENT THREATS)

A constant threat to the prosperity of any woodland arises from insect and disease attacks. On rare occasions an assault from these quarters can significantly change the character of a forest. Such an assault occurred when the chestnut blight invaded this state. Most of Kumbrabow was spared because of a lack of chestnut trees. In the areas where the tree was present it was lost as it was everywhere else. A pest of the future with the same potential is the gypsy moth. Although most destructive in oak forests, large infestations could significantly affect the cherry stands of Kumbrabow.

Many pests influence the development of the forest, but only rarely have the impact of a gypsy moth or chestnut blight invasion. Among these have been a recent defoliation of mixed species thought to have been caused by the looper complex. This complex is a

group of three insects of similar habits which do similar damage and are often found together. After some defoliation in 1988-89, no further attacks have been noted.

One common pest on the forest is black knot on the black cherry population. Some areas are infected worse than others. The Rich Mountain area seems to be particularly hard hit. Although generally not devastating, the disease can and does do significant damage to individual trees and to some stands. Nectria cankers in birch are also common on the forest. Many of the birch on the forest also exhibit Inonotus obliquus which rots the main stem of the tree leaving hollow shells susceptible to storm damage. Again infected trees are removed whenever possible.

Nectria also plays a part in beech bark disease. First noted in the 1980's on Guadineer Knob on the Randolph, Pocahontas County line, this disease has spread throughout the highlands devastating beech stands. First signs of the problem occur when small white scale insects attack a beech. Soon, dark runny sores appear on the bark of the tree. The bark begins to die in patches associated with these sores. Eventually the tree is girdled and quickly dies. Prior to death the resultant wounds are invaded by the nectria fungus causing severe degrade in the tree. Most trees are not salvageable within weeks of discoloration of the leaves.

Pear thrips in maple are another new problem. These tiny insects invade the buds of host trees and cause severe leaf deformity leading to defoliation, tree decline and sometimes death.

Other potential problems include oak wilt and an assortment of decays. With only limited stands of oak on the forest, oak wilt will be limited in its affect, if and when it invades. There is only limited occurrence of the disease in Randolph County, and none known in Webster at this time. The array of decay organisms in this area is typical of the entire Appalachian region. Although a serious problem in the hardwood forests, their presence is manageable.

There is a history of fire on this forest. In 1920 a large fire burned much of the previously harvested area. A fire in the 1930's burned a lot of the area that was not burned in the 1920 fire. Fire control and prevention was one of the priorities of the Conservation Commission (predecessor to the Forestry Division), when the state purchase this property in 1934. There is currently a memorandum of understanding between the Division of Forestry and the Parks and Recreation Section of the Division of Natural Resources, which established a protection boundary around the forest and the initial attack responsibility of the resident Parks personnel. The Division of Forestry has provided a cache of fire fighting tools for use within the protection boundary.

A major influence on the development of the forest was a free range law in Randolph County that was in effect into the mid 1950's. The grazing of livestock was allowed anywhere in the open, no fencing was required.

## F. FLORA AND FAUNA

### 1.) Cover Types

Forest cover type is a "descriptive classification of forest land based on present occupancy of an area by tree species," according to the Society of American Foresters publication Forest Cover Types of the United States and Canada. Several classification systems have been developed over the years. All have had some shortcomings which usually have resulted in another attempt at classifying the forest. The system followed in the previous (1969) Kumbrabow plan used a scheme devised by the Renewable Resource Evaluation Group (RRE) of the U.S. Forest Service. This scheme recognized ten Eastern forest type groups and ten Western forest type groups. These type groups were oak-hickory, beech-birch-maple, oak-pine, etc.

This plan relies on the more refined classification developed by the SAF and published as Forest Cover Types of the United States and Canada 1980. Classification is based on basal area of the predominate species or species combination. The term pure means stocking of 80 percent or more by a single species, majority means half or more of the stocking, and plurality indicates the largest proportion of stocking when combined and each being at least 20 percent when taken alone.

Several forest cover types occur on Kumbrabow. Those occurring on the forest, and described in the Society of American Foresters' "Forest Cover Types of the United States and Canada," 1980; are listed and paraphrased as follows:

**Red Spruce-Sugar Maple-Beech** - SAF type #31 (RRE Type group spruce-fir)

Sugar maple and beech predominate in this type. Red spruce is a minor but characteristic component comprising 20% of the basal area and occasionally more. Associated tree species are eastern hemlock, yellow birch, red maple, and black cherry.

This type occurs in southern Canada, and northern New England, through the Adirondacks, and along the ridges of the Appalachians into this area. On the forest this type occurs above 3,500' and is more prominent along Rich Mountain, Mill Ridge, and along Phillips Camp Run.

Red spruce-sugar maple-beech, if undisturbed, is a climax forest cover type. The red spruce regeneration that occurs in undisturbed stands, although far outweighed numerically by that of sugar maple and beech, is usually sufficient to maintain the type composition. Some of this type probably occurs where originally pure stands of red spruce were found. The absence of cultural practices designed to maintain the proportions of spruce, has converted much of the type to a sugar maple-beech forest with only an

occasional red spruce. With heavy disturbance, the type yields to earlier successional stages dominated by such species as red maple, striped maple, pin cherry, and occasionally quaking aspen.

**Eastern Hemlock** - SAF type #23 (RRE type group white-red-jack pine)

Eastern hemlock is pure or provides a majority of the stocking. Among the common associated species in northern forests are white pine, balsam fir, red spruce, sugar maple, beech, and yellow birch. Other associates in the East include northern red oak, white oak, yellow poplar, basswood, black cherry, red maple, and white ash.

This type extends from southern Canada, southward through the Appalachians to northern Georgia and Alabama. In this area the type may be found at all elevations. It is also most prevalent along the moist cool valleys, and can be found on moist flats, north and east slopes, coves, and benches. Soils are generally acidic and well drained.

Hemlock is very tolerant of low light intensities. Seedlings, which germinate on moist well-decomposed litter, rotten wood, mineral soil, or moss mats, can live with as little as five percent of full sunlight. Adequate available moisture is the key to early survival. The species' long life span and remarkable ability to respond to release from suppression for up to 200 years accounts in large part for the continuance of the type. Early logging and especially the fires which followed it greatly reduced the occurrence of the shallow-rooted, thin barked hemlock. Once dominant along most if not all stream courses in this area the type seems to be gradually reclaiming its former haunts.

**Sugar Maple** - SAF type #27 (RRE type group maple-beech-birch)

Sugar maple usually comprises a majority of the stocking and frequently occurs in pure stands. Several other species are commonly present, although each will constitute less than 20% of the total basal area. Typical associates include white ash, basswood, beech, yellow birch, red maple, red spruce, northern red oak, hophornbeam, black cherry, black birch, eastern hemlock, yellow poplar, and cucumber magnolia.

This type is most commonly found in the Great Lakes area and upper elevations of New England and the southern Appalachians. In this area the type is more likely to be found above 3,000'. Best development occurs on the deeper silt-loam soils with good drainage and moderate acidity. Although site-indexes vary widely, the majority of the type occupies sites of 60-65. The common associates tend to have higher site-indexes on the same sites.

The successional development of the type is to a climax association with an increasing proportion of sugar maple. This species tends to increase because of its seed's ability to germinate at low temperatures and develop a vigorous root capable of penetrating heavy litter. Most of the associated species require higher temperatures for germination and at least partially disturbed seedbeds for seedling establishment and early growth. In addition, sugar maple completes seasonal growth earlier and requires less light for optimum photosynthetic activities than most of its competitors.

The broad range of the type results in considerable association with and transition to other forest types. In the northern hardwood region of the U.S. the type frequently merges into sugar maple-basswood, beech-sugar maple, sugar maple-beech-yellow birch, black cherry-maple, and red spruce-sugar maple-beech. In the eastern and southern portion of the type range the transition is frequently to yellow poplar or to the yellow poplar-white oak-northern red oak type.

**Sugar Maple-Beech-Yellow Birch** - SAF type #25 (RRE type group maple-beech-birch)

Sugar maple, beech, and yellow birch are the major species and together comprise most of the stocking. Associated in varying mixtures are red maple, hemlock, white ash, black cherry, basswood, black birch, northern red oak, American elm, slippery elm, red spruce, and hophornbeam. Yellow birch although present, diminishes in importance within the type southward from the Adirondacks. In young stands that follow drastic disturbance, pin cherry, fire cherry, quaking aspen, and bigtooth aspen are associates. The early selective cutting of hemlock for tanbark accounts in part for the lesser proportions of this species in present stands.

Prominent in the northern Appalachians, this type extends into the southern mountains, occurring at ever increasing elevations. All elevations in Kumbrabow are potential sites for the type. The best development occurs on moist, well drained, fertile loamy soils. Sugar maple, its principal component, unifies the association and is the least site sensitive of the three species. It is absent only at the extremes of soil drainage. Where the type occurs on wet sites, it blends into a red maple-yellow birch-hemlock mixture. On the drier sites beech becomes increasingly prominent.

Even-aged stands originating after clearcutting and natural disasters have varying representations of locally indigenous shade-tolerant species. Uneven-aged stands resulting from partial cuttings or no disturbance have sharply decreased representations of the shade-intolerant species with an accompanying increase in the tolerant sugar maple and beech and very tolerant hemlock. The type tends to be climax; where hemlock is present and

there is no major disturbance, this species, with its greater shade tolerance and normally longer life span, outlasts the hardwoods. Throughout the range, the blending of different subtypes and variants, past land use, cutting histories, soil characteristics, and differential deer browsing all significantly affect conditions, structure, and composition of the type.

Fire is generally unimportant and few insects attack all species present in the type. In this area beech seems to be more susceptible to a variety of diseases than the other primary species. Yellow birch is often limited by nectria infestations. Browsing by deer seems to have little impact on this timber type.

The type blends into many types identified as parts of the northern hardwood forest, among them black cherry-maple, beech-sugar maple, and sugar maple.

**Sugar Maple-Basswood** -SAF type #26 (RRE type group maple-beech-birch)

Sugar maple and basswood occur in different proportions but together comprise the majority of the stocking. The proportion of basswood is the most variable; this tree may be considered the key species in the type. Several other species are usually found in the mixture, among them white ash, northern red oak, hophornbeam, and elm. Additional species frequently present in this type include red maple, hemlock, bitternut hickory, butternut, and several species of oak.

Although primarily a cover type of Minnesota and Wisconsin, this type does occur on Kumbrabow primarily on moist sites. Frequently associated with well-drained loams and silt loams; the soils are moderately acid and generally fertile because of the high nutrient concentrations in basswood leaves.

Basswood and the associates white ash, northern red oak, and American elm exhibit rapid growth rates as compared to sugar maple. Sugar maple and basswood are both prolific seed producers, but basswood regeneration from seed is not common. Basswood is unique in that regeneration through stump sprouts develops without defect or loss of growth vigor. While the type is usually considered climax, slow succession toward sugar maple occurs, largely because basswood and many of the associated species do not readily regenerate from seed. The type will blend into the sugar maple type, the sugar maple-beech-yellow birch, beech-sugar maple, or the drier oak types.

**Black Cherry-Maple** - SAF type #28 (RRE type group maple-beech-birch)

Black cherry, sugar maple, and red maple together comprise a majority of the stocking, with beech and white ash commonly present. The proportions of these five species vary from complete absence of one or more to nearly pure stands of a single species. Although no typical composition exists, many stands, measured in basal area, would fall in the range of 20-50% black cherry, 10-40% sugar maple, 10-30% red maple, 5-15% beech, and 0-20% white ash. This is currently the most important cover type on Kumbrabow.

Common associates include yellow birch, black birch, yellow poplar, hemlock, cucumber magnolia, basswood, red oak, and butternut. Pin cherry or fire cherry and striped maple are common in young stands. Any of the associated species may account for a significant percentage of the basal area in individual stands, but on the average they represent only 5-10% of the composition throughout the type.

This type is the predominant cover type on the Allegheny Plateau of northern Pennsylvania and southern New York. It also occurs along the mountains south through West Virginia and into the southern Appalachians. It may be on poorly drained to well drained soils of the sandy loam to silt loam variety.

Present black cherry-maple stands originated from a series of commercial cuttings during the last half of the nineteenth or early part of the twentieth century. Most areas of the original forest received several cuts. In many cases, early partial cuttings for spruce or selected hemlock or hardwood sawlogs were followed by clearcutting - either for sawlogs only or for both sawlogs and cordwood. Some clearcuts for pulpwood removed all but a very few small stems. The many combinations and variations of cutting produced stands of different species composition, structure, density, and age arrangements.

The type includes species that vary widely in growth rate and tolerance to shade. The intolerants tend to grow faster than the tolerants. As a result the stands tend to become stratified, with intolerants making up a large proportion of the canopy and upper diameters, and the tolerants mostly relegated to the lower canopy and small diameters. This two-storied effect is most pronounced in the truly even-aged stands that followed the heaviest clearcuts for pulpwood. Such stands also usually have the largest percentages of cherry or ash and the fewest number of species. Stands that were less completely clearcut often have more species, a wider range of diameters within each species, and a many storied-canopy, giving them a

multi-aged structure and appearance in spite of the usually narrow range of ages present.

This type represents an intermediate stage in the ecological succession of the region. Species characteristic of the type normally exist as small advance seedlings in the understory or as seeds buried in the forest floor. After cutting or other disturbance, these advance seedlings and buried seeds - plus stump sprouts - provide the basis for the next stand. Other earlier successional species also often get started after disturbance, and these plants may temporarily predominate. Fire cherry, striped maple, aspen, and black birch will fill this role. However, the more desirable species usually assume dominance within 5-10 years. Sometimes, however, lack of seed or advance seedlings reduces the black cherry-maple regeneration and results in retarded development. The type may be similarly reduced by fire, heavy deer browsing, poor soil drainage, or interference from understory plants.

If left undisturbed, black cherry-maple stands can be expected to succeed gradually to a beech-hemlock-sugar maple climax. This will occur over a period of one hundred to several hundred years as the less tolerant species mature, die, and are replaced by shade-tolerant species. An exception occurs where heavy deer browsing on hemlock and sugar maple alters this successional trend towards a pure climax of the less palatable beech.

The black cherry-maple is itself a variant of the broad northern hardwood type. The type differs from the main type primarily in that black cherry assumes a dominant role. Black cherry-maple gradually converts to the sugar maple-beech-yellow birch type, the beech-sugar maple type, or the sugar maple type in many places. All of these types are known locally as Allegheny hardwoods because their origin, ecology, and climax condition are basically the same.

Common understory vegetation in the type includes small seedlings of black cherry, white ash, sugar maple, beech, red maple, striped maple, and black birch. Larger stems of beech root suckers, black birch, striped maple, and serviceberry are also found in some stands. In some areas, particularly where the forest cover is unbroken, deer browsing often decimates tree seedlings. Often hay-scented fern, and New York fern will dominate the understory. These plants tend to spread when disturbed and can prevent successful germination of desirable tree seedlings.

**Beech-Sugar Maple** - SAF type #60 (RRE type group maple-beech-birch)

Beech and sugar maple together generally comprise a majority of the stocking, but the composition may vary from stands composed entirely of beech-maple to a mixture of species. On the forest common associates include yellow and black birch, eastern hemlock, white ash, red spruce, basswood, red maple, and black cherry. At lower elevations yellow poplar and red oak begin to mix with the type.

This type is considered climax, but often disturbances such as cutting, fire or grazing will delay succession. Generally the type is found on moist, well drained soils and on northern aspects. Frequently the upland oaks, northern hardwoods, and other hardwood types form subclimax stands on moist sites, but dense understories of beech and sugar maple develop and the type eventually becomes beech-sugar maple. Where disturbed repeatedly by cutting or fire, beech has a tendency to dominate. Often this type occurs with a variety of other species and may be considered a remnant of the beech-birch-maple type. On the forest this type is limited to elevations above 3,000'.

The beech-sugar maple type converts into numerous related types according to degree of disturbance and changes in site. Near the lower limits of its occurrence in Kumbrabow the type may change into upland oaks, hemlock, or black cherry-maple. At other boundaries black cherry-maple, sugar maple, or beech-birch-maple will occupy adjacent areas.

In young even-aged stands, short-lived species such as pin cherry, fire cherry, and striped maple are often quite prominent. Also yellow and black birch, as well as, other more shade intolerant species such as white ash, slippery elm, basswood, black cherry, and red oak are more common than in older stands.

In older stands, understory trees, shrubs, and vines are more prominent; they include grapevines, striped maple, hophornbeam, hornbeam, serviceberry, and dogwood.

**Red Maple** - SAF type #108 (RRE type group maple-beech-birch)

Red maple comprises a majority of the stocking. Because the type grows on a wide variety of sites over an extensive range, associates are diverse. Some of the more common for this area are red spruce, sugar maple, beech, black birch, hemlock, aspen, black cherry, red oak, and yellow poplar.

Previously red maple was recognized only as an associate of many different forest types. In recent years the proportion of red maple in many stands has increased dramatically, now frequently accounting for over half of the basal area; thus qualifying as a forest type.

While in aggregate the area in red maple is relatively large, the type seldom occurs in extensive, unbroken tracts; more often it is found in scattered stands that grade into and out of other types. In and around Kumbrabow the type is more common on moderately moist to dry sites. Red maple is very adaptable. Seedlings on wet sites form short taproots with long, well-developed laterals, but on dry sites they produce deeply penetrating taproots and much shorter laterals.

Red maple's recent expansion as a cover type is generally attributable to disturbance in stands where red maple was formerly only an associate. In some cases, the disturbance has left red maple as the dominant species. In stands that were partially cut, red maple was often left as an undesirable residual. These residual trees have responded to release by growing rapidly and increasing their proportion of the stocking.

More severe disturbance, such as fire and clearcutting has converted many mixed hardwood stands to red maple. The species produces a heavy seed crop nearly every spring, with trees as young as four-years old producing seed, and the seed germinates almost immediately. Thus, if a site has been burned or cut in winter or spring, red maple will have nearly a full growing season's head start over species that produce fall maturing seed. Equally important, red maple stumps and damaged seedlings develop vigorous sprouts. These tendencies cause red maple to be considered a pioneer species.

Most red maple stands on this forest are immature, with the majority of their stocking in saplings and poletimber trees. On upland sites, as these stands mature, the moderately tolerant and relatively short lived red maple will gradually give way to more tolerant species. On certain wet sites, though, red maple can probably maintain itself indefinitely as an enduring climax type.

On Kumbrabow, this type typically transitions into the black cherry-maple type. Other variants are possible if types with red maple as an associate species are disturbed and red maple is allowed to increase its stocking in the stand.

**White Oak-Black Oak-Northern Red Oak** - SAF Type #52 (RRE type group oak-hickory)

White oak, black oak, and red oak together comprise a majority of the stocking. Scarlet oak is occasionally present in this forest cover type, as well as, chestnut oak. Often one or more species of hickory are also components of the type, but seldom make up more than 10% of the stocking. Other tree associates are yellow poplar, red and sugar maple, white ash, slippery elm, basswood, cucumber magnolia, mountain magnolia, black cherry, black walnut, beech, and hemlock.

White oak is present over the range of sites from moist to dry. Red oak is more prevalent on moist sites, lower and middle slopes on north and east aspects, coves, and benches with deep, well-drained loamy soils. Black oak usually is most abundant on the drier south and west aspects, upper slopes, and ridges.

This type is subclimax to climax depending upon geographic location and site quality. On moist fertile sites, species other than the oaks, especially sugar maple, are likely to increase in the absence of fire or other disturbances. On some Kumbrabow sites, this type tends to be succeeded by types containing sugar maple, basswood, white ash, elms, beech and other more moist site species. This succession may be delayed by fire and grazing. Since natural fire has all but been eliminated, most delay can be attributed to heavy deer browsing. Also prescribed fire might be used to delay the succession. Some sites might see increases in yellow poplar, white ash, and the more moisture dependant species on good to excellent sites after disturbances such as clearcutting or windstorms. Without fire the more shade tolerant species such as sugar maple, beech, and elm are likely to increase on moist sites. On drier sites the type probably succeeds itself.

Several variants of this type result from the changing mixtures of oaks that occur. Important ones are white oak-red oak, white oak-black oak, black oak-red oak, black oak-scarlet oak, white oak-black oak-chestnut oak, black oak-scarlet oak-chestnut oak, and scarlet oak-chestnut oak. In these variants the named species comprise a majority of the stocking.

Some important understory trees and shrubs found in this type include dogwood, sassafras, sourwood, serviceberry, redbud, hornbeam, and hophornbeam, witch hazel, viburnums, spicebush, mountain laurel and rhododendron. Grape, greenbrier, Virginia creeper, and poison ivy are common woody vines.

**Northern Red Oak** - SAF Type #55 (RRE type group oak-hickory)

Northern red oak comprises a majority of the stocking; in limited areas it may occur in pure stands. Associated species vary according to site and geographic locality. On moist sites they include yellow poplar, black cherry, sugar maple, white ash, white oak, beech, buckeye, and black walnut. On dry sites the type is less frequently found, however, associates there are the other upland oaks, hickories, black gum, and red maple.

Although northern red oak trees grow through most of the northeast, the forest cover type occurs infrequently. In the Appalachians the type has a consistent but spotty distribution. It occurs in spots in and around Kumbrabow at elevations up to 3500'. In damper locations where the type most frequently occurs - coves, north and east slopes, and benches - growing conditions are excellent. Loam and silt-loam soils predominate and site indexes range from 65 to 90+ for upland oaks. Usually the type is subclimax, possibly a happenstance rather than a true stage in succession. Given time, undisturbed stands tend to develop greater proportions of species other than northern red oak, generally such shade tolerants as beech and sugar maple. The cover type also occurs occasionally in small stands on dry ridges and south and west slopes more typical of oak-hickory forests, which approach climax on these sites.

Variants include the yellow poplar-white oak-northern red oak type. Small tree and shrub associates that occur characteristically in this type are flowering dogwood, hophornbeam, hornbeam, serviceberry, sassafras, redbud, witch hazel, rhododendron, mountain laurel, and paw paw.

**Yellow Poplar** - SAF Type #57 (RRE type group oak-hickory)

Yellow poplar is pure or comprises a majority of the stocking in the type. It is associated with many different species, mostly those common to moist sites, but associates vary from region to region. Around Kumbrabow these can be sugar maple, red maple, beech, white ash, red oak, black cherry, cucumber magnolia, mountain magnolia, and black birch.

Although rare on Kumbrabow, the type is fairly common throughout the east. On the forest this type may be found in bottoms and small lower elevation coves. It's occurrence is probably due to site quality and previous stand disturbances. Wherever the type is found the site quality is high; site indexes range from 80 to well over 100 for yellow poplar. The species has been found to be more responsive to site quality differences than other Appalachian hardwoods, outgrowing them in height on the best sites. Soils tend to be moderately deep to deep, moist, well drained, and medium to fine

in texture. They are derived primarily from sandstones and shales, with limestones often present.

The type is temporary in the successional scale as yellow poplar is very intolerant of shade and requires openings to develop well. Natural regeneration benefits from the facts that yellow poplar seed is usually abundant and has the ability to lie dormant in the humus for several years and retain its viability, thereby ready to take advantage of openings in the overstory. Subsequent rapid height growth enables it to compete well with other species. In this area yellow poplar is long-lived but is gradually replaced by sugar maple, beech, basswood, red maple, red oak, and hickories if not disturbed.

This type frequently changes to yellow poplar-eastern hemlock or yellow poplar-white oak-red oak types. On both poor and fertile sites, oaks are associated with yellow poplar. At higher elevations the associate is often sugar maple. Common understory vegetation includes the maples, oaks, hickories, and black cherry. Minor species include greenbrier, spicebush, flowering dogwood, and black birch.

**Yellow Poplar-Eastern Hemlock** - SAF Type #58 (RRE type group oak-hickory)

Yellow poplar and eastern hemlock make up a majority of the stocking. Associates include white ash, basswood, yellow and black birch, cucumber and mountain magnolia, red and sugar maple, and red, white, and black oak. This type is most common on Kumbrabow along stream courses. These are cool moist sites where ground fires are rare. It probably originates after heavy cuttings or blowdowns where no wildfires have intervened immediately before or during the regeneration period to eliminate advanced hemlock reproduction or destroy yellow poplar seed stored in the litter. The disturbance releases understory hemlock and provides the sunlight necessary for yellow poplar seedlings to become established.

This type may also originate through the seeding in of hemlock beneath even-aged stands of yellow poplar. The most favorable seedbeds for hemlock are moist decomposed litter and rotted wood beneath a partial canopy; mineral soil is less favorable than other media for initial survival because tiny hemlock seedlings are susceptible to frost-heaving and to being washed out or covered with soil during heavy rains. Successful yellow poplar seedling establishment requires adequate moisture, mineral soil, and sufficient sunlight for early growth. The types place in succession has not been determined, but barring excessive stand disturbance, hemlock increases and becomes the dominant species.

The type is related to the yellow poplar-white oak-northern red oak type but the latter generally occurs at lower elevations and lacks a hemlock component. Beneath hemlocks, vegetation is usually absent except for scattered hemlock seedlings. Under yellow poplar crowns, more light reaches the forest floor, and hemlock seedlings are more abundant; seedlings of sugar maple, beech, black and yellow birch and rhododendron also occur.

**Yellow Poplar-White Oak-Northern Red Oak** - SAF Type #59 (RRE type group oak-hickory)

Yellow poplar, white oak, and northern red oak together comprise a majority of the stocking. This forest type usually contains a large number of mesic or moist site species as associates. At lower elevations these include black locust, white ash, black walnut, black birch, butternut and hemlock. On the upper slopes black cherry, cucumber and mountain magnolia, white ash, and beech may be present.

Since the type is characteristic of mountain coves, it is one of the types included under the general designation "cove hardwoods". Nonetheless, it is even more extensive on moist north and east facing slopes and on well drained flats. High site quality, which requires ample soil depth and moisture and loose texture, is a major factor determining occurrence of this forest type. As site index decreases, the type gradually gives way to upland oaks.

Many stands of this type have evolved through natural succession from the yellow poplar type, which is particularly sensitive to minor variations in site quality. Other stands have become established after heavy cutting, wildfire, or blowdowns in yellow poplar or mixed hardwoods. Yellow poplar is less tolerant of shade than the other type species and many of the associates. It is therefore probable that this long term subclimax type will be replaced eventually by an upland oak climax if there is no major stand disturbance. Ground fires in sapling stands of the type may eliminate the less fire resistant yellow poplar, basswood, cucumber, and white ash, resulting in dominance by oak types. Thus wildfire history often explains the presence of mixed oak forest on typical cove sites where yellow poplar - white oak - red oak would normally be expected.

One characteristic of yellow poplar is that in many places where there is no apparent obstacle to its growth, large areas are devoid of this species. Here the white oak-black oak-red oak type is often the dominant cover.

Yellow poplar-white oak-sugar maple is a variant, especially on limestone soils. On the wettest sites on which yellow poplar grows, a mixed

forest of yellow poplar, white oak, black gum, and red maple takes over. Yellow poplar-hemlock at higher elevations, bears a relationship to the type.

Common understory trees may include maples, oaks, hickories and black cherry. Yellow poplar, however, because of its intolerance of shade, is rarely present. Dense colonies of ferns often form the major herbaceous cover.

### 2.) Timber Size Classes

For the purpose of this plan, the vegetative cover of this forest has been broken into some broad categories with arbitrary divisions.

The first category is *open land*. Open land is any area with less than 10 square feet of basal area per acre in stems of tree species. This group has very little acreage within the forest. The two most prominent areas are the reclaimed mine sites on Rich Mountain. These areas total about eight acres. Some plantings have been made along the borders of these zones to provide some transition for improved wildlife use. Other such areas are at the residence of the superintendent, the picnic area, the camping area, and the cabin grounds. Also grouped in this class are reclaimed logging roads and landings. These areas are seeded after logging, and mowed periodically to maintain their herbaceous cover.

The next category is *seedling and sapling*. This classification will include areas of more than 10 square feet of basal area per acre and an average diameter of less than 5" dbh. for tree species. Three distinct areas, clearcut between 1984 and 1990, comprise the bulk of this class. The oldest is near the Glade Run shelter and is 14 acres in size. The other two are each 15 acres and are part of the Mill Ridge Harvest. In addition, eight patches ranging in size from one to four acres were clearcut between 1982 and 1984, in conjunction with the Beech Run Harvest.

*Poletimber* is considered to be anything larger than 5" average dbh., but less than 12" average dbh., and not more than 35 square feet of basal area per acre in trees 12" and up. We currently have no estimate of the acreage in this class, but don't believe there is any significant amount.

*Light sawtimber* includes all forested acreage with more than 35 square feet per acre of basal area in trees averaging more than 12" dbh., but not more than 5,000 board feet per acre. Approximately 32% of the commercial forest area is covered in timber of this class. The largest concentration of this class is in compartment XIV. Other stands may fall into this category as stand level information is obtained.

The last division is designated *large sawtimber*. This division contains all of the stands with a volume of more than 5,000 board feet per acre. Approximately 66% of the forest now supports timber of this size. When stand level data is secured, we will generate precise acreages for all of these classes.

### 3.) Wildlife

When this property was acquired by the state, the number of game animals present could figuratively be counted on one hand. As early as 1936, deer were brought into this area from Michigan and released. This was an effort to replenish a resource that had disappeared from the forest. Other wildlife enhancing schemes were tried including pen raising turkey, grouse, and quail. At the appropriate time these birds were released into the recovering habitat with the hope that they would adapt to the surroundings and thrive. Some of these efforts were more successful than others, but much knowledge was gained through the attempts. Success was eventually attained in repopulating the area, but primarily through managing the forest habitat.

Management efforts focused on protection, and improving the health and vigor of the naturally regenerated stands which developed following the fires and harvests in the first quarter of the century. Deer, quail, and grouse did well initially. As the trees matured their populations stabilized, eventually declining in various degrees. Deer adapt better to maturing forests, quail not at all. Grouse, never numerous, persist, taking advantage of small area openings, and early successional sites created through storms or management activities.

With the protection and development of the forest, other species reappeared. Bear, turkey and raccoon took up residence on the forest. These animals were followed by red and gray squirrels. Red squirrels, being the primary food for fisher, allowed the fisher to successfully reestablish themselves. Beaver have greatly expanded their range in the last thirty years and have long been a force for change on the forest. Wood ducks, hawks and various song birds fill appropriate niches.

The largest single threat to the continued vibrant existence is the lack of habitat diversity. As part of the benefits from our forest management program, habitat maintenance and diversity are significant aspects. Grouse are the benefactors of several recent clearcuts, being major users of these areas in the first thirty years after their creation. Turkey, bear, and deer also utilize these areas. Turkey make extensive use of reclaimed logging roads.

With the majority of the forest marching steadily towards the 150 year rotation age, the lack of early successional habitat is currently the focus of attention. Less than one percent of the forest is in this stage, which can last for thirty to fifty years. Each prescription for an area is analyzed to determine if any part of the area is suitable to fill this critical need. Whenever conditions meet the criteria to fill this void, every effort is made to do so.

### 4.) Rare, Threatened, and Endangered Species

The Endangered Species Act of 1973 established a framework for identifying and monitoring changes in populations of rare lifeforms. A threatened species is one which is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range. An endangered species is one which is in danger of extinction throughout all or a significant portion of its range. Rare species are so designated by meeting requirements of a global and state ranking process. The ranks are as follows:

GRANK (Global rank)

G1 - Critically imperiled globally. Five or fewer occurrences or very few individuals.
G2 - Imperiled globally. Six to 20 occurrences.
G3 - Very rare throughout range or very restricted range. Twenty to 100 occurrences.
G4 - Apparently secure globally.
G5 - Demonstrably secure globally.
GH - Historical. May be rediscovered.
GX - Believed extirpated. Little likelihood of rediscovery.
T# - Rank of subspecies or variety.

SRANK (State rank)

S1 - Critically imperiled in state. Five or fewer occurrences or very few individuals.
S2 - Imperiled in state. Six to 20 occurrences.
S3 - Rare or uncommon in state. Twenty to 100 occurrences.
S4 - Apparently secure in state.
S5 - Essentially ineradicable in state.
SH - Of historical occurrence but not verified in recent years (since 1970).
SX - Believed extirpated. Little likelihood of rediscovery.
SC - USFWS Species of Concern, formerly C2.

Characters Related To Ranking For Birds

B - Breeding populations
N - Non-breeding populations

Accordingly the Natural Heritage Program of the Division of Natural Resources Wildlife Resources Section tracks rare species, and threatened or endangered species. A list of species either known to occur, or thought possible to occur, (because of the existence of suitable habitat, and being within the expected range of the species) are

maintained for the forest. Surveys for the listed species are conducted whenever prescriptions are made which involve any of the appropriate habitats. The list for Kumbrabow State Forest is as follows:

KNOWN RARE SPECIES

| | | | | |
|---|---|---|---|---|
| Aneides aeneus | Green salamander | G3G4 | S3 | |
| Geum aleppicum | Yellow avens | G5 | S1 | |
| Saxifraga pensylvanica* | Swamp saxifrage | G5 | S2 | |

*questionable identification

POSSIBLY OCCURRING RARE SPECIES, ETC.

| | | | | |
|---|---|---|---|---|
| Accipiter gentilis | Northern goshawk | G5 | S1B, S1N | |
| Aconitum reclinatum | White monkshood | G3 | S2, S3 | |
| Aegolius acadius | Northern saw-whet owl | G5 | S2, S3N | |
| Cryptobranchus alleganiensis | Hellbender | G4 | S3 | |
| Glaucomys sabrinus fuscus | Northern flying squirrel | G5T2 | S2 | LE |
| Glyceria acutiflora | Sharp-scaled manna-grass | G5 | S1 | |
| Juglans cinerea | Butternut | G4 | S3 | |
| Listera cordata var. cordata | Heartleaf twayblade | G5T? | S2 | |
| Listera smallii | Kidney-leaf twayblade | G4 | S2 | |
| Microtus chrotorrhinus carolinensis | Southern rock vole | G4T3 | S3 | |
| Myotis sodalis | Indiana bat | G2 | S1 | LE |
| Neotoma magister | Allegheny woodrat | G3G4 | S3 | |
| Parnassia asarifolia | Kidneyleaf grass-of-parnussus | G4 | S2 | |
| Sorex dispar | Long-tailed shrew | G4 | S2S3 | |
| Sorex hoyi winnemana | Southern pygmy shrew | G5T4 | S2 | |
| Sorex palustris punctulatus | Northern water shrew | G5T3 | S2 | |
| Trifolium stoloniferum | Running buffalo clover | G3 | S2 | LE |
| Viola appalachiensis | Appalachian blue violet | G3 | S2 | |

Of the species listed above the most significant with regard to forest management and the possibility of altering a prescription is the Northern flying squirrel. This animal has only recently been confirmed to reside on the west side of the Tygart Valley River. Nest boxes placed on some adjoining property contained residents of this species after two years. This larger cousin of the more common southern flying squirrel, is generally found at elevations above 3,000 feet, preferring mixed coniferous and deciduous stands of mature timber. This type of habitat occurs throughout the forest but primarily in Barkswitch Run. Twenty-four nest boxes have been placed throughout the forest in an attempt to determine the presence and numbers of squirrels in residence. To date several squirrels have been found using a nest box on the forest. Additional nest boxes are being placed to continue this monitoring process.

Surveys along with other recent efforts has greatly expanded the population estimates of this species. In 1985 there were only 10 documented captures of the squirrel in West Virginia. By the middle of 1995, there were over 700 recorded captures at 82 sites in the state. The US Fish and Wildlife Service is reviewing the status of this subspecies to determine if it should be "down listed" from endangered to threatened status based on this new information.

Within the past year sightings of the Northern goshawk have been confirmed on the forest. It is very likely that at least one breeding pair is in residence or the nest is located very near the forest. Once the nest is located, a buffer of twenty acres around the nest site will be established to prevent any undue disturbance to the site. Nest sites are used repeatedly by the same or succeeding pairs.

Indiana bats have been listed as endangered. Other areas appear to be more critical to the health and vigor of this species in the Mountain State, but prior to any significant management prescription, mist netting will be done to determine if the bats are using the area. Appropriate measures to ensure the safety of the bats will be instituted should it be necessary.

The Division of Forestry is coordinating with the U. S. Fish and Wildlife Service and the Division of Natural Resources, Wildlife Resources Section to ensure proper conservation measures are used regarding rare, threatened and endangered species. As a follow up to this, a Safe Harbor Agreement is being initiated for the forest. Through this agreement, habitat enhancement for the endangered species is the objective.

## II. ANALYSIS OF MANAGEMENT REQUIREMENTS

Multiple-use management is a concept which tries to satisfy the needs of a number of varying interests using a single resource base. The concept attempts to consider consequences resulting from the implementation of management decisions directed at furthering the utility of the resource. By developing the resource through the multiple-use approach, priorities can be set and provisions made to reduce unintended results. This section will evaluate the condition of the most prominent aspects of the forest, and establish goals for them.

State forests, in general, have certain management advantages over state parks that, if exercised wisely, can enhance particular types of public recreation, wildlife habitat, and revenue, all of which are in demand by the public. A good forest management plan should balance as many of the numerous potential forest uses as possible in a manner which encourages those uses to be mutually beneficial. Sound, unobtrusive timber management will result in improved wildlife habitat, which will result in increased recreational demand. Each in turn will generate revenue, which when placed back into the forest should be spent in ways to enhance its future productivity and attractiveness to wildlife and people.

## A. RECREATION AND AESTHETICS

Kumbrabow State Forest has an undeveloped, remote character which appeals to the more physically fit, and adventuresome segment of the outdoor using public. Hunters and fishermen are the most frequent users of the forest. Many are drawn by the inaccessibility. It is unlikely that this particular aspect of the forest will significantly change within the duration of this plan. Habitat manipulation will be incorporated into management prescriptions to provide diverse niches for wildlife. This diversity will in turn enhance hunting opportunities. Hunting seasons are regulated by state law. Other management activities will increase access through the development of roads and trails. Access to these resources will be controlled through the use of gates and barriers to prevent unauthorized vehicle travel. The forest's availability to provide hunting and fishing opportunities is becoming increasingly more important as the free use of private land diminishes.

Other recreational uses include hiking, bird watching, and limited bicycling and horseback riding. Aesthetics are important to the individuals pursuing these interests. The use of buffer strips to protect streams and visual corridors is standard practice in the implementation of silvicultural prescriptions. Trail development is often incorporated with harvest prescriptions, while other trails are established in recognition of increased needs. Further development of trails to accommodate bicycles and horses are being considered. One intended pursuit fulfilled by the forest is the opportunity to leave the designated travel corridors and explore the untrammeled forest as it exists today. Off Road Vehicles (ORV's) and All Terrain Vehicles (ATV's) are prohibited by state law from using any of the roads or trails of the forest with the exception of public highways. On these roads the same laws apply as on all other state highways.

Presently the forest has about 482 acres dedicated to recreational use only. This includes picnic areas, rustic cabins, and campgrounds. These buffered areas are off limits to hunting and commercial timber harvesting. Other areas with high potential recreational value have been identified and are unofficially treated as recreational areas. These include selected stands of large growth trees, all riparian zones, and open areas.

## B. WILDERNESS

Currently, state forests have not established specific wilderness areas for the purpose of preserving old growth habitats; however, areas of wilderness quality are easily discovered by those seeking them. Since the majority of Kumbrabow is accessible only by foot after a dedicated effort, and the majority of the forest is approaching 100 years of age, there is ample opportunity to find solace and isolation here. Some of the less developed areas of the forest which have more mature stands of trees include the northwest side of Mill Creek above the cabins, most of Mowry Run, the west side of Beech Run, Glade Run near the County Road, and much of Piney Ridge.

West Virginia's State Parks contain over 70,000 acres. Hunting, timber harvesting, and mineral extraction involving surface disturbance on the parks are forbidden. The

management of the parks under these guidelines will evolve into an ample supply of well distributed, wholly natural areas, which should satisfactorily augment the already existent 78,100 acres of Federally designated wilderness areas on the Monongahela National Forest. Add to that the designated buffer zones surrounding developed recreation areas, streams, trails, and roadways, which will only be cut for salvage or safety reasons and the need for additional set-aside areas is not considered an urgent mission for the state forests. Eventual access and active management of these areas is expected, but the time table has not been set.

### C. TIMBER

Kumbrabow State Forest is blessed with an abundance of timber. As of January, 2001, the forest had an estimated 70.8 million board feet of standing timber, 12" DBH+. That's an average of 9,077 board feet/acre. Of that amount 37.5 million board feet is considered to be in the permissible cut category. That volume could be cut without reducing the productivity of the forest. The permissible cut is currently increasing at about 1.2 million board feet/year on the forest. We know that at some unknown time in the future this rate of increase will slow, stop, and even decline indicating over maturity, and a substantial loss of merchantable volume. Harvests and other silvicultural treatments are intended to prevent a stand from entering this stage of decadence and lost vigor.

The Division of Forestry has been harvesting timber at a rate of about 5 million board feet per decade. This amounts to about one-half of the volume that could be harvested and still maintain a well stocked vigorous stand of timber. The Division of Forestry intends to continue this level of harvesting, as a minimum. However, in order to maintain the health and vigor of the forest, an increase in the harvest rate, at some point in time, will be necessary .

### D. MINERALS

Currently, the only minerals not controlled by the state involve the coal under the western portion of the forest. Some mining of this reserve has been attempted in the past with limited success. From time to time, new interest is shown in this deposit. When mining occurs in these deposits, every effort is made to limit surface disturbance on the forest.

Should other mineral discoveries become commercially attractive, the division will work with the other agencies involved to insure that the principals of multiple-use are duly protected.

### E. WILDLIFE

The most vigorous users of the forest are the wildlife residents. These inhabitants represent all of the species common to the upland hardwood forests native to the central Appalachian Mountains. Each species has unique habitat requirements which when combined and present in a sufficiently close area constitute that animals home range.

These home ranges vary in size from a few square feet for salamanders to several square miles for bears. As a result of this variance, every activity, whether natural or man-made, which changes the character of the forest will impact one group of species or another.

The basic requirements of each animal are food, water, and shelter, all three elements must be present and within close proximity or the animal will not reside there. Cutting down a single tree will not alter the habits of a resident bear, but that may have been the only tree within the stand to offer sufficient denning sites to allow squirrels to live in this area. Conversely, that same tree, now on the ground, might be the impetus for a shrew or a mouse to move into the stand to feed on the beetles and grubs, and in turn be eaten by a larger animal. That's the nature of healthy forests. A variety of niches, each occupied by a population of animals equipped to take advantage of a particular niche.

Kumbrabow State Forest, being a dynamic forest, is on the broad scale an even-aged forest. Less than 1% of the forest is under 50 years of age. Some adjoining properties, have in the past, provided enough early successional sites to maintain a presence on the forest of species which favor those types of habitats. These species, however, are limited to small, concise border areas. In order to expand the variety of species currently known to frequent the forest, an effort to diversify the habitats available would be necessary. This would include an expanded use of even-aged management techniques. In order to help sustain present populations of wildlife, and provide an aesthetic experience for non-hunters, continued restricted access will be maintained.

### F. WATER

The natural quality of the water surfacing within the bounds of the forest is excellent. All of the streams which arise within the forest or flow into the forest are fishery quality streams. Acid mine drainage has significantly impacted several of the tributaries with major impacts on the fish populations. It is imperative, therefore, that these waters be protected and passed on in as good a condition as when they emerged from the ground. In conjunction with this goal, the maintenance of healthy and vigorous timber stands is necessary, and all prescriptions will be administered according to the "Best Management Practice Standards"(BMP's).

All of the streams of Kumbrabow could use some form of stream improvement work. Mill Creek and several of its major tributaries have in the past benefitted from this type of management. Log dams with cascade notches were installed to create pools and to scour the fine sediment and debris from the stream bottom below the dam. This improved the habitat for cold water species. Unfortunately these structures eventually decay, or are overwhelmed during intense floods, and cease to function properly. Rehabilitation or new construction would benefit the streams which once utilized the structures, but costs and manpower requirements severely restrict the likelihood that such work will be done. If funds become available, natural stream channel design techniques will be utilized to guide these improvements. Mill Creek is currently treated annually with limestone fines. This practice has proven to be very effective in increasing the water quality and nutrient levels

of streams. Morgans Camp, Phillips Camp, and Beech Run are possible streams for inclusion in this program in the future.

### G. ROADS

An extensive road system has been developed on the forest, but needs still exist. The primary road needs involve extensions of the Trout Run and Rich Mt. roads. The Trout Run extension would provide access to Mowry Run and the rest of Mill Ridge. This could eventually form a loop ending at the CCC area. Another possibility involves an extension in Mowry Run connecting with the Elkwater Road. The feasibility of this construction has not yet been determined, but the ability to control access in this area will be a key consideration when the decision is made.

The Rich Mt. extensions would provide access to Meatbox Run and Potatohole Fork. Both areas will be reviewed for management needs. Accessing these compartments via Rich Mt. appears to be the least intrusive route. Another extension being considered would tie the Rich Mt. management road to the Morgans Camp management road. Controlling access will be a major consideration in this construction, as well.

Construction of any or all of these roads will most likely be done in conjunction with timber sales. This approach relieves the state of appropriating the money for construction. The roads are built by logging contractors to State Forest Standards. Forest management roads become crucial tools in providing recreational opportunities, and implementing management prescriptions for wildlife, and watershed projects. Any excessive roads or existing roads poorly situated will be permitted to return to natural vegetative cover, if they pose no threat to the environment in their present state. Problem sites will receive remedial measures prior to abandonment.

Due to the practical nature of the standards to which the roads are constructed, the general nature of maintenance requirements is primarily custodial. This work is performed by Division personnel as part of an annual maintenance needs program.

### H. BOUNDARIES

In the period since the last revision no official surveys have been conducted by the state on any of the Kumbrabow property lines. Most of the lines as defined by the wire strung around the forest are in good condition. Most have been painted within the last ten years. Surveys by adjacent landowners have been done in two sections within the past five years. These include a section of line in the southern area of the forest where the line crosses Mill Creek, and in the northeast along the Glade Run Harvest area. Neither of these surveys have been checked or collaborated by the state.

Periodic encroachments upon the property occur primarily along the Turkey Bone Road section nearest to Pickens. This is the result of errors in some of the original surveys

beyond the forest. Surveys are presently a priority in the management of the forest. Funds associated with future harvests are anticipated to be available for this task.

During the winter of 1998-1999 all of the known corners and points on the wire where sharp direction changes were evident were located using satellite triangulation equipment (GPS receivers). This allowed the Division to accurately map these points as they exist on the ground. The few points which were not found and could not be approximated from other physical evidence were recorded using locations derived from interpolation of topographic features. With all points entered into the GIS computer, the most accurate map of the forest to date was generated. This map indicates a considerable discrepancy in the on the ground acreage and the deeded acreage. The deeded acreage is 9,431, and the area inside the existing boundary is 9,165 acres. Errors in past surveys and measuring techniques are most likely the reason for the discrepancy.

## III. QUANTITATIVE DATA

### A. SUMMARY OF ACRES

Forest Land- (within the active management boundary)----------7,796 Acres
Other Forest Land—(excluded from active management *)----------1,369 Acres
Total Forest Acreage----------9,165 Acres

*buffer zones around streams, trails, improved recreation areas and utility rights-of-way

There is no current breakdown of acreage for the timber types present on the forest. This is due to a change in the number of types now recognized as compared with those used in the original inventory. Plans are currently being developed for a new forest inventory which will provide that information.

### B. SUMMARY OF VOLUMES

The figures referred to in this plan are from the International 1/4" tree scale. The following figures were derived from the last comprehensive inventory of the forest completed in 1971. These figures have been projected forward and checked against all subsequent inventories as they are completed. When the need for an adjustment is indicated, one is made in line with the new data. All figures have been evaluated and judged to be reasonable as determined by the personnel most familiar with the timber stands of Kumbrabow State Forest.

The total merchantable volume contained in trees 12" DBH and up is approximately 70.8 million board feet. The forest averages 9,077 board feet per acre and is growing an average of 192 board feet per acre per year. Not all of this volume is in desirable species nor is it all in good quality trees. This figure also represents a decline in growth rate due

to approaching maturity and increased mortality associated with advancing age. Overall, however, this forest contains as good a selection of high quality hardwood timber as is likely to be found anywhere.

### C. AVERAGE ANNUAL GROWTH

Soils information data are the basis of the average growth figures used in this plan. Information from the U. S. Dept. of Agriculture, Soil Conservation Service, as compiled in the report "Woodland Interpretations For Soils In Major Land Resource Area #127", Section II-F W. V. 1970, was used to compute growth figures. Conservative values were used as a rule.

The analysis indicates our best sites produce around 360 board feet per acre per year of added wood volume, while the low end of the scale produces about 150 board feet. The forest-wide average for the commercial forest land is about 192 board feet per acre per year. The growth of the forest is estimated to be 1,681,453 board feet per year. Catastrophic events can and do impact this progression. Growth rates have begun to decline somewhat due to increased mortality. A new forest-wide timber inventory will serve to gage this change. The observations of the managers, and the stand evaluations performed on individual stands in association with prescriptions, also serve as monitors of these changes.

### D. ESTIMATED PERMISSIBLE CUT

Each timber harvest area is evaluated to determine the amount of merchantable timber that each contains. From this figure the permissible cut can be calculated. This represents the excess volume on the site which when removed, will allow the trees to take full advantage of the available growing space. When permissible cut is calculated for management compartments, it is useful in determining when and where to look for harvest opportunities. The forest-wide figure also helps track the development of the forest.

The overall figures for Kumbrabow State Forest are:

Average permissible cut per acre----------4,283 board feet.
Total permissible cut----------37,505,409 board feet.
Average annual increase in permissible cut per acre----------137 board feet.
Total annual increase in permissible cut----------1,198,609 board feet.

Currently 1.2 million board feet of timber could be cut each year without reducing the growing capacity of the forest. A total of 37.5 million board feet could be immediately harvested, selectively, without reducing the forests ability to fully utilize the available growing space.

## E. MULTI-DISCIPLINARY DATA

To be better able to understand the nature of Kumbrabow State Forest, a physical inventory was conducted in 1991. That inventory is contained in the Appendix.

# IV. MANAGEMENT REVIEW AREAS

Due to species composition and condition of the timber resource in Compartment II, the possibility of stand manipulation to benefit the conifer component is a desirable management objective. Work in this area would improve the access to Phillip's Camp Run which would facilitate the desire to introduce limestone fines into this stream. This project would be aimed at improving the water quality of the creek, as well as, improve the fertility of the stream for fish growth. Controlled access will be a prime objective of the management prescription for this compartment. A closer examination of the prospects for this work will be undertaken in 2003.

An inventory done in 1984 recommended a re-evaluation be conducted in the southern portion of Compartment IX in 2004. Some special assets of this area include a large site of historic beaver occupation, and an extensive red spruce understory. Thinning of the overstory can enhance the growing conditions for spruce. Spruce habitat enhancement can benefit various species that would typically occupy northern boreal forests. Such species could include the Northern Goshawk, Northern saw-whet owl, yellow-rumped warbler, yellow-bellied fly catcher, Canada warbler and winter wren. This habitat can also be important for magnolia warbler breeding. Snowshoe hare and squirrels can benefit which in turn can benefit the fisher.

Following these evaluations Compartment I is the next most likely area to be reviewed. Some type of regeneration prescription is anticipated for suitable portions of this compartment. Access would most likely be required through Coastal Lumber Co. lands on the Buckhannon River. The access needed for this activity would also allow for Morgan's Camp Run to be included in the liming project. Ground dwelling and foraging species would benefit from the type of harvest being considered for this compartment. Grouse, turkey, deer and bear would benefit the most initially. Within a few years nesting and foraging by numerous species of song birds will follow. This project will be investigated in the year 2006.

Compartment XV should be evaluated for potential trail development. A commercial thinning would be beneficial to remove several areas of storm damaged timber which would constitute a hazard to hikers. Silvicultural operations in the compartment would require access through private property to the southeastern part of the compartment. A challenging trail could be established from Compartment XIII into XV. The year 2008 is the expected date for this project.

These compartments are the most likely to require silvicultural treatments within the scope of this plan. . By thinning over stocked stands, the remaining trees have the opportunity to expand their crowns and produce more mast. More mast is a great value to wildlife. The openings in the crown, created though thinning, also permit more light to reach the forest floor which increases growth of the herbaceous and shrub layers. These layers are beneficial to many wildlife species including birds, by providing food and shelter. Light to the forest floor also aids in the regeneration of tree species. All projected dates are subject to change, and those toward the end of the planning cycle are more likely to change than the earlier projections. All projects are subject to public review prior to implementation. Aesthetic consideration is part of the final decision for each project.

Development of a multiple use trail, consisting of a 15 - 20 mile loop, would tie into the existing Glade Run, Trout Run, Mill Ridge and Rich Mountain trails near the cabin area is desired. The Parks and Recreation Section would also like to look at potential overlooks as part of future harvesting efforts. Other interests of Parks and Recreation include a small impoundment and additional cabins and attendant outbuildings.