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CABWAYLINGO STATE FOREST
FOREST RESOURCES MANAGEMENT PLAN

TICK RIDGE FIRE TOWER

By:
West Virginia Division of Forestry

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INTRODUCTION

The purpose for developing management plans for the State Forests is to ensure that these lands are managed sustainably for future generations and that the core functions of the West Virginia Division of Forestry are reflected in the management of these lands. This plan reflects the management intentions based upon current knowledge of land capability, inventory data, sound forestry practices, land stewardship and public demands. This plan is a working document and will be revised as needed to address the challenges of managing the forest resources that are constantly changing.

West Virginia's State Forests were established as areas to demonstrate proper forest management, provide wildlife habitat and enhance recreational opportunities. 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 can better withstand stresses such as insect and disease attacks and are better producers of oxygen and consumers of carbon dioxide. Plus they provide better quality habitat 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 can enhance recreational potential for an area such as hiking and biking and can provide access for hunters and nature enthusiasts. A managed forest provides habitat necessary to sustain desirable plant and wildlife species.

West Virginia's State Forests were first inventoried in the 1950s, again in the late 1960s and management plans were prepared in 1970s. These first generation plans focused primarily on timber management. With new knowledge, changing management philosophies and cultural values there is a shift toward using the ecosystem management-based approach. Ecosystem management is where all aspects of an ecosystem are considered important, and decisions are made based on the best understanding of ecological interactions to sustain the ecosystem's composition, structure, and function over the long run.

A. History and Overview of the Forest

1. Area History and Acquisition:

As early as 1911, the idea to examine land suitable for state forests was documented. In 1927 a State Forest and Park Commission was created. It consisted of the Governor, Commissioner of Agriculture, Director of Agricultural Extension, State Geologist and Executive Director of the Conservation Commission. Their duty was to determine the availability of land suitable for state forests and parks.

Cabwaylingo State Forest derived its name from the Counties Cabell, Wayne, Lincoln and Mingo which the Forest was intended to serve.

On February 13, 1935, the West Virginia Conservation Commission purchased approximately 7,832.5 acres from R.E. Floyd. The Wilson Coal Land Company was the previous owner and like many other landowners during the Depression era (1930s) lost their property by not being able to pay property taxes. Mr. Floyd was able to purchase the property at a special sale at the Wayne County Courthouse in 1934 for $2174.70.

Since that time additional purchases brought the forest to the present acreage of 8,500. Most of these were in the '50s and '60s and a list of these purchases can be found in the Appendix.

Cabwaylingo State Forest is a conglomerate of small farms that were purchase from various pioneer settlers descendents of Marcum, Ferguson, Wiley, Spalding, and Copley families by the Wilson Coal Land Company of Wilsondale, WV. Many of their descendents are still located in the area today. There is one recorded incident in the 1790s, of an Indian raid in which Jenny Wiley was kidnapped and her children massacred. She remained a prisoner for almost a year and managed to escape and returned to living within the boundary of the present day forest. Jenny Branch and Wiley Branch are just several of the places named in her honor.

The earliest use of Cabwaylingo State Forest was to provide a base of operation for the Civilian Conservation Corps (CCC) during the Depression era (1930s). Camps were established by the Civilian Conservation Corps (CCC). There young men, ages 18 to 25, were put to work building roads, structures, ditches and bridges, planting trees and performing other arduous labor.

The Division of Forestry of the Conservation Commission in cooperation with the U.S. Forest Service established two camps in the vicinity of Cabwaylingo State Forest and they were: Camp Anthony Wayne and Camp Twelvepole.

CCC Workers Monument

Camp Anthony Wayne, S-61, was established on July 4, 1935, and occupied by CCC Company 3532. The camp was located at the junction of Wiley Branch and Twelvepole Creek where the present group camp stands today. The camp buildings were finished by August 23, 1935. On October 20, 1938, Company 3532 was replaced by Company 1558V, a company of WW I veterans, which were transferred from Camp Logan, P-55. They remained until the camp was closed on April 11, 1939.

Camp Twelvepole (or Aracoma), S-71, which was located just across the Wayne County line in Mingo County at the junction of Poor Branch and Twelvepole Creek. It was originally established as Camp P-71 for work assigned on private forest and later re-designated as S-71 when the camp was assigned to work on Cabwaylingo State Forest. It was occupied on July 13, 1935, by CCC Company 3540. The camp was abandon on April 5, 1937, when further funding was not approved by Congress.

Work projects included forest stand improvement, game refuge development, recreation development, wildlife feeding, surveys, stream development and fire control. Construction of the fire tower, ranger stations, telephone lines and truck trails were just some of the fire control projects. Later work included thirteen vacation rental log cabins, a lodge which serves as the

present superintendent's residence, picnic shelters, and trails. A fourteenth log cabin was built to support the fire look-out tower located on Tick Ridge. Unfortunately, the Tick Ridge cabin burned due to an arson fire in November of 1994.

2. Original Forest Type:

Prior to the establishment of a timber industry in this portion of the state, the original forest was primarily oaks and chestnut on the ridges, with hemlock, beech, black walnut and associated species on the lower elevations. Most of the original forest was harvested by the early part of the twentieth century. Many areas were cleared for farming.

3. Periodic Descriptions of the Forest:

Cabwaylingo State Forest has experienced many destructive forest fires over the years due in large part to arson, debris burning and moon-shining. Because of the severity of the fires, parts of the Forest were set back years in developing to maturity.

The first planned harvests on Cabwaylingo State Forest were conducted using the multiple-use forest management approach to prepare the forest for sustained management. One was conducted on Turkey Creek in 1956 and another was made on Gourd Branch in 1960.

Seven harvests were conducted under the management plan developed in 1970. These harvests were in the form of improvement cuts. These timber harvests not only improved the residual standing timber by removing fire and storm damaged trees but they also improved wildlife habitat, hiking and recreation on the area. These harvests ranged from 50 to 330 acres in size with volume being removed averaging just less than 4,000 board feet per acre. Individual trees that were over mature, declining, or of poor form or condition were removed. The remaining trees had more room to develop with less competition, allowing them to grow faster, while at the same time providing benefits for wildlife. These harvests resulted in healthy and vigorous stands.

B. Recreational Use of the Forest

As with most of the other State Forests, Cabwaylingo includes a designated recreation area within the Forest. This area is managed by the WV Division of Natural Resources, Parks and Recreation Section. The old CCC camp was converted into a group camp, now known as the Mc Clintic Group Camp. This group camp comfortably accommodates 100 people. Other improved recreation areas on the Forest are 13 log cabins, two camping areas, more than 100 picnic tables and nine picnic shelters. These shelters are available on a first-come-first-served basis. The cabins and the group camp are

rented to the public during all but the winter months. There are two campgrounds at Cabwaylingo State Forest. Tick Ridge is a 20-site rustic campground with 20-sites. Spruce Creek Campground added to the forest facilities in 1999, features eleven sites, six with electrical and water hookups and full shower and bathroom facilities. The rustic nature of the cabins blends well with the remote location of the forest.

In the middle 1950s a swimming pool and sunning area were built. Other recreational opportunities at Cabwaylingo State Forest include, but are not limited to, hiking, picnicking, sightseeing, hunting, trapping, nature observation, photography, horseback riding, mountain biking, bird watching, and geocaching. Most of these activities are seasonal, while others are enjoyed throughout the year. Trout fishing also attracts users on the Right Fork of Twelvepole Creek, which is stocked by the Fisheries Section of the West Virginia Division of Natural Resources in the early spring months.

C. Management Responsibilities

At present, the West Virginia Division of Forestry, the West Virginia Division of Natural Resources, Parks and Recreation Section and the West Virginia Division of Natural Resources, Wildlife Resources Section all have management responsibilities on Cabwaylingo State Forest.

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

The Division of Natural Resources, Parks and Recreation Section, has management responsibility for the improved recreation areas and facilities on the Forest. Included are the camping area, picnic areas and shelters, trails, cabins, and the residence/service area. They also have law enforcement jurisdiction over the entire Forest. In addition, this agency maintains hiking trails throughout the Forest through a verbal agreement with the Division of Forestry.

The Division of Natural Resources, Wildlife Resources Section, has the responsibility to manage and maintain wildlife on the Forest. This includes managing fisheries in area streams, conducting research and data collection, providing limited law enforcement and advising the Division of Forestry in regard to wildlife needs.

The Division of Highways is responsible for maintenance of all Forest roads which are included on their county road inventory.

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 mandated by law to manage the state forests for "silviculture and scientific research, developed and undeveloped outdoor recreation; propagation of forest trees, fish and wildlife; wildlife and fisheries management; aesthetic preservation; hunting and fishing; timber production; and demonstration of state-of-the-art forestry [sic] management, and therefore should be managed on a multiple-use basis" (§19-1A-1).

Multiple use management is accomplished through interagency cooperation to implement a natural resources stewardship ethic. This cooperation is needed to accomplish the mandated goals and to serve the many needs of the public. Additional duties of the Division of Forestry include maintenance of forest roads, cooperation in recreational opportunity development beyond the improved recreation areas and maintaining the painted Forest boundary.

D. Physical Features

1. Location, Area and Boundaries:

Cabwaylingo State Forest is located 25 miles south of Wayne in Wayne County. Primary access to the Forest is gained from County Road 35. Most of the Forest is located in Wayne County. However, there are three disjunct tracts, two in Wayne County and one in Mingo County.

The nearest towns having Post Offices are Dunlow to the north and Wilsondale to the south. The eastern boundary of the Forest borders Martin and Perry Ridge while the western boundary crosses Tick Ridge. The entire Cabwaylingo State Forest area according to the West Virginia Tax Department contains just over 8,688 acres and encompasses more than 13 square miles. However, using the latest GIS information, it is calculated to be 8,224 acres. The exact acreage is unknown because of differences found in the deeds and has not been completely surveyed.

2. Topography, Geology and Climate:

The topography of the Cabwaylingo area has been determined by stream erosion rather than glacial or igneous activity. The Forest is located on the Cumberland Plateau and Mountain land resource areas. The area is highly dissected with narrow flood plain along streams, and narrow, strongly sloping and moderately steep to steep ridgetops separated by long, steep and very steep side slopes. Cabwaylingo State Forest is covered by the Radnor, Kiahsville, Webb and Wilsondale 7½-minute topographic quadrangle maps, published by the U.S. Geological Survey.

Cabwaylingo State Forest lies in the foothills of the Appalachian Mountains. It consists of rolling hills with 50% of the area being 25 to 40% slope, while another 33% of the area has slopes exceeding 40%. The ridges are flat-topped and usually surrounded by rock. The streams on this plateau have set up a drainage pattern with little apparent regard for structural conditions or for the characteristics of underlying rocks. Most of Cabwaylingo State Forest drains into Twelvepole Creek.

The elevation of Cabwaylingo varies from just short of 708 feet at the confluences of Meade Branch and Twelvepole Creek near the northwestern corner of the Forest to approximately 1,478 feet on the high knob in the southern portion of the forest.

Total annual precipitation is about 39.9 inches. Temperature will range in the winter with an average low of 25°F to a summer highs averaging 83°F. The frost free season usually extends from the second week of April to the middle of October. Severe storms are not unusual. Significant damage to the timber resource can be expected about once every ten years. A severe thunder storm in 1981 is the most devastating storm event in the recent history of the forest. About 98 acres of mature hardwoods were uprooted and later salvaged as a result of that storm.

The summer season is moderately warm and humid, with the valleys considerably warmer and more humid. The winter months are moderately cold, with an occasional severe cold wave lasting a few days. The four seasons are nearly equal in length and autumn is the most pleasant, with warm days and cool nights. The heaviest rainfall occurs in July and August, mostly in thunderstorms, and flash floods are common in the area. The winter rainfall occurs mostly prior to and with a frontal passage. These rainfalls frequently last from two to four days, causing frequent general flooding on all streams. Snow seldom remains on the ground more than two days in the valley. However, at higher elevations snow may remain for several days.

The geological features in and around the Forest were formed during the Paleozoic era more specifically the Pennsylvanian Period. All of the surface rocks are Sedimentary and show little local folding or disturbance.

Cabwaylingo State Forest soils are characterized by interbedded sandstone, siltstone, shale, limestone, and coal of the Allegheny and Kanawha Formations. Most of the ridgetops are capped by Conemaugh Group. This area of the county has a higher percentage of sandstone bedrock and exhibits a more rugged topography than the northern half of the county.

3. Minerals:

The major minerals present on the Forest include coal, oil and natural gas. Cabot Gas Corporation owns the gas and oil under 6,170 acres. Nile Bartram owns all mineral rights under a 67 acre tract. The state has the coal rights for 6,170 acres and the remaining mineral rights belong to Chesapeake Energy Corporation. Numerous oil or gas wells have been drilled on the Forest over the years. It is estimate that there are approximately 100 known wells on the forest.

Coal seams exiting under the Forest include the Winifrede (Coalburg), and the Upper Freeport veins *(this information was obtained from the U.S. Bureau of Land Management, East Lynn Lake Coal Lease)*. No prospecting or test drilling has been done on the Forest itself, but coal has been mined in the immediate surrounding area.

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 layout and location approval are 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 is decided in cooperation with the Wildlife Resources Section of the Division of Natural Resources.

E. Protection (Historical - Current Threats)

Cabwaylingo State Forest is heavily used and needs protected from fire, insects, disease, unwise development, encroachment and damage from overuse. All agencies that have administrative responsibility on this area must be aware of the dangers and take appropriate steps to deal with the situations as they arise.

From an historical standpoint, the threat of uncontrolled fire on the Forest was much more prevalent in the past than today. After the land was purchased for use as a State Forest and the CCC arrived, fire prevention and control programs were established. Fire is still a prime concern at Cabwaylingo because of the heavy use of the forest. Fires are more likely to occur when a large number of people are using the forest. Campfires, picnic fires and incidental fires from cigarettes, matches and fireworks are most common. Arson fires do occur and are major causes. The steep slopes and abundance of fuels could result in a major fire in this area. The Division of Forestry is in the process of developing a general fire plan for Cabwaylingo State Forest. This plan should include an agreement with the Parks and Recreation Section of DNR and should contain

both prevention and suppression techniques. Fire suppression assistance is available from the Division of Forestry, Parks and Recreation personnel, and one volunteer fire department (Dunlow VFD). All visitors must be made aware of forest fires and the use of fire must be restricted to designated areas and closely monitored. Above all, extreme caution must be exercised during critical fire danger periods and the use of fire must be prohibited in inaccessible areas.

A constant threat to the prosperity of any forest land arises from exotic plants, insects and diseases known as invasive species. Invasive species are an ongoing threat to the Cabwaylingo State Forest. Some invasive plant species are already present on the Forest and others may be present now or in the future. Plans will be made to deal with invasive plant species' populations utilizing appropriate control measures.

F. Flora and Fauna

West Virginia is located in the heart of the Central Appalachian Mountains which is considered to be one of the world most diverse broadleaf temperate forest areas and provide habitats for more than 3,000 plants and animals species. More than 150 species of trees grow in West Virginia, 30 of which have commercial value. Even though, Cabwaylingo State Forest is located in the southwestern part of the state, its forest contained species that can be found in the northern, central and southern forests of the United States.

1. Forest Cover Types:

According to the Society of American Foresters publication titled *Forest Cover Types of the United States and Canada*, forest cover type is "a descriptive classification of forest land based on present occupancy of an area by tree species". Several classification systems have been developed over the years, many with shortcomings that led to more attempts at classifying the forest. The previous management plan for Cabwaylingo State Forest (1971) used a system based on the Society of American Foresters (SAF) forest cover types published in 1954. The Society of American Foresters revised and refined the classification and published their new system as *Forest Cover Types of the United States and Canada* in 1980. The classifications in this book are based on basal area of the predominant species or species combination. The term *pure* means stocking of 80 percent or more by a single species, *majority* means comprising more than half the stocking, and *plurality* means comprising the largest proportion of stocking when combined and each species being at least 20 percent when taken alone. For example a white oak-black oak–red oak type meant that these species together must comprise greater than 50% of the total basal area.

When writing this management plan, foresters were faced with a unique situation at Cabwaylingo. The initial growth and species composition of the

Forest had been heavily influenced by farming and uncontrolled fires, thus leading to development of atypical forest stands. In many cases, the existing cover type was a combination of several types. Therefore, the foresters had to broaden the classification of cover types on Cabwaylingo Forest, while still keeping in line with the SAF system.

Cover type groups were created using those cover types species that had required similar growing requirements, tolerant, and silvicultural needs. There are three general groups found on the forest and they are: Oak-Hickory, Cove Hardwoods, and Northern Hardwoods. Each of these groups includes many different specific forest cover types and a more detail description of each specific cover type can be found in the Appendix. A brief description of each cover type group and its components are as followed:

OAK-HICKORY GROUP:

The Oak-Hickory forests are present today because of past land use practices, the incidence of chestnut blight and fire protection. During the 1800s to the early 1900s, heavy logging, grazing and wild fires disturbed West Virginia forests. In the 1930s, the chestnut blight eliminated the American chestnut from West Virginia Forests. This event allowed for oaks and hickories to further developed. These species have somewhat of a thicker bark and were able to survive the ravages of wild fires. With the intensive fire control programs, the surviving oaks and hickories thrived. These species were able to mature and grow into our current forests.

Typical Oak – Hickory Type

At the present time there are 3,681 acres classified as Oak –Hickory group and comprises the majority of Cabwaylingo forest (46.6%). They can be found on the ridges and drier sites. However, they can also be found on the lower slopes and coves. This group is intermediate in the succession scale as oaks are intermediate in shade tolerant and requires some sunlight to develop well.

This group consist of at least five different specific cover types with the most common one being White Oak-Black Oak-Northern Red Oak (cover type 52). Other types in this group that may occur on the forest include: Chestnut Oak (cover type 44); White Oak (cover type 53); Northern Red Oak (cover type 55); and Black Oak (cover type 110).

In most areas white oak, black oak, northern red oak and hickory comprise a majority of the stocking. Other oaks usually present include scarlet oak and chestnut oak. Other tree associates occur, with the most common being yellow poplar, black gum, sugar and red maples, white and green ash, elms, basswood and cucumber magnolia, with occasional beech, black cherry, black walnut and eastern hemlock appearing. White oak is present over the range of sites from moist to dry. Northern 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 is usually abundant on the drier south and west aspects, upper slopes and ridges.

COVE HARDWOODS GROUP:

This group makes up the second largest component of Cabwaylingo forest at 34%. There are 2,695 acres classified as Cove Hardwoods. It can be found on northerly and easterly aspects, lower and middle slopes, coves, and stream bottoms. This group is highly productive and typically occupies good to excellent sites. As site quality decreases, the group gradually gives way to upland oaks. Forest cover types that can be found in this group are: Yellow poplar (cover type 57), Yellow poplar-eastern hemlock (cover type 58), and Yellow poplar-white oak-northern red oak (cover type 59).

Yellow-poplar – Hemlock Cover Type

A single species can dominate a stand, but typically 25 or more species will be present. Important components are yellow-poplar, northern red and white oak, sugar and red maple, American beech, white ash, American basswood, black cherry, Cucumbertree, birches, hickories, yellow buckeye and black locust. Other species that occur occasionally are eastern white pine and eastern hemlock.

Many stands of this group have evolved through natural succession from the yellow poplar type, which is particularly sensitive to site quality variations. Yellow-poplar seed, usually abundant, has an unusual ability to lie dormant on the forest floor for several years and then germinate when the stand has been disturbed from heavy cutting, wildfire or blowdowns. This group is early in the succession scale as yellow-poplar is very intolerant of shade and requires openings to develop well. It will be replaced eventually by an upland oak climax if there is no major stand disturbance. Ground fires in sapling stands of the group may eliminate the less fire resistant yellow poplar, basswood, cucumber magnolia and white ash, resulting in dominance by oak types. Wildfire history often explains the presence of mixed oak forests on typical cove sites where yellow poplar-white oak-northern red oak would normally be expected.

MAPLE – BEECH – HEMLOCK GROUP:

This group covered 1,535 acres or 19.4% of Cabwaylingo forestland. It is becoming more predominant as the succession stages on Cabwaylingo State Forest move from an early and intermediate stage to a more intermediate and climax stage. Another reason is because of the importance of wild fire protection given to the forest over the last 80 years.

This group consists mainly of four forest cover types which are: Eastern Hemlock (cover type 23), Sugar Maple (cover type 27), Beech – Sugar Maple (cover type 60), and Red Maple (cover type 108). The occurrence of this group

occurs on middle to lower slopes, and on moist, well-drained sites. This group is considered climax, but often disturbances such as cutting, fires, or grazing temporarily delay succession.

These species are shade tolerant and are able to germinate and grow in the shade of other trees. Frequently dense under stories of beech, sugar maple and hemlock developed under the canopy of the other groups and when that overstory is removed, they become the dominate species. This group is also fire-sensitive and the thin bark of this group makes it very susceptible to fire injury. Where disturbed repeatedly by cutting or fires, beech has a tendency to dominate.

2. Timber Size Classes:

For the purposes of this management plan, the vegetative cover on the commercial forest land area of the Forest has been classified into broad categories. These categories were also used in the previous management plan.

The first category is *open land*. According to the original plan guidelines, this is any area that is less than 10% stocked with trees. This means that it is usually covered in grass or other vegetation. Other areas that may be grouped under this heading include reclaimed skid trails, truck haul roads and landings from previous harvest operations and well sites. These areas are reclaimed after being established and mowed periodically to maintain their herbaceous cover. Also included in this category may be any areas used as wildlife openings.

Next is the *seedling and sapling* category. These are basically areas that are over 10% stocked, but consist of trees no larger than 5 inches in diameter. These would likely be older clear-cut areas, areas that have recovered from storm damages or previously cleared areas that may have reverted to trees. There may be some small areas of this class on the Forest, but they would very likely be less than an acre in size.

Poletimber is considered as anything larger than 5" diameter at breast height (dbh), but less than 12" dbh. This category is also limited to having an average volume per acre of 1,500 board feet or less.

For the purpose of this plan, most of the forest land managed by the WV Division of Forestry on Cabwaylingo State Forest falls into the *Sawtimber* category. This category is broken into two classes: *light and heavy*. *Light sawtimber*, which includes all commercial forest acreage with trees averaging more than 12 inches dbh, but having not more than an average of 5,000 board feet per acre of volume. This is sometimes referred to as small sawtimber. *Heavy sawtimber*, which could also be referred to as large sawtimber. This is any area that contains an average volume of 5,000 board feet or more per acre of volume.

3. Wildlife:

As with any forested area, Cabwaylingo State Forest is home to many wildlife species. This section of the plan will describe both the traditional game and nongame wildlife species found on the Forest.

Traditional Game Species

Wildlife populations on Cabwaylingo State Forest are very well established. With proper management techniques, these populations can be maintained at optimal levels. The application of silvicultural practices on the Forest is the primary technique which can be used to enhance wildlife populations on the area.

Turkey numbers remain stable in the Cabwaylingo area. Wayne County's spring 2009 harvest was 146 birds. The 2008 season harvest was 145. At the present time, Wayne County doesn't have a fall season.

The creation of savannahs should increase the numbers of birds. The newly created fields will provide additional insect production for the young poults.

The population of ruffed grouse and other forest species which thrive on early succession habitat is low, and could be enhanced by even-age silvicultural practices. Even-age management would promote a higher stem density which would be consistent with and enhance ruffed grouse habitat.

Cabwaylingo State Forest provides ideal habitat for both gray and fox squirrel. Abundance of the oak/hickory mast that these populations depend on will vary from year to year. Squirrels will be concentrated in those areas of high mast production. . Squirrel hunting provides numerous recreation hours afield and is an important component of the Forest's use.

Southern Wayne County doesn't have as high of deer density as the northern portion of the county. Antlerless season is currently closed in the State Forest area, but opportunities exist for archery, buck and muzzleloader hunting. During 2009, 326 deer were taken during archery season in the entire county. Buck season harvest was 880. Muzzleloading season harvest was 84 deer.

Deer harvest numbers remain low but stable in Cabwaylingo. Three bucks were taken during the 2008 season and two were harvested in 2009. Complete harvest data for 2010 will be published in February 2011.

Harvest objectives for Wayne County are 3.0 bucks per square mile. Wayne County has 499 square miles of deer range, so the harvest objective is 1497 deer.

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Using a good balance of silvicultural practices which provide both regeneration and mast producing trees would benefit deer on the Forest.

Bear populations are increasing throughout Wayne County. Bears have been released on nearby East Lynn Wildlife Management Area for the last 20 years. Animals have been captured in the urban areas of Charleston and Huntington then released in this rugged remote area. Wayne County has both an archery season and a gun season that prohibits the use of dogs. During the 2009 season one bear was killed in Wayne County.

Furbearer numbers are increasing in this area due to depressed fur prices. During the 2008-2009 season harvest of all major species were down except for coyote and opossum.

Cabwaylingo would not be considered good rabbit habitat. It is mostly thickly wooded, just the opposite of what is normally considered good rabbit habitat. Rabbits would currently be found in forest openings and near developed areas. Creation of savannahs should allow for an increase in populations as there would be more edge and cover in the form of debris piles.

Nongame Species

Many bird species visit and use Cabwaylingo State Forest during the year. Some, like the chickadee, titmouse and cardinal are permanent residents. Here, they spend their entire lives finding everything they need to survive: food, water, protection (cover), and a safe place to raise their young. Other birds, such as the scarlet tanager, red-eyed vireo and hooded warbler temporarily leave their winter homes in South America and Mexico and fly hundreds of miles to places like the Forest where they stay just long enough to raise and feed their young on the area's abundant food resources. Still other species like the white throated sparrow and slate colored junco travel south to our region to escape the severe weather and its hardships of their northern breeding grounds.

Some birds, like the cerulean warbler, are specialists requiring specific habitats for survival. While others are generalists like the American robin, which adapt readily to changes in their environment. Some birds fulfill all their needs in more open areas like old, grown over fields while others prefer the mature forest. Through the use of various silvicultural practices, the Division of Forestry's goal is to maintain and/or increase bird diversity by providing different habitats.

West Virginia is also part of a center of distribution for amphibians, especially salamanders. Large populations of these animals are usually found in

mature forests with plenty of rock cover and downed woody material. Thirty one species of amphibians have been observed or are likely to occur on Cabwaylingo State Forest. Twenty three species of reptiles have been observed or are likely to occur on the Forest. Four out of the five turtles are aquatic, needing clean water and healthy aquatic communities. The snakes and lizards use a variety of habitats and often utilize edge habitat. The two venomous snakes (Northern copperhead and Timber rattlesnake) occur mostly in rocky habitat.

Forty-five species of mammals have been observed or are likely to occur at Cabwaylingo State Forest. Most are small mammals residing in a variety of habitats throughout the Forest. Forest species, such as mice *(Peromyscus spp.)*, woodrats *(Neotoma spp.)* and shrews *(Sorex spp.)* are most abundant in areas with high proportions of rocks and woody material on the ground with dense groundcover. Other species such as chipmunks *(Tamias spp.)* and woodchucks *(Marmota spp.)* thrive in more open areas that provide a variety of grasses and sedges. Bats use a variety of habitats, roosting in forested areas and foraging over fields, water and forests. Listings of wildlife species found or likely to live on Cabwaylingo State Forest are included in the Appendix.

4. Rare, Threatened and Endangered Species*:*

Several state and nationally rare plants and animals occur on the Forest. Special attention will be paid to the habitat needs of these species. Green salamanders *(Aneides aeneus)* and Allegheny woodrats *(Neotoma magister)* have both experienced population declines through much of their range. They live in rocky and cliff areas. The salamanders *(Aneides aeneus)* prefer damp rock faces with deep horizontal crevices and are usually only active in the spring at night. Allegheny woodrats *(Neotoma magister)* are active all year. They prefer rocky crevices, talus slopes and cliffs. They construct extensive nests under rocks and in boulder piles and like to pick up shiny objects.

The Rafinesque's big-eared bat *(Corynorhinus rafinesquii)* is a species that has been declining and there is a great deal of concern over the fate of this bat. The US Fish and Wildlife Service and Bat Conservation International area currently conducting a stats review of this bat and there is a big push to do positive conservation activities to promote this species. This bat historically roosted in hollow trees and rock shelters and now often uses old buildings which are often temporary in nature. A project is underway to construct an artificial roost on the forest.

Bats all along the eastern half of the nation are being impacted by white nose syndrome. It appears to be a fungal disease that irritates the bat during hibernation, causes it to wake early and burn all its fat reserves before spring, when food would be available. This syndrome has been devastating to bat populations. Scientists involved with bat research have basically dropped all other projects to try and address this situation.

The butternut tree *(Juglans cinerea)* is a federal candidate species, category 2.

The spreading pogonia *(Cleistes bifaria)* and Roundleaf catch fly *(Silene rotundifolia)* are considered rare and are listed as species of concern in the Natural Heritage database.

Rare fish known to live in area streams include the rosie sided dace *(Clinostomus funduloides)* this fish is sensitive to rises in temperature. Its state conservation status is S4, apparently secure.

Any sighting of these species will be reported to the WV DNR Natural Heritage Program and steps taken to protect these populations. Unique physical features, such as caves and cliffs, are often inhabited by rare species. These features should not be disturbed.

More information regarding the Natural Heritage Program and the rare species found on Cabwaylingo State Forest can be found in the Appendix.

G. Soils Information

The Natural Resources Conservation Service (formerly the Soil Conservation Service) of the USDA is the lead agency in matters relating to the nation's soils. This agency usually has field offices in each county. Soil surveys were often conducted on adjoining counties at different times. The land area of Cabwaylingo State Forest spans over portions of two counties, Wayne and Mingo. The soil surveys for these counties were not done at the same time. Therefore, maps and aerial photos may not align perfectly near county borders, and some duplication of information may be seen. Soils information for Cabwaylingo State Forest was supplied by the NRCS for both Wayne and Mingo Counties, with each county represented separately. The following descriptions will also examine the soils present based on the county.

Wayne County:

The general soil unit found on Cabwaylingo State Forest in Wayne County consists of the Dekalb-Pineville-Guyandotte. These soils are on moderately steep and steep, narrow ridgetops and very steep side slopes with moderately steep and steep benches and foot slopes. Colluvium is on side slopes adjacent to residual soils, in coves, and on foot slopes above drainageways. The rugged landscape has been dissected by many small, steep, erosional drainageways. Slope ranges from 8 to 65 percent.

This unit is composed of about 31percent Dekalb soils, 17 percent Pineville soils, 11 percent Guyandotte soils, and 41 percent soils of minor extent.

The minor soils are Grigsby soils on flood plains: Buchanan soils on foot slopes and in coves; Fiveblock soils in surface-mined areas; Dormont, Gilpin, and Latham soils on uplands; and Udorthents.

The steep and very steep Dekalb soils are on side slopes and ridgetops. They are moderately deep. They have very dark grayish brown, moderately coarse textured surface layer and a brown and yellowish brown, moderately coarse textured subsoil. These soils formed in acid material weathered from sandstone.

The moderately steep to very steep Pineville soils are on the lower side slopes, on foot slopes, and in coves. They are very deep. They have a dark brown, medium textured surface layer and a light yellowish brown, reddish yellow, and yellowish brown, medium textured subsoil. These soils are form in colluvium.

The very steep Guyandotte soils are on north facing side slopes and in coves. They are very deep. They have a very dark grayish brown, medium textured surface layer and a brown, dark yellowish brown, and yellowish brown, medium textured subsoil. These soils formed in colluvium.

Nearly all of the acreage on side slopes and foot slopes is used as woodland. Some small areas on the less sloping ridgetops, in coves, and on foot slopes are used as pasture. Many of the flood plains and terraces and a few of the broader ridgetops and less sloping foot slopes are used as hayland or cropland. The developed areas are mostly on terraces. Depth to bedrock and slope are limitations affecting most urban uses.

Mingo County:

The general soil unit found on Cabwaylingo State Forest in Mingo County consists of the Matewan-Pineville-Guyandotte. These soils are on moderately steep and steep, narrow ridgetops and very steep side slopes with moderately steep and steep benches and foot slopes. Colluvium is on side slopes adjacent to residual soils, in coves, and on foot slopes above drainage ways. The rugged landscape has been dissected by many small, steep, erosional drainage ways. Slope ranges from 35 to 80 percent.

This unit is composed of about 35 percent Matewan soils, 25 percent Pineville soils, 20 percent Guyandotte soils, and 20 percent soils of minor extent. The minor soils in this map unit are Fiveblock soils in surface-mined areas, Berks and Lily soils on ridgetops and shoulders, areas of rock outcrop, and small areas where 15 to 50 percent of the surface is covered by stones or boulders.

Matewan soils are moderately deep and well drained or somewhat excessively drained. They are on convex side slopes, ridge summits, nose

slopes, and shoulders. These soils formed in channery, loamy residuum and are underlain by sandstone and siltstone. They generally are associated with areas of rock outcrop. Typically, they have a surface layer of sandy loam and a subsoil of channery or very channery sandy loam.

The moderately steep to very steep Pineville soils are on the lower side slopes, on foot slopes, and in coves. They are very deep. They have a dark brown, medium textured surface layer and a light yellowish brown, reddish yellow, and yellowish brown, medium textured subsoil. These soils are form in colluvium.

The very steep Guyandotte soils are on north facing side slopes and in coves. They are very deep. They have a very dark grayish brown, medium textured surface layer and a brown, dark yellowish brown, and yellowish brown, medium textured subsoil. These soils formed in colluvium.

Nearly all of the acreage on side slopes and foot slopes is used as woodland. The remaining acreage has been developed for urban uses. It is along the main tributaries. Slope, stoniness, and low soil strength are limitations affecting construction of logging haul roads and landings.

More detail on soils distribution on the Forest can be obtained by consulting the soils map and tables in the Appendix. Suitability ratings for mentioned purposes are also explained in the Appendix.

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. Sometimes these diverse interests are in-compatible. By developing the resource through a multiple-use approach, priorities can be set and provisions made to reduce conflicts. Central to this concept is determining each interest's ***needs*** as opposed to its ***desires***. With this in mind, this plan will address several of the more prominent current issues, hopefully establishing goals and developing the relationships between them.

A. Boundaries

Regardless of the objectives, the location of boundaries is one of the primary considerations when attempting any type of management activity. Boundaries must be known and well marked if possible, even on State Forest land. Cabwaylingo State Forest is similar to many of the other state forests, in that it was at one time surveyed and a customary wire strung around the boundary. In many places yellow metal signs were also placed around the boundary, either on trees or on the wire itself. Much of the wire is now rusted away or buried. Over

the years, it has been found that private landowners have inadvertently encroached upon the Forest in many places.

B. Minerals

At the present time there are approximately 100 oil and gas well sites located on the Forest. Most are located within the Wilson Coal Lease which is owned by Cabot Oil & Gas Corporation.

In 1999, the State of West Virginia leased over 8000 acres beneath the Cabwaylingo State Forest to Vantage Mining Corporation. This lease only covered the coal from the "Alma Seam".

Should other well sites or mineral discoveries or deposits become commercially attractive, the Division of Forestry would work with the other agencies involved to insure that the principles of multiple-use are protected. Any disturbances of surface area would have to be planned and meet approval of the managing agencies on the Forest. For example, any road construction would be planned by the Division of Forestry to benefit future forest management work, enhance access for recreational purposes, create new wildlife habitat and protect water quality. Reclamation work and choice of seed mixtures would be coordinated with the Wildlife Resources section in order to obtain the best results not only for erosion control, but for wildlife food and cover.

C. Old Growth

West Virginia's State Parks contain over 70,000 acres which are dedicated to the preservation of all the forest resources. State Parks and recreation areas were established "for the purpose of preserving scenic, aesthetic, scientific, cultural, archaeological or historical values or natural wonders, or providing public recreation". Hunting, timber harvesting and mineral extraction involving surface disturbance on Parks are forbidden. The management of the Parks under these guidelines, while not intended specifically for wilderness or old growth, will evolve into an ample supply of well distributed, wholly natural areas, which should satisfactorily augment the already existent 117,000 acres of Federally designated wilderness areas on the Monongahela National Forest. Currently, Cabwaylingo State Forest does not have any area set aside as Old Growth.

D. Recreation and Aesthetics

Cabwaylingo State Forest supports a variety of recreational activities. The current recreational use of the Forest, with the exception of the cabins and overnight camping, is for day-use activities with rustic type facilities. The most prevalent of these is picnicking and followed closely by hiking. The DNR Parks and Recreation Section manages approximately 424 acres on the Forest,

including are the picnic areas, the Mc Clintic Group Camp, camping area, cabins, the residences (superintendent and assistant superintendent) and Forest office complex and the water plant. This includes all of the currently developed recreation facilities and the Division of Forestry has designated these areas as being excluded from other management practices. In addition, Parks and Recreation maintains hiking trails, not only in the improved recreation area, but throughout the Forest.

Waterfall on Bark Camp Branch

Occasionally conflicts arise when forest management activities occur adjacent to recreation areas. Timber harvests cannot be hidden, but in many cases, their location, size and prescription can be altered to lessen their visual impact. To the extent possible, aesthetic corridors are provided to lessen the impact of a harvest area. Considerations will be given to buffer zones adjacent to roads and recreation areas, maintaining forest vistas and minimal disturbance of existing forest trails. Forest management activities will enhance the forest recreation by creating a healthier forest, improving the quality and quantity of plant and animal life, encourage a wider distribution of species, create additional and easier access and provide additional trails for hiking and biking.

Post activity reclamation includes work done not only for environmental requirements, but also for aesthetic needs. The West Virginia Division of Forestry will conduct all forest management activities in a manner sensitive to multiple uses.

E. Roads

Cabwaylingo State Forest is fortunate, as far as access is concerned, to be bisected by County Roads 35 and 41. The road system on the Forest consists of state maintained paved and gravel roads, access roads of either gravel or dirt that are used for service and emergency use. The main access roads are paved. These roads lead through the Forest and to the main recreation areas. Of course, many of these roads are used for more than one purpose.

Paved roads included:

1.) County Route 35, (Twelvepole Creek and Sweetwater Branch) which has a total length of approximately 2 miles;
2.) County Route 41 (Twelvepole Creek), which begins at the junction of Sweetwater Branch and Twelvepole Creek. It is approximately 3 miles long;
3.) County Route 41/1, (Turkey Creek Road). It is approximately 2.5 miles in length;
4.) Forest Route 850, this road serves the Group Camp area;
5.) Forest Route 851, which serves the Spruce Creek Camping Area;
6.) Forest Route 852 which serves cabins 1 and 14;
7.) Forest Route 853 which serves cabins 8 to14.

These roads are maintained by the West Virginia Division of Highways and Division of Natural Resources (DNR) Parks and Recreation Section.

Gravel roads included: County Route 35/3 (Martin Ridge Road), 35/4 (Perry Ridge Road), and 35/5 (Tick Ridge Road). These roads are maintained by the West Virginia Division of Highways.

The Tick Ridge Campground Area consists of several gravel roads that are maintained by the DNR Parks and Recreation Section.

The majority of the roads in the Forest are access roads built for well site maintenance. These roads are maintained by Cabot Oil and Gas Corporation.

Forest management roads are those that have been constructed in conjunction with harvesting operations by logging contractors to State Forest standards. These include truck haul roads, skid roads and landing areas. This approach relieves the State of appropriating funds for road construction. Maintenance is dependant on funds also. This work is primarily custodial and is performed by Division of Forestry personnel as time allows. Efforts are hampered, however, due to the lack of any mechanized equipment available to assist with performing needed maintenance. As funds become available, some of this work can be contracted out as needed.

A more detail list of roads can be found in the Appendix.

F. Timber

The trees of the forest are the reason for all of the opportunities provided by State Forests. They are also the point of contention whenever conflicts of interest arise. The dual utility of this resource, as a standing tree or a harvested crop, provides the challenge when managing this resource. The demands placed on the forest, in addition to the health and vigor; require that this renewable resource be used in both forms. The standing tree serves recreational purposes, wildlife habitat needs, watersheds protection and forest management practices.

Once harvested, the trees again serve to highlight forestry practices, diversify wildlife habitat, enhance certain recreational aspects, generate income and provide a useful commodity for the benefit of society.

The WV Division of Forestry is involved with the actual management of timber at Cabwaylingo State Forest. Other agencies are affected by it and have an interest in this activity too. Management, including the removal and use of timber, is a way to manipulate the forest cover in order to accomplish the desired goals for the Forest, including demonstration, teaching, research and wildlife.

When the original management plan for the forest was prepared in 1971, 8,150 acres were considered. Approximately 432 acres of that area, including all of the improved recreation sites, were considered more valuable for recreation, aesthetics and wildlife habitat protection, and were classified as noncommercial forest at that time. The remaining acres were classified as commercial forest land. However, as in the beginning, the entire 8,224 acres will be considered by the Division of Forestry in meeting the requirements for multiple-use forestry.

Since 1979 there has been approximately 2.3 million board feet of timber harvested from Cabwaylingo State Forest. This is only a small portion of what could have been harvested, and still allow the forest to grow at its optimum potential. In time, the growth that the forest is now experiencing will slow and eventually decline, resulting in a considerable loss in volume. Planned harvests can prevent a stand from entering this stage of lost vigor and keep it at its most productive levels not only for timber, but also for wildlife and other uses. An increase in the harvest rate is desirable in order to maintain the health and vigor of the Forest. The increased level of harvest would be dependent upon favorable market conditions affording profitable removal of the forest products.

The most recent Forest inventory was completed in 2008. Data collected included tree species, size, condition and quantity. The inventory results indicated that approximately 92 million board feet of timber exists on the Forest at the present time.

G. Water

On Cabwaylingo State Forest there are numerous ridges where many streams begin either on the Forest or nearby. This provides an excellent opportunity to show the effects of land management on stream conditions. It also provides the opportunity to show that forest management activities can be conducted while maintaining high quality streams. Forest management practices and prescriptions are planned with water quality as a major consideration of the operation. The intent is to conduct the harvesting using methods and techniques that will provide the least amount of land disturbance and maintain the quality of the streams. Best management practices (BMPs) are guidelines pertaining to road location, construction, maintenance and reclamation. They are implemented

with the objective of maintaining or improving water quality. Surface water control systems are installed on all roads and may include culverts, ditches, water bars, use of gravel, broad-based dips and grade breaks.

Streamside management zones (filterstrips) are established in prescription areas. These areas are given special consideration in relation to timber marking and road location with the goal of minimum disturbance in this zone. Water conditions are closely monitored during logging operations and adjustments are made, including closing down operations if conditions warrant.

All roads on logging operations are limed, seeded and fertilized during the reclamation phase. They are then maintained for future forest use and provide outstanding permanent hiking trails, wildlife habitat and access for forest protection.

H. Wildlife

The most common users of the Forest are the wildlife residents. These inhabitants represent almost all of the species typical to the upland hardwood forests of the central Appalachian Mountains. Each species has unique habitat requirements which when combined and present in a close area constitute that animal's home range. These home ranges vary in size from a few square feet for salamanders to several square miles for bear. Every activity, whether natural or man-made, which changes the character of the Forest will impact one species or another, either for better or worse. Maintaining and enhancing diversity of habitats can continue to be accomplished through silvicultural practices such as crop tree release, thinnings, harvesting of mature timber and the associated factors of each that create change. Additional wild turkey and ruffed grouse brood range can be enhanced by seeding logging roads to beneficial herbaceous vegetation, limiting access on these roads and maintaining all current clearings by periodic mowing. Also, the protection or enlargement of spring seeps and propagation of wild grape is recommended to further strengthen turkey habitat and increase population.

Even-age silvicultural practices would increase the amount of browse and escape cover on the Forest. Practices that regenerate areas 10 to 20 acres in size would greatly enhance the population of ruffed grouse. Even-age cuts should be at least 10 acres in size and located in the same general area, but not isolated. Even-age cuts which are isolated tend to be heavily browsed by deer and regeneration could become a problem. The value of an even-age cut is greatly influenced by its shape. Long, irregular shaped cuts are more beneficial to most wildlife species than are square or round cutting areas. Song birds also utilize these areas to promote quick development of young fledglings.

Selective harvesting, another silvicultural practice, benefits a large variety of wildlife species, both game and nongame. This practice allows the forest to

develop characteristics such as large standing snags, nurse logs, downed timber, varied vertical structure and uneven age classes. This habitat is beneficial for many songbirds, small mammals and amphibians and is an important component for game and other high profile species as deer, bear, furbearers and wild turkey. Areas could be managed to maintain these characteristics by the continued use of selective cutting. Old growth characteristics could be mimicked by girdling trees, felling trees and planting understory species. Surrounding areas could be intensively managed using even-age practices to provide early successional habitat. Portions of existing wildlife openings could be seeded with perennial or annual plant species to attract and support various wildlife species.

By implementing both even-age and uneven-age management practices and maintaining log landings as clearings, seeding roads with beneficial vegetation and transitioning borders around existing clearings, most wildlife populations on the Forest could be improved or maintained at optimal levels.

The Wildlife Resources Section's fish management program on Cabwaylingo State Forest is primarily interested in trout. Twelvepole Creek is suitable for trout. The fish biologists monitor the stream and lake conditions to determine stocking programs and then trout are stocked when and where appropriate. In addition, fish biologists make recommendations on all activities that could have an affect on streams.

I. Invasive Species

Invasive species are often defined as non-native species whose introduction does or is likely to cause harm to the economy, ecology, or to human health. Invasive species, with respect to a particular ecosystem, are any species including its seeds, eggs, spores, or other biological material capable of propagating that species, that is not native to that ecosystem. Invasive species pose an immediate and future threat to Cabwaylingo State Forest. Endangered, threatened and rare plant and animal species are especially at risk because they often occur in small populations that make them particularly vulnerable to competition from more aggressive invasive plants. Other potential problems caused by invasive species include replacement of native plant species currently found on the Forest. Many native species such as northern red oak are important for wildlife. Certain invasive species can hinder tree regeneration by smothering seedlings. Wildlife can be especially affected through elimination of native food sources. Several invasive species, such as Japanese stilt grass, can create wildfire hazards due to their thick growth and natural flammability. Biological diversity can be reduced if invasive species are not held in check.

Japanese Knotweed in bloom behind the Forest Office

On rare occasions, an onslaught from these invaders can significantly alter the character of a forest. Such a change occurred when the chestnut blight invaded West Virginia in the early 1900s. Cabwaylingo State Forest had significant numbers of chestnut trees, but they were lost from the Forest as they were in other regions. Efforts were made to stop the spread of the blight and a State Chestnut Blight Commission was developed. Although the Commission disbanded years ago, scientists from West Virginia University and elsewhere continue to research and combat this problem.

A major pest to invade West Virginia in the more recent past has been the gypsy moth. This insect has slowly been working its way from Massachusetts since 1889 and had established itself throughout the Northeast by 1987. The gypsy moth caterpillar is among the most destructive insects in oak forests and has the potential to inflict major damage on Cabwaylingo State Forest. However, through cooperative agreements and programs between the WV Division of Forestry, WV Department of Agriculture, and the USDA-Forest Service, an aggressive monitoring and spraying program was developed for State Lands. Sample plots were set up on the Forest and monitored annually until gypsy moth egg mass populations reached a treatment threshold. Currently, there are no known infestations of gypsy moth in this part of the state.

Many pests influence the development of the forest, but rarely do they have the impact of a chestnut blight or gypsy moth invasion. Among these is a group of mixed insect species known as the looper complex, more commonly known as inch worms. This complex is a group of three insects with similar habits which do similar damage and are often found together. In 2003 white oaks on ridges in the Forest were defoliated by loopers and common oak moth caterpillars.

Another forest pest which will most likely have an impact on the Forest is the hemlock woolly adelgid *(Adelges tsugae)*. These soft-bodied, fluid-feeding insects, closely related to aphids, are a serious pest of eastern hemlock trees.

Hemlock woolly adelgids display several different forms during their life cycle, including winged and wingless adults. The females are oval, blackish-gray and about 1mm in length. Newly hatched nymphs (crawlers) are approximately the same size, reddish-brown and produce white, waxy tufts that cover their bodies throughout their life. The white-cottony masses are 3mm or more in diameter. The presence of these cottony flecks on twigs and at the base of hemlock needles is the most obvious indicator of an infestation. The egg sacs of the hemlock woolly adelgid look like the tips of cotton swabs clinging to the undersides of hemlock branches and are also an indicator of an infestation. A fact sheet on this insect pest can be found in the appendix of this plan. Hemlock trees in Cabwaylingo State Forest and State-wide are important for providing shade to small streams which helps maintain lower water temperatures. The loss of these trees, especially along high quality creeks and streams, could have a detrimental effect on water quality and aquatic species habitat and populations. Currently, there are no known infestations of hemlock woolly adelgid on the Forest.

Those invasive species known to occur on the Cabwaylingo State Forest at the present time include Japanese stilt grass, tree of heaven, autumn olive, oak wilt, Japanese knotweed, kudzu, oriental bittersweet, and multiflora rose. See appendix for available fact sheets on these invasive species.

TABLE 1
PRIORITY LIST OF INVASIVE SPECIES
OF
CONCERN FOR CABWAYLINGO STATE FOREST

Common Name	Scientific Name	Habitat
PLANTS;		
Garlic Mustard	*Alliaria petiolata*	forest
Japanese barberry	*Berberis thunbergii*	forest
Thistles – musk, bull, European marsh, Canada	*Carduus nutans, Cirsium arvense. C. palustre, C.vulgare*	Open, wetland
Oriental bittersweet	*Celastrus orbiculatus*	Forest
Spotted knapweed	*Centurea biebersteinii*	Open
Crown Vetch	*Coronilla varia*	Open
Russian and autumn olive	*Elaeagnus angustifolia, E. umbellate*	Forest, open
Japanese honeysuckle	*Lonicera japonica*	Forest, open
Kudzu	*Pueraria lobata*	Forest, open
Purple loosestrife	*Lythrum salicaria*	Open, wetland

Mile-a-minute	*Persicaria perfoliata*	Forest, open
Japanese knotweed	*Fallopia japonica*	Open, wetland
Tree of Heaven	*Ailanthus altissima*	Open, forest
Multiflora rose	*Rosa Multiflora*	Forest, open
Japanese silt grass	*Microstegium vimineum*	Open, forest
INSECTS		
Hemlock woolly Adelgid	*Adelges tsugae*	Forest
Emerald ash borer	*Agrilus planipennis*	Forest
European gypsy moth	*Lymantria dispar*	Forest
DISEASES		
Oak Wilt	*Ceratocystis fagacearum*	Forest
Beech bark disease	*Nectria coccinea var. faginata*	Forest
Sudden Oak Death	*Phytophthora ramorum*	Forest

Agencies involved in the management of Cabwaylingo State Forest are currently working to identify areas of invasive species infestation. Periodic monitoring is needed, especially along roadways and water courses where invasive species are more likely to be introduced and become established. When problem populations of invasive species are located on the Forest, control measures will be implemented. Awareness and education about invasive species and the threats they pose are extremely important for users of Cabwaylingo State Forest and the State of West Virginia as a whole.

III. QUANTITATIVE DATA

A. Summary of Acres

Commercial Forest Land----------7,916 Acres
Non-Commercial Forest Land----------308 Acres
Total Forest Acreage----------8,224 Acres

Cabwaylingo State Forest's most common forest cover type is Oak-Hickory (46.6%) followed by Cove Hardwoods (34%) and then Maple-Beech-Hemlock (19.4%). Most of this forest (57.2%) is in the medium sawtimber size of 12 to16 inches DBH (diameter at breast height, this is measured 4.5 feet above the ground), followed by 35.2% in large sawtimber size of 18 inches DBH and up and then 7.6%, in sapling to pole size of under 10 inches DBH. A more detail breakdown can be found in the table below.

Table 2
Summary of Forest Cover Type and Size Classes by Acres

		Forest Cover Type in Acres			Forest Size Class in Acres		
Compartment	**Acres**	**Cove Hardwood**	**Maple, Beech, Hemlock**	**Oak & Hickory**	**Under 10 inches DBH**	**12 to 16 inches DBH**	**18 inches and up DBH**
1	650	183	244	223	20	356	274
2	604	198	212	193	84	300	219
3	799	200	112	487	21	458	321
4	538	188	129	220	57	385	96
5	605	343	11	252	54	354	190
6	590	267	39	284	125	386	79
7	612	288	12	313	86	245	281
8	553	37	288	228	34	270	250
9	532	193	25	314	43	3346	142
10	581	221	83	277	22	300	259
11	307	132	0	169	0	150	151
12	535	154	160	220	18	287	230
13	325	72	85	163	0	141	82
14	684	211	135	338	25	452	207
TOTALS	**7,915**	**2,687**	**1,535**	**3,681**	**589**	**4,430**	**2,781**

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 comprehensive inventory of the forest completed in 1971 and 2008. Board foot (bf) volume is a measurement that is represented by a 12"x12" x1" piece of wood. A tree needs to be at least 12" DBH to be considered large enough to make a sawlog and its volume can be expressed in board feet.

TABLE 3
1971 AND 2008 INVENTROY DATA RESULTS

Compartment Number	1971 Inventory		2008 Inventory	
	Acres	Volume (bf)	Acres	Volume (bf)
1	654	2,722,780	649.80	7,955,457.90
2	581	3,101,809	603.58	7,144,041.46
3	627	2,469,396	799.29	10,649,147.17
4	516	958,357	537.97	4,420,754.35
5	633	2,492,487	605.35	7,931,605.97
6	626	1,189,987	590.25	4,243,259.99
7	627	1,608,164	612.38	6,111,019.46
8	575	2,689,233	553.29	5,353,883.28
9	530	1,475,878	531.56	6,367,020.01
10	547	1,662,943	581.30	7,831,389.99
11	272	982,432	306.82	4,113,280.52
12	621	2,024,335	535.01	6,494,238.47
13	339	774,999	325.28	3,582,102.43
14	545	2,394,408	684.16	9,419,096.78
TOTALS	**7,693**	**26,547,208**	**7,916.04**	**91,616,297.78**

There are some differences in acreage due to additional acreage being added. Some of these changes are due to the computer advancement and using Global Information System (GIS).

TABLE 5
2008 INVENTORY DATA

Compartment	Area (Acres)	Number of Samples	Volume/acre	Total Volume
1	649.796447	65	12,243.00	7,955,457.90
2	603.584264	60	11,836.03	7,144,041.46
3	799.292301	81	13,323.22	10,649,147.17
4	537.968281	53	8,217.50	4,420,754.35
5	605.354276	60	13,102.42	7,931,605.97
6	590.248353	60	7,188.94	4,243,259.99
7	612.383051	61	9,979.08	6,111,019.46
8	553.228280	56	9,677.53	5,353,883.28
9	531.563521	57	11,977.91	6,367,020.01
10	581.298715	59	13,472.23	7,831,389.99
11	306.824078	28	13,405.99	4,113,280.52
12	535.007206	55	12,138.60	6,494,238.47
13	325.284019	33	11,012.23	3,582,102.43
14	684.155969	69	13,767.47	9,419,096.78
Totals	**7915.988761**	**797**	**11,524.44**	**91,616,297.78**

This is the total merchantable volume contained in trees 12" DBH and up. The present day forest averages 11,443 bd. ft. /acre. And is growing an average of 200 bd.ft./ac./yr. Not all of this volume is in desirable species nor is it all in good quality trees. Overall, however, this forest contains an excellent selection of high quality hard and softwood timber.

C. Species summary Stocking and Volume

At the present time the Forest consist of Yellow Poplar (16%), Chestnut Oak (16%), White Oak (13%), Hickory (8%), Red Maple (6%), Hemlock (4%), Red Oak (4%), Black Oak (4%), Scarlet Oak (4%) and Beech (4%). This ranking is based on Basal Area (BA) a reflection of stocking that is represented by the number of square feet occupied by tree stems at DBH. This measurement counts all trees 2" and larger DBH.

The ranking based upon board foot volume counts stems 12" DBH and larger. The percentage of each major species by volume is Yellow Poplar (22%), Chestnut Oak (14%), White Oak (13%), Hickory (7%), Red Oak (5%), Black Oak (5%), Hemlock (4%), Scarlet Oak (4%), Red Maple (2%), Cucumbertree (2%) and Beech (2%). A more detailed breakdown is provided in the table below.

TABLE 6
SPECIES PERCENTAGES

Species	Percentage by Basal Area	Percentage by Volume
American Beech	4.37	2.07
American Elm	0.19	0.11
Basswood	2.22	0.15
Black Cherry	0.15	0.11
Black Gum	1.14	0.61
Black Locust	0.18	0
Black Oak	4.47	5.24
Black Walnut	0.41	0.36
Buckeye	0.15	0.14
Chestnut Oak	16.10	14.20
Cucumbertree	2.32	2.44
Dogwood	0.10	0
Hickory	4.77	4.49
Hemlock	8.38	7.64
Hophornbeam	0.02	0
Pitch Pine	0.31	0.18
Red Maple	6.48	2.81
Red Oak	4.55	5.73
Sassafras	0.63	0.06
Scarlet Oak	4.41	4.25
Slippery Elm	0.03	0
Sourwood	1.15	0
Sugar Maple	4.27	1.76
Sweet Birch	1.19	0.57
Sycamore	0.39	0.58
Virginia Pine	0.06	0
White Ash	1.51	1.16
White Oak	13.72	13.75
White Pine	0.09	0.12
Yellow Birch	0.02	0
Yellow Poplar	16.24	22.55

As the Forest matures the more intolerant (to shade) species such as Yellow Poplar, will begin to drop out and will be replaced by the more tolerant species such as Maple, Beech and Hemlock.

D. Average Annual Growth

The average annual growth, for the sections of the Forest managed by WV Division of Forestry, is approximately 222.15 board feet per acre per year

based upon the differences between the 1971 and 2008 inventory. The total annual growth increment for the Forest is estimated at 1,602,031 board feet per year. Catastrophic events can have a retarding effect on this progression. It is also unrealistic to believe that these rates will remain unchanged if left alone. At some point, decadence and over maturity will develop and growth rates will decline. Continuous monitoring and observations by the managers will detect and predict these changes. Future visitation and re-measurements will greatly enhance the WV Division of Forestry's knowledge of forest growth and dynamics.

The following tables contain estimated total forest board foot volume and estimated board foot volume per acre by compartment for the years 2008 (date of inventory) and a 15-year growth estimate.

TABLE 7

Total Forest Board Foot Volume by Compartment

Compartment Number	Total Volume (2008)	Total Volume (2023) (projected)
1	7,955,457.90	10,120,849.52
2	7,144,041.46	9,155,434.89
3	10,649,147.17	13,312,721.06
4	4,420,754.35	6,213,488.08
5	7,931,605.97	9,948,897.82
6	4,243,259.99	6,210,212.64
7	6,111,019.46	8,151,734.11
8	5,353,883.28	7,197,469.66
9	6,367,020.01	8,138,410.42
10	7,831,389.99	9,768,518.72
11	4,113,280.52	5,135,745.77
12	6,494,238.47	8,277,104.67
13	3,582,102.43	4,666,083.87
14	9,419,096.78	11,698,988.60
Totals	**91,616,297.78**	**117,995,659.84**

Board feet International 1/4 Inch Scale (only includes trees 12 inches DBH and larger)

E. Estimated Permissible Cut

Each forested area is evaluated to determine the amount of harvestable timber that is contained therein. This is known as the permissible cut and represents the excess volume on the site which, when removed, will still allow the site to take full advantage of its growing capacity. When applied to management compartments permissible cut is also useful in determining when and where to look for harvest needs. The forest wide permissible cut also helps track the overall development of the forest. Currently, approximately 961,219

MBF of timber could be cut each year without reducing the total volume of the Forest.

F. Multi-disciplinary Data

1. Boundaries:

Condition: Most of the boundaries have blue painted trees and/or single strand wire. You can also find many of the yellow metal State Forest signs along the boundary. It is very likely that encroachment occurs along and within the forest. Last Action: at least some parts of the boundary are painted every year. Needs: Continue to freshen paint marks along lines and refresh all corners as needed.

2. Roads and Rights-of-Way:

The road system on Cabwaylingo State Forest can be classified into four categories based on primary use or intent. 1) Public access roads are either paved, tarred and chipped or gravel and are maintained by the WV Division of Highways. 2) Service roads are either paved, dirt or gravel and are restricted to public use during certain periods, by State vehicles or foot travel. 3) Rights-of-way deal primarily with well sites. 4) Forest management roads are those that have been constructed in conjunction with harvesting operations or research areas. This includes truck haul roads, skid roads and landing areas. Access for emergencies and maintenance activities are common uses of the entire road system. Of course, many of the roads are used for more than one purpose. See the “Physical Features” maps in the Appendix for more information.

3. Trails:

The trail system at Cabwaylingo State Forest is a network developed from old roads, access roads and casual use. A few of these trails were developed for a specific use and some of them serve dual purpose as forest access roads.

It is the intent of the West Virginia Division of Forestry to manage the Forest in a manner that will continue to provide a trail system for as many compatible uses as practical. Care will be taken to account for as much of the current trail system as practical and compatible with planned forest uses. In order to ensure compatibility with other uses, new trails will be preplanned before they are developed. Current trails in use on Cabwaylingo State Forest will be classified into three categories; permanent, special use and casual.

Permanent

Permanent trails will be designated initially after considering use, location and compatibility. They will be maintained in their current location whenever

possible through agreements with the Parks and Recreation section. In cases where permanent trails serve dual purpose as access roads, the road use will take priority when necessary although trail use will be continued. Occasional interruption for other forest uses may occur, but will be minimized and continued trail use will be maintained. These trails will also be used for emergency forest access. Trails designated as permanent are as follows:

Ash Branch Trail: Trail Length – 1.5 miles
This trail begins near Cabin #8 and extends to Long Branch and ends at the Long Branch Picnic Area. Points of interest are rock formations at the top of the ridge and CCC improvements such as stairs and stream crossings. Color code for marking this trail is white.

Copley Trail: Trail Length – 1.28 miles
The trail begins near cabin #7 and goes to Tick Ridge. It then comes off the mountain to the swimming pool. Points of interest to notice are the rock formations running the top of the ridge. Color code for marking this trail is blue.

Indian Trail: Trail Length – .91 mile
The trail begins near the Group Camp and ends at Tick Ridge Fire Tower. Color code for marking this trail is red.

Martin Ridge Trail: Trail Length – .7 mile
The trail begins in Doane Hollow Picnic Area and ends on Martin Ridge Road. By going east on Martin Ridge Road it connects with Sleepy Hollow Trail. Color code for marking this trail is green.

Sleepy Hollow Trail: Trail Length – 1.09 miles
The trail begins near Cabin #1 and ends on Martin Ridge Road. Points of interest include the large rock overhangs and scenic waterfalls. Color code for marking this trail is bright pink.

Spruce Creek Road and Trail: Trail Length – 1.31 miles
This begins in Spruce Creek Picnic Area and connects with Tick Ridge Road. Color code for marking this trail is yellow.

Special Use:

Special use trails may be designated to meet a special use or need. They may be developed in cooperation with some group or agency to provide a specific function. This will usually be done by special agreement with the group to develop and maintain the trail along with other actions. At the present time there are no special use trails on Cabwaylingo State Forest.

Special use trails will be planned to conform to existing roads and trails whenever possible. They may be altered later to fit in with planned or newly

constructed access systems. These trails may be constructed outright, or be a combination of existing roads and trails. The life span of such trails may be limited to the duration of the development/maintenance agreement or the length of the need.

Casual:

Casual trails are of an unplanned or temporary nature. Many of these trails utilize access roads created during forest management activities. They frequently have limited use and usually are unimproved. The Division of Forestry does not recognize these as official trails. Because of the casual nature, limited use and sometimes temporary needs for these trails, the Division of Forestry will not consider improvement or maintenance. No attempt will be made to list or map the casual trails.

The areas of Cabwaylingo State Forest that have been assigned to the DNR Parks and Recreation Section to be managed for improved recreation contain a number of trails that serve those areas. Their primary purpose is to provide improved recreation and generally the trails are incorporated into the recreation system. No further need exists to address these trails.

It is anticipated that the trail system will expand over time to provide additional recreational experiences and enjoyment at Cabwaylingo State Forest. Incorporating roads from previous management activities, along with future construction, will provide many more opportunities to develop trails and user access.

5. Water Resources:

The area of Cabwaylingo State Forest under Division of Forestry management has five main drains into Twelvepole Creek. These are Arkansas Branch, Sweetwater Branch, Spruce Creek, Turkey Creek, and Moses Fork. Lesser drains include Bark Camp, Wiley Branch, Long Branch, Gourd Branch, Johnnies Branch and Sleepy Hollow. The main forest road follows Twelvepole Creek.

Overall, the water resources on Cabwaylingo State Forest are considered to be of high quality. The watersheds have been lightly impacted by human use and there are no known water quality problems at this time. However, it would benefit all agencies involved in land management to devise a water quality sampling system for the Forest. This would establish baseline information on water quality and would allow for tracking of any water quality problem that should arise.

Wildlife Areas:

There are two designated wildlife openings, three acres total and one waterhole developed at a spring for wildlife habitat improvement. These were completed in conjunction with the Sweetwater Harvest project on the Forest. Gas well sites along with haul roads, skid trails and landings from timber harvests, range in size from one fourth of an acre to three acres were seeded to game food, providing additional wildlife habitat. Generally, these have all been planted to a combination of Kentucky 31 fescue *(future use discontinued)*, orchard grass, ladino clover and birdsfoot trefoil. In most cases the trefoil and clover have dropped out. Other grasses and herbaceous plants such as deer tongue grass and milkweed are present as volunteers. Most of the openings are mowed at least once a year. Some near the roads are mowed more often for aesthetic reasons. Other openings are strip mowed to allow for transitional cover. These are not actively managed or maintained specifically for wildlife habitat.

Plans are underway to create more permanent wildlife openings and grasslands with future timber harvesting and well development operations.

IV. PAST PROJECTS

Since the completion of the original forest management plan for the Forest, each timber harvest, inventory or special project has been given a designation or name. This section is a record of those activities in chronological order.

A. WHITE OAK GROWTH STUDY AND DEMONSTRATION AREA (1936-1955)

LOCATION

The study area is located approximately 100 yards west of Cabin #7 and is one acre in size. Posts were set at the corners.

PURPOSE

The purpose of the study was to measure growth rate before and after an improvement cut was made. This study was established in 1936 by the CCC, but all the data from them was lost. The study area was re-established in 1950 and data was collected. The stand consists of White Oak (51%) and the other 49% were other hardwoods such as red oak, hickory, beech, and yellow poplar. Data was collected on 253 trees within the study area.

RESULTS

The study was abandon in 1955 after data was collected. The table below is a summary of their finding:

YEAR	Average DBH	Average Basal area
1950	8.7	61.776
1955	9.4	71.049

The average 10 years growth predication for white oak ranges from .2 to 1.2 inches.

B. YELLOW POPLAR GROWTH STUDY AND DEMONSTRATION AREA (1948)

LOCATION

The study area was located immediately north of the Spruce Creek picnic ground.

PURPOSE

The broad objective was to determine how yellow poplar grows under different competitive conditions and to allow the public to see the results.

Three plots were established and were approximately 1/5 acre in size and a 10-foot strip was cleared between the plots.

Plot #1, all the trees were removed except the yellow poplar and the hemlock understory.
Plot #2, the yellow poplar was release from competition.
Plot #3, was left as a control plot.

RESULTS

Data was collected on the study area in 1952 and the following results were recorded.

ANNUAL RINGS PER INCH			
Year	Plot 1	Plot 2	Plot 3
1948	9.5	10.3	10.7
1950	6.9	9.0	9.2

This study showed that removing competition allowed the remaining trees to grow faster (i.e. the fewer rings per inch mean the tree is growing faster).

C. TURKEY CREEK TIMBER HARVEST (1955 - 1958)

LOCATION

The harvest area is on the headwaters of Moses Fork, Chestnut Log Branch, Bear Run and Old Fork of Jennies Creek of Twelvepole Creek or in Compartment 7. Most of the data has been lost on this timber sale.

MANAGEMENT OBJECTIVES

With this harvest area, it was intended to improve the quality of the stand for wildlife and timber production. Due to past forest fire history, a lot of the Compartment 7 was severely damaged. By removing some of the cull trees along with some of the sound trees a better stand of trees resulted. Young mast producing tree species were favored resulting in increased mast production for the squirrel, turkey and deer.

SPECIFIC RECOMMENDATIONS

The total board foot volume to be removed in the harvest amounted to 2,616,332 board feet. What was unusually about this timber harvest was that the State was paid based upon the amount of lumber produced by the sawmill. The price ranged from a high of $6.5.0MBF for Yellow Poplar, Cucumbertree and Basswood to a low of $3.00/MBF for Hickory. There was also approximately 1.5 miles of haul road constructed.

STATUS OF COMPLETION

This timber was sold to Ken Marcum of Wilsondale, WV, in 1955. The harvest was completed in 1958. This timber sale brought $12,090.00.

D. GOURD BRANCH TIMBER HARVEST (1959 - 1962)

LOCATION

The harvest area is on the Gourd Branch of Twelvepole Watershed, Compartment 5A located approximately 25 miles south of Wayne, WV. The total acreage of this harvest was 516 acres.

DESCRIPTION OF THE TIMBER

The timber on Compartment 4 was composed of mature hardwoods and softwoods. The area to be cut was marked on a single tree selection basis with an estimated 806 MBF to be removed.

MANAGEMENT OBJECTIVES

With this harvest, it is intended to improve the quality of the stand for wildlife and timber production. Due to past forest fire history, a lot of the Compartment 4 was severely damaged. By removing some of the cull trees along with some of the sound trees a better stand of trees resulted. Young mast producing tree species were favored resulting in increased mast production for the squirrel, turkey and deer. The skid roads and trails were seeded with wildlife in mind.

SPECIFIC RECOMMENDATIONS

The total board foot volume to be removed during the harvest amounted to 806 MBF. This is an average of 1,562 board feet per acre.

The appraised value of this timber was $10,740.49. The price ranged from a high of $12.50/MBF for red oak to a low of $8.00/MBF for hemlock and beech. There was also approximately one quarter of a mile of new haul road constructed.

STATUS OF COMPLETION

This timber was sold to Ken Marcum of Wilsondale, WV, in 1960. The harvest was completed in 1962. This timber sold for $8,448.50.

E. SPRUCE CREEK TIMBER HARVEST (1980-81)

LOCATION

The harvest area was on the Spruce fork of Twelvepole Watershed, Compartment 5A located approximately 25 miles south of Wayne, WV. The total acreage of this harvest was 256 acres.

DESCRIPTION OF THE TIMBER

The timber on Compartment 5A was composed of mature hardwoods and softwoods. The area to be cut was marked on a single tree selection basis with an estimated 981.3 MBF to be removed. The volume to be cut was 3,833 board feet per acre. The average tree volume was 335 board feet. Thirty-seven black walnut trees with a total volume of 7,866 board feet are included in the harvest. The average diameter of merchantable trees is 20" at breast height.

MANAGEMENT OBJECTIVES

With this harvest, it is intended to improve the quality of the stand for wildlife and timber production. Due to past forest fire history, a lot of the Compartment is severely damaged. By removing some of the cull trees along with some of the sound trees a better stand of trees remained. Young mast producing tree species will be favored resulting in increased mast production for the squirrel, turkey and deer. The skid roads and trails were seeded with wildlife in mind.

SPECIFIC RECOMMENDATIONS

The total board foot volume to be removed in the harvest amounted to 989.2 MBF. This is an average of 3,900 board feet per acre. The removal of 32 ft^2 of basal area per acre of sound and cull were removed. The total number of trees was 3,397 of which 14% were culls and 86% were sound.

The appraised value of this timber was $29,519.00. The price ranged from a high of $46.83/MBF for red oak to a low of $1.00/MBF for hemlock and beech. There was also approximately 2.56 miles of haul road constructed with a 5 foot in diameter culvert, 70 feet in length utilized in a major stream crossing.

STATUS OF COMPLETION

This timber was sold to Industrial Timber and Land Company from Cleveland, Ohio, in 1980. The harvest was completed in 1981. This timber sold for $31,968.35. The additional sum of $5,935.00 was paid by Industrial Timber and Land Company for the West Virginia Division of Forestry to seed and fertilize the road network.

F. BLOW-DOWN TIMBER SALVAGE (1982)

LOCATION

The harvest area was on the West fork of Twelvepole Creek in Wayne County. The area was hit by horrific winds that blew down many trees. Three areas were impacted comprising 98 acres in Compartment 14.

DESCRIPTION OF THE TIMBER

The timber was completely blown down in a strip 200 feet wide. For 150 feet in width on either side of this strip 50% of the timber was either blown down or twisted off. The wind was so severe that red oaks 24" in diameter were twisted of 40 to 50 feet above the ground. The volume to be salvaged from this area was marked and estimated to be 326,900 board feet. The average diameter of the marked timber was 18" at breast height.

MANAGEMENT OBJECTIVES

With this harvest, the intent is to salvage the timber to reduce the forest fire hazard by removing excess heavy fuels on the forest floor and to reduce the insect buildup as the timber decays. The skid roads and open areas were being seeded with wildlife species.

SPECIFIC RECOMMENDATIONS

The total board foot volume to be removed in this harvest amounted to 326.7 MBF. This is an average of 3,300 board feet per acre.

The appraised value of this timber was $6,540.40. The low value is due to the large amount of damaged timber. The price ranged from a high of 43.00/MBF for basswood to a low of $3.00/MBF for beech.

Two tenths of a mile of haul road was constructed along with 7,000 feet of skid trails. The Division of Forestry provided temporary access to the harvest area via a low water bridge. The Division also seeded the landing as well as the haul roads and skid trails.

STATUS OF COMPLETION

The timber was sold to Maynard Lumber Company for the appraised value of $6,540.40. The harvest was completed in 1982. The salvage sale area was seed and reclaimed. Remarkably the reclaimed area has recovered from the

storm to the degree that it is almost impossible to tell tornado type winds ever occurred in this area.

G. RIGHT FORK OF SPRUCE CREEK TIMBER HARVEST (1982-83)

LOCATION

The harvest area was on Spruce Creek Fork of Twelvepole watershed, Compartment 8A located approximately 25 miles south of Wayne, WV. The total acreage of this harvest area was 330 acres.

DESCRIPTION OF THE TIMBER

Timber on Compartment 8A was composed of mature hardwoods and softwoods. The area was marked on a single tree selection basis with an estimated 1,409.8 MBF to be removed. Volume cut per acre was approximately 4,200 board feet per acre. The average diameter of merchantable trees was 21" at breast height. Fifteen black walnut trees were included in the timber sale with a volume of 5,000 board feet.

MANAGEMENT OBJECTIVES

With this harvest, it is intended to improve the quality of the forest stand. Due to past forest fire history in this stand, a lot of the stand was moderately to severely damage. By removing both sound and cull trees, a better overall stand was the result. Approximately 3,000 board feet per acre were left after the harvest. Young oaks and hickories will be favored resulting in increased mast production for the squirrel population. The skid and haul roads were seeded for deer and turkey.

SPECIFIC RECOMMENDATIONS

The cruise indicated there was a total volume on the site of 2,199,450 BF, for an average of 6,665 board feet per acre. The basal area is 65 sq. ft/acre for trees 12" and up. The total basal area for the site was 101 ft^2. The permissible cut for this harvest was is 4,370 board feet per acre. This volume also took damage from logging into account. The removal of 30.1 ft^2/acre of sound volume and 6.5 sq. ft/acre of culls were taken.

A total of 3,791 sound trees and 722 cull trees were be marked resulting in a volume of 1,409,762 board feet. The appraised value of this timber was $57,861.26. The price ranged from a high of $87.66/MBF for red oak to a low of $5.00/MBF for hemlock and beech.

STATUS OF COMPLETION

This timber was sold to Volla Maynard Lumber Company, Dunlow, West Virginia in October 1982. The harvest was completed in the fall of 1983. This timber sale brought $57,861.26. Additional money was paid for the timber on the haul road right-of-way and for timber damage during the logging operation.

H. MARTIN RIDGE TIMBER HARVEST (1983)

LOCATION

This harvest area was on Martin Ridge above Sweetwater Branch, Compartment 2A, located approximately 25 miles south of Wayne in Wayne County, West Virginia. The total acreage of the harvest area was 234.

DESCRIPTION OF THE TIMBER

Timber on Compartment 2A was composed of mature hardwoods. The area was marked on a single tree selection basis with an estimated 980.7 MBF. Volume cut per acre was approximately 4.2 MBF. The average diameter of merchantable trees was 22" at breast height. Walnut timber, 41 trees with 12.1 MBF, was included in the total volume.

MANAGEMENT OBJECTIVES

With this harvest, it was intended to improve the quality of the forest stand. Due to past farming and grazing patterns in this Compartment, a lot of this area was under stocked. By removing some of the larger trees, this will release the smaller diameter trees to increase the stocking level. There were deer and turkey moving into this area of the forest. This was mostly due to improvement in law enforcement activities. The haul roads, skid trails and landing were seeded to benefit wildlife.

SPECIFIC RECOMMENDATIONS

A total of 2,000 sound trees and 258 cull trees were be marked resulting in a volume of 980,668 board feet. The appraised volume of this timber was $90,191.00. The price ranged from a high of $118.43/MBF for red oak to a low of $5.00/MBF for hickory and beech. There was 0.6 mile of new haul road constructed, while 1.5 miles of haul road were upgraded. Sixteen culverts were needed, with 580 tons of stone required in the road construction and upgrade.

STATUS OF COMPLETION

This timber sale was sold to Paul Mercer Sawmill, Inc. of McArthur, Ohio in May 1983 for $91,127.72. The harvest was completed in the fall of 1983. This project proceeded very smoothly and orderly. The additional sum of $2,980.00 was paid by Paul Mercer Sawmill, Inc. for the West Virginia Division of Forestry to seed and fertilize the roads.

I. SOUTH ARKANSAS BRANCH TIMBER HARVEST (1986-87)

LOCATION

This harvest area was on the south side of Arkansas Branch of Twelvepole Creek watershed, Compartment 1-A. The harvest area was located approximately 22 miles south of Wayne, WV. The total acreage of this harvest was 284.

DESCRIPTION OF THE TIMBER

Timber contained in compartment 1-A was composed of mature hardwoods and softwoods. The area was marked on a single tree selection basis to remove an estimated 1,020.3 MBF. Volume cut per acre was approximately 3,600 board feet per acre. Nineteen black walnut trees were included in the harvest with a volume of approximately 4,000 board feet.

MANAGEMENT OBJECTIVES

This harvest was implemented to improve the quality of the stand. Due to past history, a lot of this compartment was heavily grazed by livestock. Also, several severe forest fires occurred in this area. These two factors lead to a stand that was under stocked and damaged.

With the heavy pressure in this area for squirrel hunting the larger trees were removed! This allowed the more vigorous trees to be released for increased mast production. The average diameter of the trees over 12" in diameter was 19.1 inches at DBH. No trees less than 14 inches were marked for cutting. Of the hickory which comprised which composed only 9% of the cut area, only 3% will be removed. There were 194 hickory trees marked for removal. Of those, only 13 were less than 18" in diameter. There was a cull factor of 11% in this compartment. An abundance of den trees were retained.

The road system was seeded with species intended to increase the turkey population.

SPECIFIC RECOMMENDATIONS

The cruise indicated there was a total volume in the compartment of 3,524,950 board feet. This was an average of 8,294 board feet per acre. The basal area was 73 ft^2/acre for trees 12" and greater in diameter. The total basal area for the compartment was 108 ft^2. The permissible cut for the harvest was 3,500 board feet per acre.

A total of 2,161 sound trees and 705 cull trees were marked resulting in a volume of 1,020,302 board feet. The appraised volume of this timber was $71,127.92. The price ranged from a high of $762.00/MBF for black walnut to a low of $5.00/MBF for beech.

STATUS OF COMPLETION

This timber sale was sold to R & D Hilltop Lumber, Inc., New Lexington, Ohio in July, 1986. The harvest was completed in the summer of 1987. This timber sale brought $71,425.70.

J. NORTH ARKANSAS BRANCH TIMBER HARVEST (1988)

LOCATION

This harvest area was on the north side of Arkansas Branch, Compartments 12A and 1B located approximately 25 miles south of Wayne in Wayne County, West Virginia. The total acreage of the harvest was approximately 144 acres.

DESCRIPTION OF THE TIMBER

The timber on Compartments 12A and 1B was mature hardwoods and softwoods. The area to be cut was marked on a single tree selection basis with an estimated 649.9MBF to be removed. The volume to be harvested was 4,513 board feet per acre. The average tree volume was 439 board feet. Thirty-seven black walnut trees with a volume of 12,302 board feet were included in this timber sale.

MANAGEMENT OBJECTIVES

The stands were largely comprised of two canopy layers. One layer was made up of very old, very large trees in a broken upper canopy, while the second layer was made up of 6" to 14" trees. These younger more vigorous trees were capable of making up a well stocked stand of trees.

The entire area that was marked was hunted heavily for raccoon, squirrel and grouse. Several of the large trees were either dead or dying and their mast production has fallen off. The younger oak and hickories have the potential to produce favorable mast crops if released.

Marking was done in the upper layer, over mature trees primarily. Several den trees per acre were left to provide for the varied wildlife present. Trees under 20 inches were marked only if they were of low vigor, were not expected to live another 25 years or if the tree would obviously be damaged beyond recovery by harvesting a near-by tree.

There were some areas in these Compartments that are very steep and/or near streams. Theses areas were not marked for harvest. Some cultural work, however, may be done in these areas, but were not done at this time.

SPECIFIC RECOMMENDATIONS

The total board foot volume to be removed in the harvest amounted to 649.9MBF. This is an average of 3,800 board feet per acre. This is a removed 30 ft^2 of basal area of sound and cull trees. There were 53 ft^2 of basal area of trees over 12" DBH with a volume of 5,480 board feet per acre left after the harvest.

The total number of trees removed was 2,017 of which 13% were cull while 87% were sound.

The appraised value of this timber was $43,442.90. The price ranged from a high of $116.00/MBF for red oak to a low of $5.00/MBF for hickory and beech. There was also 2.1 miles of main haul road to be constructed or upgraded.

STATUS OF COMPLETION

This timber sale was sold to Dale W. Riddle Forest Products, Inc. of Laurelville, Ohio in August. The harvest was completed in November of 1988. This timber sale brought $60,577.50.

K. PEN COAL HAUL ROAD TIMBER HARVEST (1991)

LOCATION

This harvest was confined to the corridor needed to build a coal haul road for the Pen Coal Corporation. This timber was located in Compartments 12 and 1 which is located approximately 25 miles south of Wayne in Wayne County, West Virginia. The total acreage in this corridor sale was 49.98 acres.

DESCRIPTION OF THE TIMBER

The timber on corridor was composed of mature and immature hardwoods and softwoods.

MANAGEMENT OBJECTIVES

The Pen Coal Corporation decided to construct a new haul road through Cabwaylingo State Forest. A license agreement was entered into between the State of West Virginia and the Pen Coal Corporation on August 1, 1990.

The Division of Forestry was provided access to existing roads and trails as well as future planned roads. The Division requested and received compensation for the timber removed during the road construction and an amount equal to the expenditure for the time and expenses incurred in appraising the timber and other activities involved with the checking of compliance during the road construction.

SPECIFIC RECOMMENDATIONS

The total timber volume marked in the right-of-way on Cabwaylingo State Forest was 414,082 board feet and 228 cords of pulpwood/firewood. This timber was appraised at $84,554.12.

STATUS OF COMPLETION

The Pen Coal haul road was constructed in 1991. The West Virginia Division of Forestry was paid $84,554.12 for the timber and pulpwood/firewood that was removed. The division was also reimbursed $4,018.66 for wages, $1,002.80 for mileage and $216.54 for material costs. The total timber value plus the Division costs were $89,792.12.

L. Oak Reproduction Study

Katharina Mueller

Cabwaylingo State Forest has a history of frequent wildfires. The West Virginia Division of Forestry (WV DOF) has been keeping records of spatial extends of such fires since 1972. After digitizing and compiling these maps, Cabwaylingo S.F. could be classified into areas that had experienced anywhere from no fires to six fires between 1972 and 2007 (figure 1). Throughout this area 164 locations that according to the WV DOF had similar forest cover types (oak/hickory) and covered different aspects and elevations were designated as sample points. During the summer of 2008, field surveys were conducted in Cabwaylingo State Forest in order to investigate the oak regeneration potential among those areas as well as the damage to sawtimber. Literature has indicated that successful oak regeneration may be tied to recurring ground fires; therefore, this study hypothesized that there would be a greater aggregate height of oak seedling and larger amount of oak saplings present in areas of high fire frequency. Sawtimber volume, on the other hand, can logically be expected to be negatively impacted by wildfires; reductions in total basal area, trees per acre, and quality volume were hypothesized with increasing fire frequency. In order to quantify forest dimensions on site, tree density was measured using a Basal Area Factor (BAF) 20 prism, also noting the species and diameters of all "in-trees" (those in the sample area). Trees in this category displaying fire damage were further subjected to total height and cull height measurements with a laser in order to calculate the tree volume and estimate the volume loss due to the fire defect. The means of saw timber volume per acre lost increase with increasing burn frequency of the area; however, the only statistical difference was observed between areas of six burns when compared to those of no, one, or two fire events.

The understory composition of each plot was also assessed by counting the number of each species' saplings (>5 feet, >3 inches DBH) in an 11.8 ft. radius around each plot center (1/100 acre). While total number of seedlings roughly increased with increasing fire occurrence; most oak seedlings were found at the four times burnt plots.

Oak reproduction potential was assessed by tallying all oaks (greater than 2 inches DBH) within a 26.3 ft. radius of plot center. The tally was species group specific and was divided by 4 inch increments. Different oak species and diameters within these groups have different potentials for resprouting if cut or lost another way. The expected oak stocking from sprout origins (in percent) 30years after hypothetical harvest of oaks was calculated and was highest on plots with medium fire occurrences (varying from 5.8% in areas of six burns to 55.7% in areas of three burns).

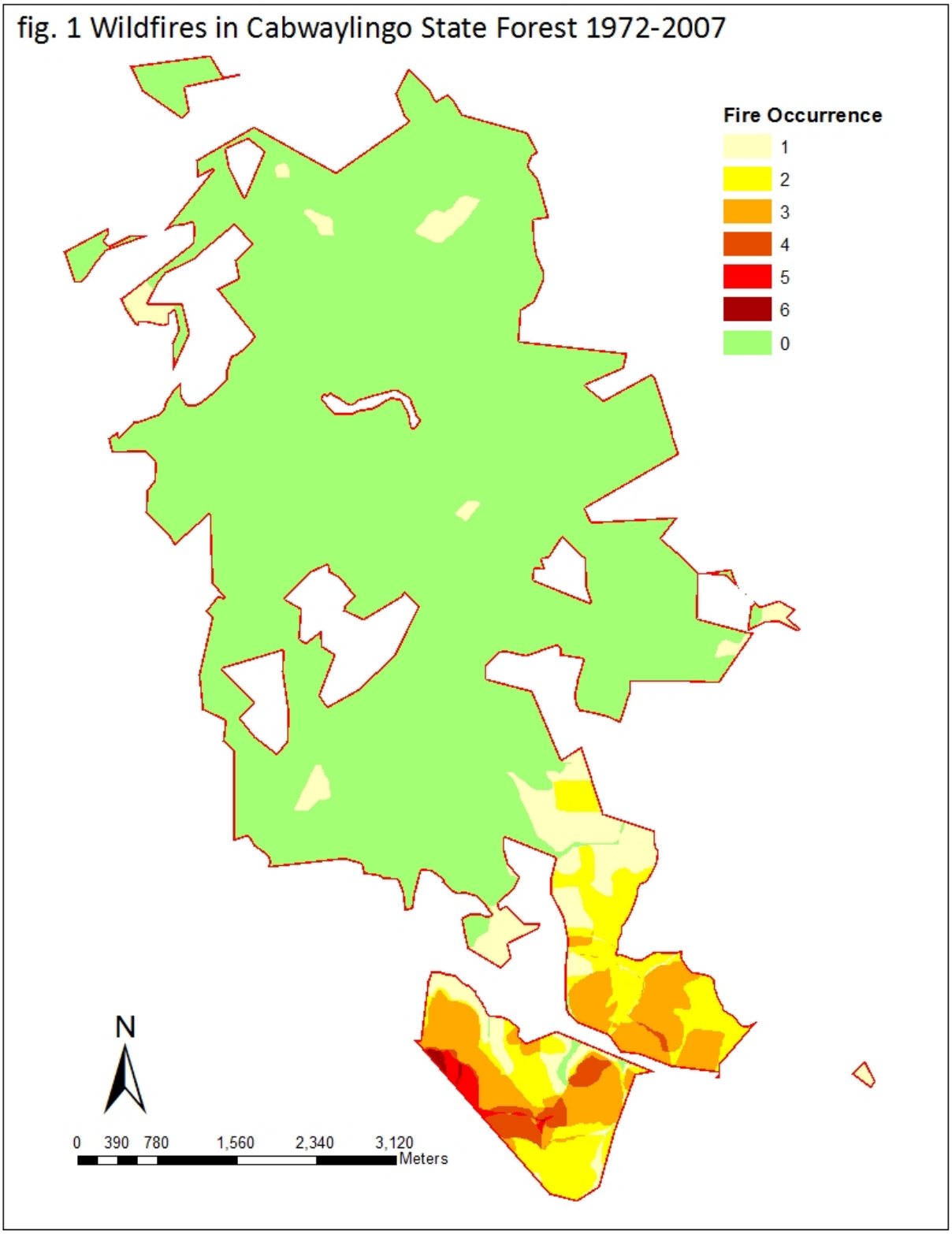
Expected oak stocking of sprout origin was also estimated. For this, three subplots were established (30 feet at bearings of 0°, 120°, and 240°, from each

large plot's center to be consistent). On these 1/1000 acre plots (radius 3.7 ft.) all seedlings (smaller than 5 ft.) were tallied by species. For the oaks in particular, seedlings were assigned height classes (<1 ft., 1-1.5 ft., 1.6-2.5 ft., 2.6-3.5 ft., 3.6- 4.5 ft., >4.6ft.) in order to recognize the higher potential for a seedling to reach the canopy the taller it is. The height factor was used to calculate the sprout origin stocking which was highest in areas of four burns (varying from 9.4 % at zero burn to 19.8% in four burn areas).

Although there seems to be a bell curve assimilating relationship between the potential stocking (as well as oak seedlings, aggregate height of seedling, and seedling height added to an estimated average height value of 15 ft. per sapling on each plot) and the fire frequencies between zero and six burns with largest values around three and four fire events, statistic analysis has been yielding only few significant differences.

We are now investigating whether the results are significant in models including elevation, and aspect, assuming that oaks are more competitive on drier sites.

fig. 1 Wildfires in Cabwaylingo State Forest 1972-2007



M. SWEETWATER – CULL BEECH TREATMENT (2009)

LOCATION

The area treated was on the Right Fork of Sweetwater Branch, Compartments 2 and 3 located approximately 25 miles south of Wayne in Wayne County, West Virginia. The total treatment acreage was approximately 47 acres.

DESCRIPTION OF THE TIMBER

There were 498 cull trees marked on Section 1 and 2 of the Sweetwater Timber Harvest area. Many of these trees were beech and had been heavily damaged by fires over the years.

MANAGEMENT OBJECTIVES

To remove possible seed sources (beech) and overstory to promote the establishment of yellow poplar and oak regeneration.

SPECIFIC RECOMMENDATIONS

Trees marked with an "X" were treated with herbicide using the hack and squirt method.

STATUS OF COMPLETION

The treatment was completed in early June of 2009 by the American Timber Marketing Group, LLC of Fayetteville, West Virginia for $2,561.90.

N. SWEETWATER TIMBER HARVEST (2009 - 2010)

LOCATION

This harvest was on the Right Fork of Sweetwater Branch, Compartments 2 and 3 located approximately 25 miles south of Wayne in Wayne County, West Virginia. The total acreage of the harvest was approximately 135 acres.

DESCRIPTION OF THE TIMBER

The timber on Compartments 2 and 3 was mature hardwoods and softwoods. The area cut was marked using a variety of regeneration methods with an estimated removal of 1,064,908 BF.

MANAGEMENT OBJECTIVES

The objectives for this harvest were: 1. Increase diversity by creating a variety of successional stages, age classes and habitat types; and 2. Promote the establishment of oak regeneration.

SPECIFIC RECOMMENDATIONS

The total board foot volume removed during the harvest amounted to 1,064.9 MBF. The total number of trees removed was 3,266 of which 15% were cull while 85% were sound. The appraised value of this timber was $98,700.47.

STATUS OF COMPLETION

This timber sale was sold to Ohio Valley Timber Products, Inc. of Beverly, Ohio in June 2009 for $260,262.00. The sale was completed in May of 2010. This harvest also created two wildlife openings for a total of three acres and one wildlife waterhole. Two hundred red oaks seedlings were planted in several of the harvested areas to ensure a future red oak component in the stand.

O. BARK CAMP TIMBER HARVEST (2009 - 2010)

LOCATION

The harvest area is on Bark Camp Run, Compartments 9 located approximately 25 miles south of Wayne in Wayne County, West Virginia. The total acreage of the harvest area is approximately 73 acres.

DESCRIPTION OF THE TIMBER

The timber on Compartments 9 is mature hardwoods. The area to be cut was marked using either the seed tree method or single tree selection method with an estimated 573 MBF to be removed.

MANAGEMENT OBJECTIVES

The objectives for this harvest are: 1. Increase diversity by creating a variety of successional stages, age classes and habitat types; and 2. Promote the establishment of oak and yellow poplar regeneration.

SPECIFIC RECOMMENDATIONS

The total board foot volume to be removed in the harvest is estimated at 566.543 MBF. The total number of trees marked for removal is 2,241 of which 150 are cull. The appraised value of this timber is $65,135.96.

STATUS OF COMPLETION

This timber was sold to Tolsia Lumber Company of Fort Gay, WV in June 2010 for $65,155.85. The timber is under contract at the present time.

V. MANAGEMENT OBJECTIVES

The following objectives have been developed to address the unique needs of Cabwaylingo State Forest.

1. Increase diversity by creating a variety of successional stages, age classes and habitat types. Develop a diverse forest with multiple age classes and successional stages to improve overall forest health. Benefits include increased habitat diversity, increased sawtimber potential and sustainability, increased regeneration of shade intolerant species and increased diversity of flora, fauna, and wildlife.

2. Develop and implement an invasive species plan that will prevent, monitor, control and restore habitats destroyed or threatened by various invasive species.

3. Identify, increase and protect rare ecosystems such as grasslands, savanna, riparian areas and wetlands. Rare ecosystems will be maintained or expanded when appropriate. These ecosystems will be inventoried and the data entered as a layer in the Cabwaylingo State Forest GIS (Global Information System).

4. Increase knowledge of flora, fauna, and wildlife of the forest by increasing research, compiling existing research and creating databases. The West Virginia Division of Forestry will coordinate with other agencies and organizations to attain research and survey information that pertains to the forest resources.

5. Increase the quality of recreational opportunities.

6. Foster and encourage partnerships with local and regional organizations, including non-profit, volunteer groups and other state agencies that relate to forest resources in West Virginia.

7. Develop inventory methods that will gather digital data all resources found on Cabwaylingo State Forest for the GIS.

VI. MANAGEMENT REVIEW AREAS

The 2008 Inventory provided general information for West Virginia Division of Forestry on where it is necessary to concentrate for a more detail inventory and analysis. A more detailed inventory is needed in order to make decisions for silvicultural, wildlife and recreation needs on the forest. Therefore the table listed below shows the areas and years in which they will be examined:

TABLE 8
MANAGEMENT REVIEW AREAS SCHEDULE

Year	Name of Management Review Area	Acres
2010	Pen Coal Haul Road.	188
2010	Upper Arkansas Branch	650
2011	Gourd Branch	325
2012	Right Fork of Spruce Creek	420
2013	Left Fork of Spruce Creek	605
2014	Ferguson Ridge	110
2015	Left Fork of Bark Camp	218
2016	Lower Arkansas Branch	100

During this examination, information will be collected on:

1. The timber resources and its regeneration.
2. Checking the wildlife habitat potential, including but not limited to: hard mast, soft mast, seeps and other water sources.
3. Look for any unique habitat that may support rare, threatened or endangered species.
4. Note geological formations that may provide unique habitat or prove to be challenges to area access.
5. Note any future recreation potential including overlooks, trails, and other aesthetic features.

In 2010 inventory work was completed on the Pen Coal Haul Road and Upper Arkansas Branch Management Review Areas. Plans for various silvicultural treatments at the present time included: 1) Four cull tree treatments, 2) Six Tree of Heaven treatments and 3) Several timber harvests. Some potential Allegheny Wood Rat habitat areas, which are a species of concern in West Virginia, were also noticed. These areas will be review with personnel from the WV Department of Wildlife Non-game Division in the near future before any silvicultural treatments is undertaken.

Reference Notes

1. This was the accepted standard at the time of the first management plan preparation, and is referred to as Society of American Foresters, 1954, *Forest Cover Types of North America (Exclusive of Mexico)*.
2. All forest cover type information and references are taken from Society of American Foresters, 1980, *Forest Cover Types of the United States and Canada*. More extensive information for each cover type may be found in this publication.
3. All wildlife population information extracted from unpublished reports done by the WV Division of Natural Resources, Wildlife Resources Section biologists stationed in the District V (Point Pleasant) office.
4. The West Virginia Natural Heritage Program was founded in 1975 and operates as part of the Division of Natural Resources, Wildlife Resources Section. The program tracks rare species of plant and animals, and also serves as a clearinghouse for information on the state's natural history.
5. Godman, R.M. and Mattson, G.A. (1976) *Seed Crops and regeneration problems*
of 19 species in northeastern Wisconsin. USDA Forest Service Research Paper NC NC-123.
6. Federal Register, Volume 64, Number 25; Monday, February 8, 1999, Presidential Documents, *Executive Order 13112 of February 3, 1999, Invasive Species.*
7. United States Department of Agriculture, Natural Resource Conservation Service (2001), *Soil Survey of Wayne County, West Virginia.*