

Sustainable Forest Management Plan

FOR

Savage River State Forest

Sustainable Forests for People the Bay and Appalachia



FOREST SERVICE



April 20, 2015

SAVAGE RIVER STATE FOREST 54,325 ACRES

PREFACE

The information contained within the Savage River State Forest Sustainable Management Plan was derived from a variety of sources. These include but are not limited to, the 1992 *Savage River State Forest - Ten Year Resource Management Plan*, and the 2010 *Sustainable Forest Sustainable Management Plan for Pocomoke State Forest*. Data presented in tables and charts that are specific to Savage River State Forest was generated from field data collected by the Maryland Forest Service and the Maryland Wildlife & Heritage Service from 2002 through 2009. Other information contained within this document is referenced as to its source.

The 54,324 acre Savage River State Forest is almost entirely contained within Garrett County except for about 40 acres in Allegany County.

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ABBREVIATIONS

AMWI	Appalachian Mountain Woodcock Initiative
ATV	All Terrain Vehicle
AWP	Annual Work Plan
BIBI	Benthic Index of Biotic Integrity
BMP	Best Management Practices
CAR	Corrective Action Requests
CBI	Combined Biotic Index
CCC	Civilian Conservation Corps
CF	Chesapeake Forest
CFI	Continuous Forest Inventory
DNA	Deoxyribonucleic acid
DC	District of Columbia
DNR	Department of Natural Resources
DDT	Dichlorodiphenyltrichloroethane
ESA	Ecologically Significant Areas
FECV	Forests with Exceptional Conservation Value
FIBI	Fish-based Index of Biotic Integrity
FIDS	Forest Interior Dwelling Species
FSC	Forest Stewardship Council
GCN	Greatest Conservation Need
GIS	Geographic Information System
GPS	Global Positioning System
HCP	Habitat Conservation Plan
HCVF	High Conservation Value Forest
ID	Interdisciplinary
LAC	Limits of Acceptable Change
MBSS	Maryland Biological Stream Survey
MD	Maryland
NBPR	North Branch Potomac River
NHA	Natural Heritage Areas
NWR	National Wildlife Refuge
OGEMA	Old Growth Ecosystem Management Area
ORV	Off Road Vehicle
PA	Pennsylvania
PHI	Physical Habitat Index
RTE	Rare, threatened, and Endangered
SAFETEA	Safe, Accountable, Flexible, Efficient Transportation Equity Act
SFI	Sustainable Forest Initiative
SMG	Soil Management Groups
SMZ	Streamside Management Zones
SRSF	Savage River State Forest

SRT	Savage River Tailwater
US	United States
USDA	United State Department of Agriculture
USACE	United States Army Corps of Engineers
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
WSSC	Wetlands of Special State Concern

CHAPTER 1

Introduction

1.1 Background and History of the Forest

Savage River State Forest is located in the north and northeastern part of Garrett County and there is a small part of the forest in Allegany County. It is in the Appalachian plateau physiographic province. Elevation ranges from 1400 to 3000 feet above sea level. The terrain is rolling hills to rather steep mountainous slopes. While the mountains lie generally in northeasterly/southwesterly direction, aspect is highly variable because of the number of deeply incised streams and creeks. Most of the forest drains into the Potomac River and hence into the Chesapeake Bay, but some of it drains into the Youghiogheny River and hence into the Gulf of Mexico.

Prior to European settlement, it is clear that Nomadic Indian tribes traveled to and through Garrett County. There is some evidence that a few tribes stayed year round especially on the Youghiogheny River. Forestry activities during this time consisted of clearing areas for crops (slash & burn type) and burning the woods for fruits and berries. Burning also improved the habitat for wildlife and made it easier for hunting and watching out for other hostile tribes. The likely effect on the forest was a mosaic of different age classes, different sizes and different species.

As the early explorers arrived in the area, diseases greatly reduced the Indian population, much before conflict between the settlers and Indians reduced it even further. The likely effect of this population decrease was to reduce the diversity within the forests as the trees grew to quite large sizes without the practice of periodic cutting and frequent low intensity fires. Thus, when the settlers started to arrive in the area, the trees were much larger and denser than they had been during the times of large Indian populations. The settlers rapidly started clearing areas for permanent agricultural areas and fences. Some of the readily accessible white pine and red spruce trees were cut out to provide masts for ships and building materials. Many of the hemlock stands in the county were not cut during this period because they were located in relatively inaccessible areas and many farmers wanted to save the hemlocks for future building materials.

In 1800, there were roughly 1000 settlers who lived in Garrett County. But cheap land, improved transportation and growth along the eastern seaboard led to a settlement boom. The national road was completed in 1818 and the railroad arrived in 1852. The transportation system better connected the resource rich Garrett County to the growth needs of the east. Increased quantities of lumber, coal and wheat were shipped east.

By the early 1900's, narrow gauge railroads were used to facilitate logging on steeper slopes as the demand for wood products continued to increase.

The result was that Garrett County was heavily cut-over, essentially clear cut, within a 20 year period. The train engines frequently caused forest fires in the tops and slash that were left from the clear-cutting. As a result of the fires, a new forest was created. This legacy we can see today as most of our older forests are the same age and are approximately 100 years old.

In part, as a reaction to the rapid cutting of trees and the burning that was taking place, the Garrett Brothers, in 1906 gave 2000 acres to the state with the proviso that an agency would be created to manage the property and to institute scientific forestry - this led to the birth of the Maryland Forest Service. The rapid exploitation of the forests came to an end by the 1930s and logging companies moved west or converted to coal mining. The early efforts of the MD Forest Service were primarily fire suppression.

On January 8, 1929, the state purchased 9,352 acres of cut-over forest land from the N.U. Bond Company. This was the beginning of Savage River State Forest. Since that time there has been a number of acquisitions both big and small. Now Savage River State Forest consists of 54,324 acres.

In the 1930s, the Civilian Conservation Corps assisted the forest service with fire suppression efforts, tree planting, and constructing facilities for recreational activities. The CCC boys helped with the early snow skiing activities on the forest – later to become New Germany State Park. They helped build many trails where hiking, biking, horseback riding, and ORV riding are still taking place.

Coal mining has also been a part of the County's heritage for at least the last two centuries. There is no current strip mining on state forest land and only one deep mine that is active. But there are a number of reclaimed strip mines and some old deep mines as well. Natural gas exploration and storage started in the Accident area of the state forest in 1964.

Exotic invasive pests, be they diseases, insects, or plants, have become a big management issue in the last ten years. A big problem occurred with Chestnut blight in the 1930's that effectively eliminated the American chestnut from our forests. Recently, a sizable part of our oak forests has been lost due to gypsy moth defoliation and subsequent attack by other insects and diseases. One of our serious challenges for the future is how to regenerate oak in the presence of gypsy moth and other potential exotic pests.

1.2 State Forest Planning & Sustainable Forest Management

The resources and values provided from state forests reach people throughout the State and beyond. These resources and values range from economic to aesthetic and from scientific to inspirational. The Department of Natural Resources is mandated by law to consider a wide variety of issues and uses when pursuing a management strategy for these forests. The importance of considering these factors is acknowledged in the Annotated Code, which establishes the following policy pertaining to state forests and parks:

"Forests, streams, valleys, wetlands, parks, scenic, historic and recreation areas of the state are basic assets. Their proper use, development, and preservation are necessary to protect and promote the health, safety, economy and general welfare of the people of the state. It is the policy of the state to encourage the economic development and the use of its natural resources for the improvement of the local economy, preservation of natural beauty, and promotion of the recreational and leisure interest throughout the state." (Annotated Code of Maryland, Natural Resources Article §5-102)

The Department recognizes the many benefits provided by state forests and has established a corresponding management policy in regulation.

"The state forests are managed to promote the coordinated uses of their varied resources and values for the benefit of all people, for all time. Water, wildlife, wood, natural beauty and opportunities for natural environmental recreation, wildlands experience, research demonstration areas, and outdoor education are major forest benefits." (Code of Maryland Regulations 08.07.01.01)

To ensure that benefits are realized by and resources are protected for future generations, a statewide system of renewable resource planning has developed. These plans are the foundation for the many activities which can and should occur on state forest lands.

"The Department shall develop a system for long-range renewable forest resources planning. The public and private forest land resources of Maryland, including, but not limited to, wood fiber, forest recreation, wildlife, fish, forest watershed, and wilderness potential, shall be examined and inventoried periodically. As part of the forest planning process, the Department periodically shall develop, review and revise a resource plan that should help to provide for a sustained yield of forest resource benefits for the citizens of Maryland. The forest resource plan shall be made available for public and legislative review and comment." (Annotated Code of Maryland, Natural Resources Article §5-214)

The Sustainable Forest Management Plan for Savage River State Forest has been prepared in consideration of these many uses and benefits. The concept of Sustainable Forest Management will be the guiding principle behind the management of Savage River State Forest. Sustainable Forestry is defined in COMAR Regulations 08.01.07.01

"Sustainable forestry" means the stewardship and use of forests and forest lands in a way, and at a rate, that:

(a) Maintains their biodiversity, productivity, regeneration, capacity, vitality, and potential to fulfill, now and in the future, relevant ecological, economic, and social functions at local and regional levels; and

(b) *Does not cause damage to other ecosystems.*

1.3 Planning Process

The new Sustainable Forest Management Plan for Savage River State Forest has been developed to replace the former ten-year Resource Management that was developed in 1992. The initial draft of the SRSF Sustainable Plan was crafted from sections of the former ten year plan and from information contained in the Sustainable Forest Management Plan for Savage River State Forest. The information utilized in the draft was originally prepared by an interdisciplinary planning team with assistance from the Savage River Forest Citizens Advisory Committee. The SRSF Sustainable Plan reviewed by representatives from the following agencies:

Maryland Department of Natural Resources

Maryland Forest Service

Maryland Park Service

Maryland Wildlife & Heritage Service

Freshwater Fisheries Division

Land Acquisition & Planning

Following completion of a final draft, the SRSF Sustainable Plan will be presented to the Savage River State Forest Citizens Advisory Committee for additional review & comments. From there the plan will go through a 30 day public comment period.

The original planning process for the ten year plan included extensive opportunity for public participation, and relied on public feedback in the refinement of management goals and implementation strategies. The new sustainable plan will adhere to a similar policy. One of the benefits of the new plan format is that it will be open for continual updates as additional resource information is developed. As updates are completed the revised plan will be reviewed by the Citizen Advisory Committee.

Resource inventory and assessment information for Savage River was completed in 2002. New stand level inventory data collection began in the summer of 2010.

1.4 Purpose and Goals of the Plan

The Sustainable Forest Management Plan for Savage River State Forest updates and expands the previous ten year resource management plan. This plan is intended to provide guidance and direction for forest staff to base their daily decisions upon. The plan also provides direction to the Forest Manager in the preparation of the Annual Work Plans and to DNR staff in the preparation of related resource protection guidelines for sensitive habitats.

Included within the appendices, are forest modeling projections of growth rates and sustainable harvest levels, as well as several detailed sections outlining planning and management tools which support the proposed management direction and strategies.

The primary goal of the Savage River State Forest Sustainable Management Plan is to demonstrate that an environmentally sound, sustainably managed forest can contribute to local and regional economies while at the same time protecting significant or unique natural communities and elements of biological diversity.

This will be pursued subject to the following resource goals for the Forest:

A) *Manage the wetlands, waterways and floodplains of the forest to protect valuable water resources.*

- That the quality of the water flowing through the forest will not be impaired due to any actions on the land, and in many cases will be improved. Where feasible, wetlands and riparian areas will be the site of watershed improvement practices specifically aimed at improving the quality of water entering the Chesapeake Bay.

B) *Provide sustainable levels of diverse recreational fishery opportunities through management strategies which emphasize protection and enhancement of aquatic resources and forested riparian buffers.*

- Monitor proposed projects within Savage River State Forest that may potentially result in blockages to fish passage and recommend design changes that will allow continued fish passage during all stream flow conditions. Continue to identify existing blockages to fish passage and make recommendations for providing access to upstream habitat.

C) *Protect and enhance biological diversity native to Savage River State Forest and perpetuate indigenous natural communities and habitats of species which are rare, threatened, endangered, or in need of conservation.*

- Insure that management policies and actions are consistent with state and federal requirements for protecting and managing rare, threatened and endangered species of plants and animals. The Department will identify locations of rare, threatened and endangered species habitat and forest conditions associated with the habitat requirements of these species. Management actions will consider opportunities to enhance existing habitats and provide for corridors. Abundance and distribution goals for common species will be periodically updated through DNR based resource assessments. Habitat goals for common species will be reflected in forest management activities.

D) *Through Sustainable Forestry practices maintain and improve the timber resource, while at the same time protecting other resource values consistent with responsible forest management.*

- That forest harvest levels comply with targets established by a long-term sustainable harvest plan. To the extent possible, harvest and thinning activity levels will produce reasonably uniform flows of products and contractor activities year-to-year. Short-term deviations due to natural disturbances, operational logistics, or unusual events are anticipated, but exceptions for an extended period will require re-evaluation of the sustainable harvest level. Spatial and timing constraints will prevent thinning or harvesting operations from concentrating impacts in any watershed or visual scene in violation of water quality goals, habitat diversity and connectivity goals, or the green-up requirements imposed by the Sustainable Forestry Initiative (SFI) Standard (See

Appendix C). The plan will be re-evaluated periodically and updated according to changes in circumstances.

- That the Department makes use of the best available data to determine what activity levels are consistent with the sustainability of the forest ecosystems so that harvests will not decrease the ability of the forests to continue that average level of yield. Ecosystem sustainability means, in addition to the factors listed in goals A, C & D, no net loss in soil fertility and no loss of non-target species due to on-site forestry practices. Past and present data are limited, so future harvests will be based on adaptive response to appropriate monitoring, forecasting, and revision.

E) Provide opportunities for the enjoyment of the natural resources on the Forest by making appropriate areas available for resource-based, low impact recreational activities and environmental education programs that are consistent with the resource values of the Forest.

- That forest recreational and educational opportunities will be provided as appropriate, and are consistent with the above goals. Recreational and education program opportunities available on the forest should be integrated with those available within New Germany State Park. The Department will determine the appropriate levels of recreational activities on the Forest as part of its ongoing evaluation and monitoring process.

1.5 Future Land Acquisition Goals for Savage River State Forest

The original Savage River State Forest properties are located in Garrett County. The addition of new parcels to Savage River State Forest could help alleviate a number of management issues as described below and also build upon a network of well managed forest lands that would perpetually contribute to the goals for protecting and restoring the Chesapeake Bay. All potential acquisitions are based on a Stewardship review that scores each property on their ecological, cultural and recreational values.

Guidelines to be considered when pursuing new properties not currently in state ownership for addition to Savage River State Forest:

- 1) The property is an in-holding within a Savage River State Forest Compartment and/or the parcel connects additional Savage River Forest properties thereby creating a larger contiguous management unit.
- 2) The property contains significant natural resources as identified in this plan that would help contribute toward their management and protection. Examples of such resources would be Ecologically Significant Areas (ESAs) as identified in Chapter 7, Wildlife Habitat resources described in Chapter 8, Water Quality Areas (Riparian areas and wetlands) as indicated in Chapter 6 and economically important forest resources as described in Chapter 5.
- 3) The property improves on or provides additional access to a Savage River Forest parcel, thereby improving on the implementation of management activities and or providing additional public access.

Properties that would meet one or all of these criteria will go through an internal DNR review process and if they are determined to be good candidates to be added to the Forest they would then be prioritized for acquisition.

Currently there are a number of potential private acquisitions being considered for addition to Savage River State Forest that would greatly enhance management opportunities on the forest.

CHAPTER 2

Garrett County - Resource Assessment

2.1 Garrett County

Garrett County is the westernmost county in Maryland. It is bordered by Grant County, West Virginia, to the south; to the west by Preston County, West Virginia; on the north by Fayette and Somerset Counties, Pennsylvania; and to the east by Mineral County, West Virginia, and Allegany County, Maryland. (See Figure 2.1). Garrett County is found on the Appalachian Plateau. Elevations range from 1,000 feet above sea level to a maximum of 3,360 feet above sea level, and the topography is gently rolling upland with some fairly steep ridges. The climate is a warm summer continental type. Summer high temperatures in this zone typically average between 21–28 °C (70–82 °F) during the daytime and the average winter temperatures in the coldest month are generally far below the –3 °C (26.6 °F) isotherm. The average growing season is about 122 days and can vary by as much as two weeks depending on the area and water availability.

Table 2.1 and Figure 2.1 show that land use patterns within the county are dominated by forests and farmland. Taken together, forests and farmlands make up nearly 89 percent of the area within the county.

Table 2.1: Land use on Garrett County

Major Land Cover Category	Total Area	Percent
Urban	34,556.5	8.1%
Agriculture	100,470.1	23.6%
Forest	279,251.5	65.7%
Water	5,808.8	1.4%
Wetland	2,725.0	0.6%
Open Areas	2,240.3	0.5%
TOTAL	425,052.2	100.00%

Source: Garrett County Office of Planning

Agriculture and forestry are the most common industries in the county. Garrett County's climate is conducive to growing crops such as hay, corn, small grains, and vegetables. According to the Census of Agriculture, 2008: 2,500 acres of corn for grain, 3,400 acres of corn for silage and 27,000 acres of hay were the top field crops. In 2007, revenue from milk and milk products totaled 12.8 million dollars. Livestock sales of cattle and calves, hogs, sheep and goats grossed over 6 million dollars. Forest products are also a significant source of income. Forested lands are also used for recreational purposes.

The forests and fields of Garrett County are favorable habitat for a variety of wildlife, including game species such as deer and turkey. Fishing in the county is also a major source of economic activity as well as an attraction for sportsmen and outdoor recreation.

Garrett County Land Cover

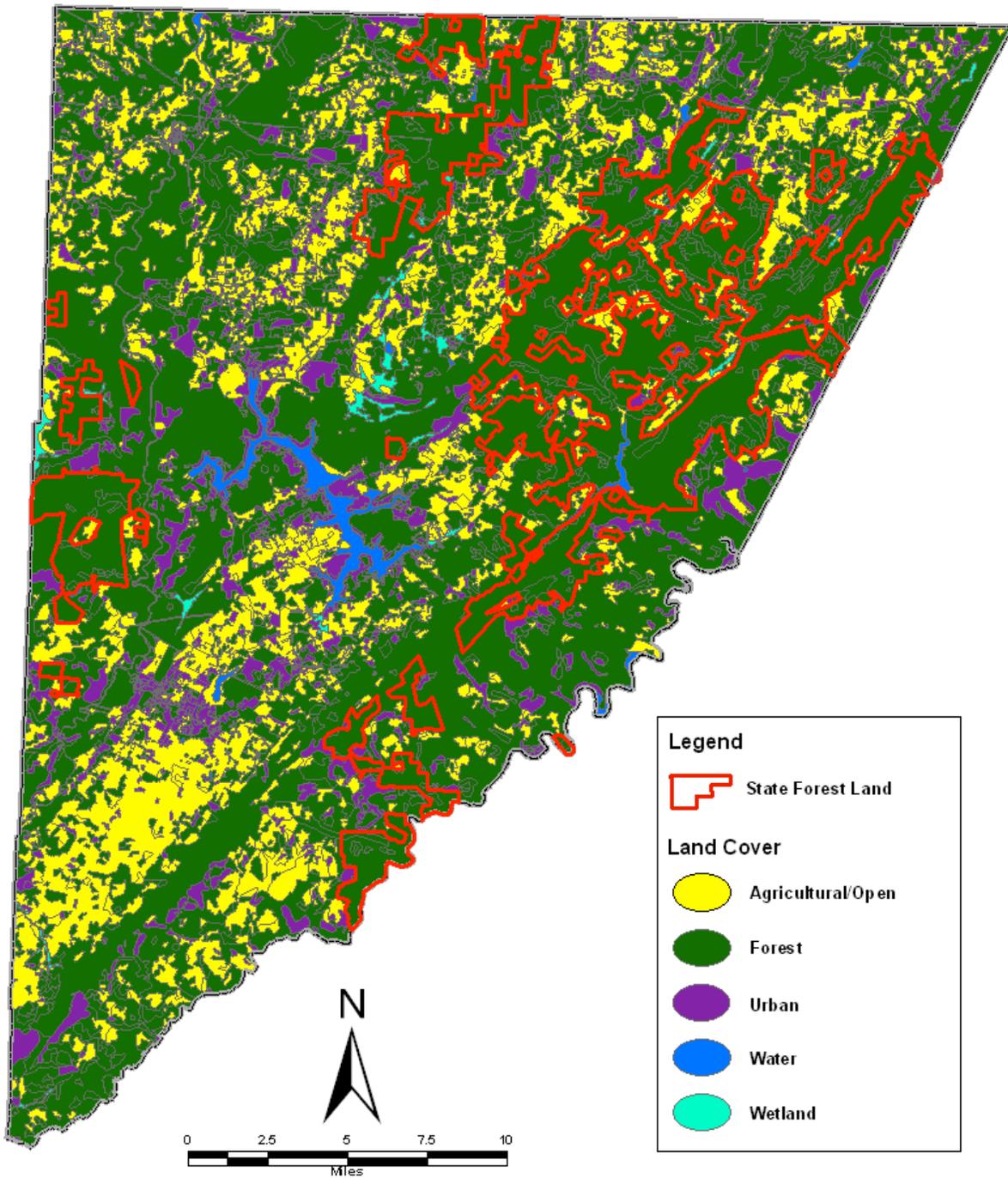


Figure 2.1: A complex mix of agricultural lands surrounds the State Forests

Much of the land in Garrett County had been cleared for farming or used as farm woodlots before the establishment of a state forest system. When the depression era hit, many of the farmers fell on hard times, resulting in the acquisition of large amounts of land by the Federal Government. In the mid to late 1930's, the State was purchasing lands for management activities, and in 1954 the Federal Government deeded its holdings to the State. In 1964, New Germany State Park areas were separated from the Forest and developed for intensive recreational use. The State continues to purchase in-holdings. Taking adjacent lands into state ownership is seen as a way to prevent their further loss to development, and the further fragmentation of what remains of the intact blocks of forest in the region. At the same time, keeping them in sustainable forest use is seen as a way of contributing to the future of the forest-based portion of the region's economy.

2.2 General Geology and Soils

The county is entirely within the Appalachian Plateau. The average altitude of the county is about 2,200 feet above mean sea level. The lowest point, at an altitude of about 1,000 feet, is at the mouth of the Big Savage River. The highest point is on Backbone Mountain, north of Kempton at an altitude of 3,360 feet. The most prominent ridges are Backbone Mountain, Big Savage Mountain, Meadow Mountain, Negro Mountain and Winding Ridge. Backbone and Meadow Mountains are part of a major north trending divide in the eastern United States that separates areas that drain into the Chesapeake Bay and the Gulf of Mexico.

The topography is gently rolling upland, deeply incised by streams and valleys. Some of the gently sloping to moderately sloping hills are comprised mainly with moderately deep, well drained, non-stony soils that are highly useful in farming. Most of the soils in Garrett County are naturally low in plant nutrients, are acid and some are very acid. Soils that are cultivated annually become deficient in nitrogen, phosphorus and potassium if these elements are not replenished. Lime generally is needed every three years.

Poorly drained meadows, locally called "glades", occur at the headwaters of many streams. Soils found in valleys are useful for farming, but they are limited in capability by wetness and are used mostly for forage crops and pastures. In some areas of the county, the soils are steep or very stony, or both, and are better suited for woodland, wildlife habitat, and recreational uses than they are for farming.

2.3 Water Resources

The high elevation, rolling hills and mountainous areas create close contact between human land use activities and aquatic systems, making this region a focal point for water quality issues. Aquatic systems can be grouped into three (3) categories: groundwater, wetlands, and streams.

2.3.1 Groundwater:

Groundwater is an important natural resource of Garrett County. Groundwater is derived from the weathered zone and the upper part of the consolidated rock. When saturated, the soil and subsoil supplies water to many of the springs and shallow dug wells.

Natural groundwater quality throughout the watershed is variable, but concentrations of iron, calcium (hardness) and manganese tend to be high, often exceeding recommended limits for potable use. Below a depth of 800 to 1,000 feet, ground water may be too saline for potable supplies.

2.3.2 Wetlands:

Nontidal wetlands are freshwater areas that are covered by water or have saturated soils for at least brief periods during the growing season. The term "nontidal wetlands" encompasses a variety of environments such as marshes and swamps, bottomland hardwood forests, wet meadows, springs and seeps, inland bogs and the shallow areas of lakes and ponds.

Some nontidal wetlands, such as freshwater marshes and shrub swamps, are very obvious. However, many nontidal wetlands, such as bottomland forests, wet meadows or vernal pools are not as easily recognized because they are dry for some time during the summer. Three characteristics are used to identify nontidal wetlands: hydrology, soils and vegetation.

Nontidal wetlands form where the land is inundated or has a near surface ground water level. There are at least 73 soil types in Maryland that are known to occur in nontidal wetlands. These soils are known as hydric soils. Plants growing in nontidal wetlands, known as hydrophytic vegetation, are capable of living in hydric soils for at least part of the growing season.

2.3.3 Streams:

The Maryland Biological Stream Survey has conducted stratified random samples of streams within the County. Based on the three ecological health indicators used by the MBSS, the overall condition of Garrett County streams during 2000-2004 was fair. The FIBI results indicate that 21% of the streams in the county were in good condition, while 39% rated good using the BIBI. In contrast, 46% of the streams in the county scored as poor or very poor using the CBI, while 23% scored as good and 32% scored as fair. Within the county, the greatest concentration of streams rated in good condition was the area in and around Savage River State Forest. Another area with predominantly good sites was the lower portion of the Youghiogheny drainage, near the Pennsylvania border. The largest concentration of streams in very poor condition was the area around Deep Creek Lake. The highest rated stream in Garrett County using the Combined Biotic Index (CBI) was Crabtree Creek, while the lowest rated streams included Three Forks Run, Cherry Creek, the North Branch Casselman River and Millers Run. Based on Stream Waders volunteer data, conditions were generally good for benthic macro invertebrates in the Youghiogheny and Savage River watersheds, and poor or very poor in the area around Deep Creek Lake. Four MBSS Sentinel sites were located in Garrett County. These streams included: the Savage River mainstem, Crabtree Creek, Bear Creek, and Double Lick Run. Sentinel sites were chosen to provide a representation of the best remaining streams around the state and track natural variations in stream health. Where possible, Sentinel sites are located in watersheds with as much protected land as possible, or in areas projected to become degraded from development at a slower pace. More information about the MBSS Sentinel stream network is found in: 2000-2004 Maryland Biological Stream Survey Volume 11: Sentinel Sites (http://www/dnr/Maryland.gov/streams/pubs/ea05-8_sentinel.pdf).

Based on the Physical Habitat Index (PHI), 49% of the stream miles in Garrett County had minimally degraded habitat, 33% had partially degraded habitat, and 18% had degraded or severely degraded habitat. Similar to the distribution of sites with high biotic integrity, the highest concentrations of sites with minimally degraded PHI ratings occurred in and near the Savage River State Forest, followed by the lower Youghiogheny drainage above Friendsville. The southern part of the county had the largest number of sites with severely degraded physical habitat.

Over 82% of the stream miles in Garrett County were rated optimal for trash. In contrast, only 3% of streams were rated as being in Marginal condition, and none were rated as being in poor condition. Low amounts of trash were consistently seen in and around Savage River State Forest and generally on state-owned lands, as well as the lower portion of the Youghiogheny drainage in Maryland.

2.3.4 Water Quality Indicators

To provide a means to prioritize stream systems for biodiversity protection and restoration within each county and on a statewide basis, a tiered watershed and stream reach prioritization method was developed. Special emphasis was placed on state-listed species, stronghold watersheds for state-listed species, and stream reaches with one or more state-listed aquatic fauna. Fauna considered included stream salamanders, freshwater fishes, and freshwater mussels. Rare pollution-sensitive benthic macro invertebrates collected during the 1994-2004 MBSS were also used to identify the suite of watersheds necessary to conserve the full array of known stream and river biota in Maryland. A complete description of the biodiversity ranking process is found in: 2000-2004 Maryland Biological Stream Survey Volume 9: Stream and Riverine Biodiversity (http://www/dnr/Maryland.gov/streams/pubs/ea05-6_biodiv.pdf).

Of the six watersheds found in Garrett County, the Casselman and Youghiogheny Rivers were classified as Tier 1, meaning that these watersheds serve as strongholds for one or more state listed aquatic species. It is also noteworthy that these two watersheds are among the top five in Maryland in terms of stream and river biodiversity. The Savage River was classified as a Tier 2 watershed, meaning that it serves as a stronghold for one or more non-state listed species of Greatest Conservation Need (GCN), and has state-listed aquatic fauna present. In stark contrast, the Georges Creek watershed was among the lowest ranking for stream and river biodiversity in the state (83rd of 84). Any reaches that had either state-listed or GCN species, or high intactness values were highlighted to facilitate additional emphasis in planning restoration and protection activities.

2.4 Wildlife Resources

Garrett County's rural landscape, with nearly 66% forest cover and 24% agriculture, provides a habitat quality that supports abundant wildlife populations and species diversity. This mixture of largely hardwood forests dominated by oak species and abundant agriculture serves to provide a rich and abundant source of nutrition for many keystone wildlife species such as white-tailed deer, wild turkeys, and black bears. Garrett County supports a diverse wildlife community with an estimated 236 different species of reptiles, amphibians, birds, and mammals documented compared to 528 species statewide.

There are several threats and concerns that may influence wildlife populations and future habitats in Garrett County. One of the greatest threats to wildlife, not only in the county, but throughout the state is loss of habitat from increasing development. The presence and attraction of Deep Creek Lake and the resort community increases the threat of commercial and residential development. As the community and businesses expand, there may be increased demand for uses that are non-compatible with conserving wildlife habitat even on DNR lands.

Hunting is a primary recreational use of public lands in Garrett County. Pursuit of forest game species such as white-tailed deer (*Odocoileus virginianus*), gray squirrels (*Sciurus carolinensis*), ruffed grouse (*Bonasa umbellus*), and wild turkeys (*Meleagris gallopavo*) provide the majority of hunter days. Hunting for upland wildlife such as American woodcock (*Philohela minor*) and eastern cottontails (*Sylvilagus floridanus*) is also popular. Some opportunity for waterfowl hunting also exists.

It is anticipated that the demand for hunting forest game will continue and likely increase as less private land is available to hunters. Along with this demand for hunting opportunity, it is expected that there will be increased interest in non-hunting use of public land for bird/wildlife watching. Mountain biking, hiking, and cross-country skiing are also popular recreational activities that may be considered wildlife enhanced activities.

White-tailed deer is the most popular species hunted in Garrett County and throughout the state. Along with the positive recreational benefits and population management that deer hunting provides, it also provides significant economic benefits to Maryland. A recent survey sponsored by the Association of Fish and Wildlife Agencies found that deer hunting in 2006 generated over \$113 million in retail sales with a total multiplier effect of over \$190 million contributed to Maryland's economy. Deer hunting in Maryland supports nearly 2,300 jobs and generates \$71 million in salaries, wages, and business owners' income, \$15 million in state and local tax revenue, and \$16 million in federal tax revenue.

2.5 State Listed Species of Concern in Garrett County

A summary of current and historical rare, threatened and endangered animal species potentially found on or within ¼ mile of Savage River State Forest lands according to Maryland DNR-Wildlife & Heritage Service is included in Appendix E.

2.6 Plants of Special Concern (Federally Listed)

There are no Federally Listed plant species known to occur in Garrett County. There are a number of species of plants listed as Rare, Threatened, or Endangered by the State of Maryland. These species are discussed in some detail in the Ecologically Significant Area portion of this document.

2.7 Plant Communities and Habitats of Special Concern

Vernal Pools : Vernal pools are typically flooded in winter to early spring or after a heavy rainfall, but are usually dry during summer. Many vernal pools are filled again in autumn. Substrate is typically dense leaf litter over hydric soils. Vernal pools typically occupy a confined basin (i.e., a standing waterbody without a flowing outlet), but may have an intermittent stream flowing out of it during high water. This community includes a diverse group of invertebrates and amphibians that depend upon temporary pools as breeding habitat. Since vernal pools cannot support fish populations, there is no threat of fish predation on amphibian eggs or invertebrate larvae.

Characteristic animals of vernal pools include species of amphibians, reptiles, crustaceans, mollusks, annelids, and insects. Vernal pool species can be categorized as either *obligate* (species that depend upon vernal pool habitat for their survival), or *facultative* (species that are often found in vernal pools, but are not dependent on them and can successfully reproduce elsewhere). Obligate vernal pool amphibians include spotted salamander (*Ambystoma*

maculatum), Jefferson salamander (*A. jeffersonianum*) and wood frog (*Rana sylvatica*). Fairy shrimp (Anostraca) are obligate vernal pool crustaceans, *Eubranchipus spp.* being the most common. Facultative vernal pool amphibians include four-toed salamander (*Hemidactylium scutatum*), red-spotted newt (*Notophthalmus viridescens*), spring peeper (*Pseudacris crucifer*), gray treefrog (*Hyla versicolor*), green frog (*Rana clamitans*) and American toad (*Bufo americanus*). Numerous species of insects, mollusks and annelids occur in vernal pools. Many of these are facultative, but further research would most probably document some vernal pool obligates among these groups.

Plants that occur in mountain vernal pools are predominately hydrophytic often growing along the edges of the water or in the basin after water levels drop later in the season. In this region most of these plants are emergent such as sedges, grasses, or bulrushes. A number of these species are uncommon in the region and a few rare species such as *Carex vesicaria* and *C. tuckermanii* have been documented in Garrett County vernal pools.

Several vernal pools have been documented on or very near SRSF. A sub-set of these support populations of the Jefferson salamander, a State-wide uncommon salamander. These habitats are afforded special management protection.

Mountain Peatlands : There are a number of wetlands on the Allegheny Plateau of Maryland. Many of these, referred to as bogs or fens, are reminiscent of wetland habitats found in the northern U.S. and Canada and are collectively known as peatlands. These wetlands often are dominated by several species of Sphagnum moss (*Sphagnum spp.*), various grasses, sedges and rushes, like *Calamagrostis canadensis*, *Glyceria striata*, *G. canadensis*, *Eriophorum virginicum*, *Rhynchospora alba*, *Carex stricta*, *C. utricularia*, *C. canescens*, *C. atlantica*, *Juncus spp.*, and *Scirpus spp.* to name a few. Other characteristic plants such as round-leaved sundew (*Drosera rotundifolia*), cranberry (*Vaccinium macrocarpon*), bog goldenrod (*Solidago uliginosa*), and narrow-leaved gentian (*Gentiana linearis*) occur in these bogs. Large sections of these wetlands are often dominated by various shrubs such as speckled alder (*Alnus incana*), arrow-wood (*Viburnum dentatum*), possum-haw (*V. nudum*), winterberry (*Ilex verticillata*), and mountain holly (*Nemopanthus mucronata*). Various plants that are rare in the State also occur in a number of these wetlands. Some of these that occur on or near SRSF include, wild calla (*Calla palustris*), yellow clintonia (*Clintonia borealis*), goldthread, (*Coptis trifolia*), and small cranberry (*Vaccinium oxycoccos*).

This habitat type also supports a number of uncommon or rare animals. The dragonfly diversity is high with a number of specialized species documented. Butterflies such as the two-spotted skipper (*Euphyes bimacla*), Harris' Checkerspot (*Chlosyne harrisii*), silver-bordered fritillary (*Boloria selene*) and the Baltimore Checkerspot (*Euphydryas phaeton*) are restricted to wetland habitats. Specialized birds such as the alder flycatcher (*Empidonax alnorum*), northern waterthrush (*Seiurus noveboracensis*), red-breasted nuthatch (*Sitta canadensis*), and Nashville warbler (*Vermivora ruficapilla*) often breed in these wetland habitats. Rare mammals such as the southern water shrew (*Sorex palustris punctulatus*) and the southern bog lemming (*Synaptomys cooperi*) have been found in some of these bogs. A large number of more common animals rely on or utilize this habitat type. Coupled with the large diversity of flora found here, these wetlands are truly 'hotbeds' of biological diversity in the region. Any of these wetlands of significant size that occur on SRSF are in an ESA.

Spring Seepage Wetlands : There are numerous springs throughout SRSF. Many of these form small seepage wetlands that support unique vegetation. Characteristic vegetation includes skunk-cabbage (*Symplocarpus foetidus*), mannagrass (*Glyceria melicaria*, *G. striata*), seep sedge (*Carex prasina*), and rough sedge (*C. scabrata*) to name a few. Occasionally, these habitats support less common or rare plants such as grove meadow-grass (*Poa alsodes*), and large purple-fringed orchid (*Platanthera grandiflora*). Specialized odonates often utilize this habitat, as well.

Sandstone Rock Outcrops/Glades : There are three major types of special habitats on SRSF where the basis is some type of sandstone outcrop. The most dramatic are large rock outcroppings that often occur on the crests of the mountain ridges that run through the Forest. Occasionally these may exist on the flanks of a mountain rather than on the crest. A second type, which may be associated with a larger outcrop or occur as an isolated habitat, are described as rock bars or boulder fields. These moss covered rocky areas are most often under a forest canopy. A third type is described as a sandstone glade. These are formed over large sheets of bedrock and are often open to semi-open habitats.

There is some overlap in the flora and fauna that utilize these habitats, but there are some differences, as well. The large outcrops most often provide habitat for the State Endangered Allegheny woodrat (*Neotoma magister*). However, much of the habitat formally occupied by the woodrat no longer supports thriving populations. This species has been experiencing declines through-out its range. Other notable fauna that make use of this habitat are timber rattlesnakes (*Crotalus horridus*), winter wrens (*Troglodytes troglodytes*), ravens (*Corvus corax*), small-footed bats (*Myotis leibii*), bobcats (*Lynx rufus*), and Appalachian cottontails (*Sylvilagus obscurus*). These habitats also support high densities of a number of small mammal species.

High concentrations of small mammals also occur in the forested rock bar habitats. A number of uncommon or rare species live in these habitats. The cool micro-habitat is important for the long-tailed shrew (*Sorex dispar*) and the smoky shrew (*S. fumeus*), two species often associated with this type of habitat. The very rare rock vole (*Microtus chrotorrhinus*) also prefers this damp, cool habitat but has yet to be documented from SRSF. However, it has been documented close by on Potomac State Forest.

Sandstone glades represent a unique natural community type. Rather than the bedrock being broke up into fragments or boulders, the basis for this community is a large slab or sheet of bedrock with occasional boulders strewn about. The habitat is characterized by an abundance of heath type plants, stunted trees and overall sparse vegetation with an abundance of mosses and lichens. Timber rattlesnakes often utilize this habitat. Only one significant sandstone glade has been identified on SRSF and it is included within an ESA.

2.8 Important Wildlife Species

Maryland first began licensing hunters in 1916, with hunting license sales peaking at 180,000 in the early 1970's. Sales have since declined to about 135,000 now and today a smaller fraction (3-4%) of Maryland residents hunt. The current number of youth hunters has shown a 70% decline from peak numbers in the early 1970's. Maryland hunters are mostly males between the ages of 30-49 years of age. Most hunters live in urban settings. Residents of Baltimore County bought 11.9% of licenses sold statewide. Residents from the five lower shore counties accounted for 9.7% of hunting licenses sold statewide.

The majority of the Savage River State Forest acreage is open for public hunting, with the exception of safety zones and other similar areas. Hunting opportunities are primarily for white-tailed deer, but other species, depending upon the site, include bear, turkey and upland birds.

There are more than 40 species of game animals that occur in Garrett County. Hunting has been a time honored tradition that continues to provide recreation, food, and quality of life in Garrett County. The large amounts of public land in the county makes it a popular destination for non-resident hunters and those from more urban areas where there is little hunting opportunity. The most popular species of game animals continue to provide for most hunter recreation days in Garrett County.

White-tailed Deer – Harvest trends indicate that white tailed deer thrive in Garrett County (Figure 2). During the 2009-10 hunting season, Garrett County had the seventh highest reported deer harvest in the state. This is significant considering that most counties have a much more liberal bag limit and therefore, higher harvest potential. The reported harvest for Garrett County during the 2009-10 hunting season was a total of 4,922 deer.

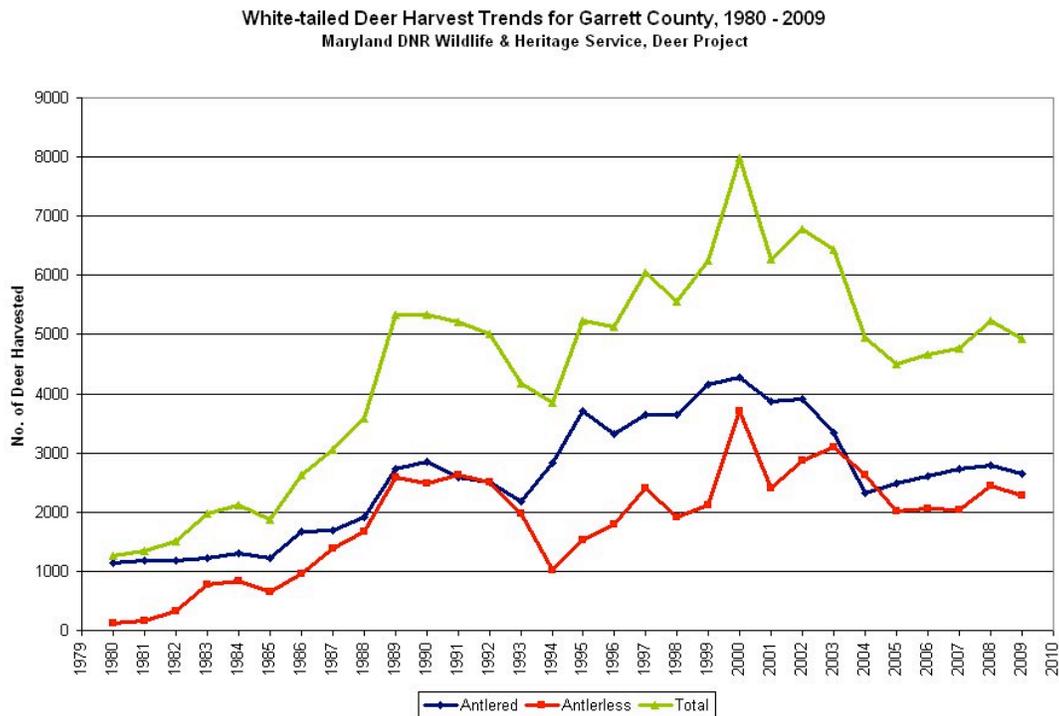


Figure 2.9.1: White-tailed deer are a popular game species in Garrett County.

Black Bear - Currently, Maryland has a breeding population of black bears in the four westernmost counties (Garrett, Allegany, Washington, and Frederick), with the highest bear densities found in Garrett and western Allegany counties. In October 2004, DNR implemented Maryland’s first bear-hunting season in 51 years. Subsequent hunts have been held each year since. DNR established a harvest quota targeting an approximate 8 to 12% harvest mortality. This was based on the objective of achieving 20 to 25% overall mortality (seasonal +non-

seasonal mortality). Harvest quotas have ranged from 30 to 85 bears between 2004 and 2009. The harvest range for the 2010 season has been set at 65 – 90 bears.

In May and June 2005, DNR conducted western Maryland’s most recent black bear population survey. A DNA-based mark-recapture study was conducted across Garrett and Allegany counties. A similar study had been conducted in 2000. The results of the DNA analysis were entered into Program MARK which yielded a population estimate of 362 adult and subadult bears across the study area. The 95% CI ranged between 242 and 482 animals.

Scent station survey routes are established across known portions of the black bear range in the four western counties annually. This survey has been conducted in western Maryland since 1993. In 2010, a total of 16 routes were established containing 126 bait stations across Garrett County. Of these, 76 were visited by black bears yielding a visitation rate of 60.3%. A total of 134 bait stations were established on 17 routes across Garrett County in 2009. Of these, 77 were visited by black bears, a 57.5% visitation rate. The 2010 visitation rate was 45.9% across the whole survey area (Garrett, Allegany, Washington, and Frederick counties). Since 1993, this survey has revealed the greatest increase in visitation in Garrett County. Garrett County encompasses the heart of Maryland’s core bear range and the routes in this county had an increase in the visitation rate of 2.8% (Figure 2). Despite this year’s increase, the visitation rates have remained below the high rates that were present between 2005 through 2007. The majority of bear harvests from Maryland’s black bear hunting seasons since 2004 have come from Garrett County. It is possible that the lower visitation rates in Garrett County are a correlating factor of the effects of the bear hunting season. Garrett County should be the first to demonstrate this potential correlation which will be evident in a ‘leveling’ of the visitation rates over time. There has not been a sharp increase in the visitation rate since 2005. We will be watching the Garrett County trend closely in subsequent years.

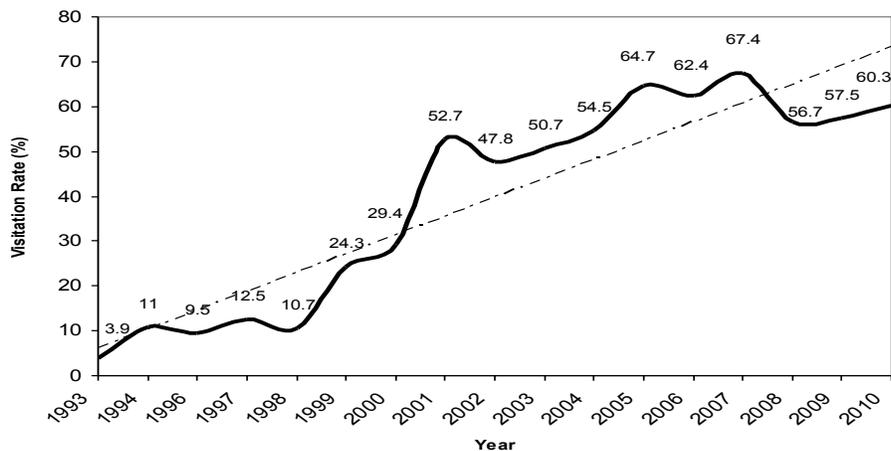


Figure 2.9.2. Bear Visitation at Scent Stations in Garrett County

Wild Turkey – Wild turkey populations have been strong in Garrett County since the rebound of suitable habitat conditions following the declines of the early 1900’s. Within the last few decades, turkey numbers have remained steady in Garrett County and Savage River State Forest. In Garrett County the turkey season is split with both a spring and a fall season. It is estimated that over 10,000 hunters pursue turkeys during the spring season statewide. Garrett County

ranked number one in harvested turkeys in 2010 with 345 birds reported (about 12% of the total statewide harvest). Brood habitat (typically herbaceous openings and edges) is reported by the Department to be the main limiting factor affecting populations and development of additional brood habitats should be considered a management priority on Savage River State Forest.

Ruffed Grouse – Ruffed grouse inhabit the forested mountains of Garrett, Allegany, Washington, and Frederick Counties. They have been a traditional staple for Western Region upland game bird hunters for decades. Public land grouse hunting opportunities are limited to three state forests and wildlife management areas. Data suggests that ruffed grouse populations in Maryland have remained somewhat stable since the mid-70s. However, the number of Maryland grouse hunters continues to decrease. This parallels the decline in participation of other small-game hunting, such as quail, squirrel, and rabbit. The DNR's Hunter Mail Survey for the 2006-2007 season reported an estimated 1,800 grouse hunters in Maryland. The typical grouse hunter spent an average of four days afield and harvested about one grouse in the 2006-07 season. Although the number of grouse hunters has declined in recent years, success rates have remained stable or increased in the last few years. A grouse hunter survey was initiated in the 2008-09 hunting season. Cooperating hunters will record the number of grouse flushed and bagged per hour. This information should allow us to better estimate grouse population trends in the region.

Furbearers – Resident furbearer populations are stable or growing within Garrett County. The diverse ecosystems support a rich and varied assemblage of furbearing species. They range from the solitary fisher of spruce and hemlock forests, to the more agricultural preferring red fox, to the wetland inhabiting beaver and river otter. Maryland's citizens enjoy a variety of ecological, recreational, economic, and cultural benefits from these valuable resources.

Garrett County's 13 resident furbearers yield many user days of recreation, while also providing the nucleus for many traditionally based rural activities. The fur harvest industry is a multibillion-dollar enterprise nationally and offers significant contributions to Maryland's economy.

2.9 Migratory Birds of Special Concern

Waterfowl Associated with Wetlands – Important waterfowl areas occur throughout Garrett County. Bottomland hardwood floodplains, beaver impoundments, lakes, farm ponds, and wooded wetlands serve as wood duck, mallard, teal and black duck habitat.

American Woodcock – Spring "singing ground" surveys coordinated by the U.S. Fish and Wildlife Service suggest that American woodcock numbers have been declining by an average of 1.9 percent per year since these surveys were started in 1968. However, population estimates are stable over the most recent 10-year period. Most woodcock biologists suspect that alterations of habitat, losses to development and changes due to maturation of abandoned farmland are the cause of the population decline. Woodcock use areas of State River State Forest as breeding and wintering habitat. Woodcock prefer moist soil areas with dense seedling/sapling cover and rich humus layers because earthworms, their primary food, are most plentiful in these habitats. State Forest lands are important to woodcock as breeding and nesting areas.

Neo-tropical migrants – Many neo-tropical migrants breed, nest or migrate through the region. One of the largest conservation concerns in the region with migratory birds is the fragmentation

of forest blocks. Other conservation concerns within the region include the loss of wetlands, loss of habitat due to development, and loss of habitat due to intensive agriculture.

2.10 Fish Species of Special Concern:

Brook Trout - Brook trout are Maryland’s only native freshwater trout species and have been a popular recreational angling resource since European colonization of North America. Brook trout in Maryland are valuable for aesthetic, recreational, economic, and biological reasons. Because of their habitat and life history requirements, brook trout are typically found in the pristine, aesthetically pleasant areas of Maryland. While there is no commercial fishery for brook trout, recreational angling has been occurring for centuries, and there is increasing local and national recognition of the uniqueness and quality of fishing for native brook trout. Anthropogenic alterations to Maryland’s environment over the last several centuries, including clear cutting of forests, establishment of large agricultural areas, and urbanization have resulted in the extirpation of brook trout from 62% of their historic habitat in Maryland. Of the remaining 151 populations, more than half are found in Garrett County, the westernmost, mountainous, and least developed area of Maryland. The vast majority (82%) of the remaining populations are classified as “greatly reduced,” meaning that within the sub-watersheds where they occur they occupy only 1% to 10% of the area that was historically inhabited. A major difficulty in managing the brook trout resource is that only 11% of all brook trout streams and stream miles are fully within state lands, the vast majority of habitat is on private land and a mix of private/public lands. Of the immediate threats to brook trout populations in Maryland, urbanization is the most serious. In watersheds where human land use exceeds 18%, brook trout populations cannot survive and if impervious surface area is greater than 0.5% in a watershed, brook trout will typically be extirpated. There are also long-term threats, of which global warming is the most serious. Current predictions indicate that warming water temperatures over the next 100 years could eliminate brook trout populations statewide except for western Maryland (Garrett County) by the year 2100.

Rare Fishes - Stonecat is the only known rare fish in Garrett County. Kline and Morgan estimate...”that a population of approximately 660 stonecat are present in the fourth order reaches of the Casselman River in Maryland. While no other populations of stonecat are known to exist in Maryland, this population extends downstream into the Pennsylvania portion of the Casselman River.” Little is known about the environmental or human caused factors limiting the abundance (acid mine drainage is thought to be a contributing factor) of this species, but it is logical to assume that strict adherence to BMP’s will help to lessen any impacts.

Species	Status	Recent Record	Historical Record
Stonecat (<i>Noturus flavus</i>)	S1, Endangered	X	

Rare fish recorded in the waters of the Casselman River: Source MD DNR Fisheries Division

2.11 The Forests of Garrett County

Historic land cover shows the region dominated by mixed hardwood forests with varying amounts of red spruce, white pine and hemlock. American Indians cleared small patches and burned the forest for hunting and gathering. Early settlers cleared areas for agriculture.

Harvesting of the conifer component was initially done to provide building materials for housing and marine uses during the development of the east coast. Hemlock was also harvested to provide bark in the tanning industry. With the advent of railroad logging, essentially all of Garrett County was clear-cut and burned. The fires were due in part to the railroads and in part to differences between neighbors. During the 1930's and 1950's many open areas were planted with conifers, mainly red pine and Norway spruce.

Practically no virgin forests remain in Garrett County, and most forests have been cut over several times. Many areas (including many that are once again in forest) have been cleared for conversion to agriculture in the past. Most of the forests are now even-aged and dominated by mixed oaks and some northern hardwood types as Table 2.12 illustrates. As Table 2.12 also illustrates, non-industrial private owners own the majority of the forests in Garrett County.

Table 2.12: Area of timberland by forest type and ownership group

Garrett County		<i>(thousands of Acres)</i>		
Forest Type	All Owners	Public	Private	
White/red/jack pine group	14.7		14.7	
Exotic softwoods group	5.9	5.9		
	20.6	5.9	14.7	
Softwood total				
Percent of Total Softwoods	100.0%	28.6%	71.4%	
Oak-Hickory	179.3	66.7	112.6	
Maple-Beech-Birch	76.1	14.8	61.3	
Non-stocked	1.2		1.2	
	256.6	81.5	175.1	
Hardwood total				
Percent of Total Hardwoods	100.0%	31.8%	68.2%	
All forest types				
	277.1	87.3	189.8	
Percent of Total All Types	100.0%	31.5%	68.5%	

Source: USDA Forest Service FIA data 2008.

Streams: Several of the State Forest lands fall within stronghold watersheds for aquatic biodiversity (specifically part of the Casselman River and Savage River Watersheds). Stronghold watersheds are those watersheds in the state that are most important for the protection of Maryland's aquatic biodiversity. Stronghold watersheds are the places where rare, threatened, or endangered freshwater fish, amphibians, reptiles, or mussel species have the highest numbers (abundance and number of occurrences). Special protection of these watersheds is necessary to ensure the persistence of these imperiled fauna. Additionally, parts of these watersheds are High Quality Waters (Tier II waters). States are required by the federal Clean Water Act to develop policies, guidance, and implementation procedures to protect and maintain existing high quality waters and prevent them from degrading to the minimum allowable water quality. Tier II waters have chemical or biological characteristics that are significantly better than the minimum water quality requirements. All Tier II designations in Maryland are based on having healthy biological communities of fish and aquatic insects. These are areas that have high biological integrity and are afforded additional protection under MDE's Anti-degradation regulations.

2.12 Forest Management in Garrett County

Most of the forests in Garrett County are privately owned, and most are managed for multiple objectives, but chiefly for wildlife habitat to support wildlife-related recreation and for revenue from the sale of timber. The forests in Garrett County are well suited to meet these objectives because of their ability to provide valuable products and diverse habitats.

As described above, the forests tend to be dominated by mixed oaks, northern hardwoods or conifers. Most of the forests are even-aged, having regenerated from the abandonment of agricultural land, or from previous clear-cut timber harvests. Some areas have probably seen timber harvests for several centuries, as both Native Americans and early European settlers cleared land and harvested wood for a variety of uses, such as building boats and houses.

Management of forests in Garrett County is done in two ways: extensive vs. intensive. On private lands extensive management frequently consists of a harvest operation when the need or opportunity arises. There is very little thought to regenerating the next forest. On public land and most industrial land intensive management is practiced. This entails tending the entire forest now and into the future

In Maryland from 1976 to 1989 the number of private forest owners grew from 95,800 to 131,000, increasing by about 2.7% per year. That calculates out to about 2,600 more owners each year. In 1976, 55% of the owners held less than 10 acres of forest; by 1989 that proportion had grown to 65%. What can be inferred from these trends is that over 2/3 of the forestland owners in the area are now essentially large-lot homeowners who will seldom be able (or desire) to manage their forest for timber production. Some properties will be managed for wildlife and recreation value, but small, fragmented pieces are limited in their capacity to produce those values, as well.

Convincing private landowners to manage forests on a long-term, sustainable plan is affected by the rapid turnover of forest properties. This produces a constantly changing clientele for forestry education, and a constantly shifting set of land management objectives that can disrupt or destroy long-term planning.

To assist the landowner with the management of their forest, there are a variety of forestry services and sources of information available. The Maryland Department of Natural Resources, Forest Service, maintains foresters to service landowners in all counties. Many landowners rely on them for impartial advice concerning timber sales, the development of forest stewardship plans and the carrying out of forest management activities such as reforestation after a timber sale. In addition, there are several private consulting foresters who assist landowners with all aspects of forest management. Most of the actual management activities, such as road building, site preparation, tree planting, and harvesting, are contracted out to separate businesses. Garrett County has access to many of these types of contractors but not in the quantity that characterize other areas of commercial forestry. Consequently some specific management practices have not been feasible because there has not been sufficient demand to support an operator.

2.13 The Forest Products Industry

Of the many commercial products that a forest in Garrett County can generate, the most valuable is hardwood veneer and sawtimber. There is typically a strong market for this because of the many local sawmills engaged in the production of dimensional lumber for the cabinet and furniture industries. There are some secondary wood industries that also provide employment to a number of regional workers.

There is also a hardwood pulpwood market in nearby Allegany County and to a lesser extent, softwood pulpwood market. There are a number of specialty markets for items like fence railing, fence posts, mine posts, pallets, railroad cross-ties, and firewood. These markets plus those mentioned earlier, have been around for decades, but the last few years the markets have been weak. A number of mills have reduced their utilization (going from three shifts to one shift) or closing down all together. There is some evidence that the markets are beginning to be a bit more robust.

From the 2007 Census of Agriculture, the value added to the county's economy from forestry is 57.4 million dollars and total outputs to the economy equal to 158.1 million dollars. In terms of employment 643 people are employed in sectors that are directly related to forestry and an additional 969 people are indirectly related to forestry.

2.14 People and Forests in Garrett County

2.14.1 Historic Settlement and Forest Use Patterns

11,000 years ago the most recent glacier moved north causing the dominant conifer cover to gradually decrease and hardwoods to become more dominant. There are still some unique bog areas that are typical of much more northern climates that are present – one is located on the 4-H center's property.

Prior to European settlement, it is clear that Nomadic Indian tribes traveled to and through Garrett County. There is some evidence that a few tribes stayed year round especially on the Youghiogeny River.

Forestry activities during this time consisted of clearing areas for crops (slash & burn type) and burning the woods for fruits and berries. Burning also improved the habitat for wildlife and made it easier for hunting and watching out for other tribes that were not friendly. The likely effect on the forest was a mosaic of different age classes, different sizes and different species.

As the early explorers arrived in the area, diseases greatly reduced the Indian population, much before conflict between the settlers and Indians reduced it even further. The likely effect of this population decrease was to reduce the diversity within the forests as the trees grew to quite large sizes without the practice of periodic cutting and frequent low intensity fires.

Thus when the settlers started to arrive in the area, the trees were much larger and denser than they had been during the times of large Indian populations. The settlers rapidly started clearing areas for permanent agricultural areas and fences. Some of the readily accessible white pine and red spruce trees were cut out to provide masts for ships and building materials.

A lot of the hemlock stands in the county were not cut during this period because they were located in relatively inaccessible areas and many farmers wanted to save the hemlocks for future building materials.

In 1800, there were roughly 1000 settlers who lived in Garrett County. But cheap land, improved transportation and growth along the eastern seaboard lead to a settlement boom. The national road was completed in 1818 and the railroad arrived in 1852. The transportation system better connected the resource rich Garrett County to the growth needs of the east. Increased quantities of lumber, coal and wheat were shipped east.

By the early 1900's narrow gauge railroads were used to facilitate logging on steeper slopes and the demand for wood products continued to increase.

The result was that Garrett County was heavily cut-over, essentially clear cut within a 20 year period. The train engines frequently caused forest fires in the tops and slash that was left from the clear-cutting. And, of course, one way to settle a score with your neighbor was to burn their fields and woods.

The effect of these activities on the forests were to create a new age class.. This legacy we can see today as most of our older forests are the same age and are about 100 years old.

In part, as a reaction to the rapid cutting of trees and the burning that was taking place the Garrett Brothers, in 1906 gave 2000 acres to the state with the proviso that an agency would be created to manage the property and to institute scientific forestry - this lead to the birth of the Maryland Forest Service and Garrett State Forest.

The rapid exploitation of the forests came to an end by the 1930s and logging companies moved west or converted to coal mining. The early efforts of the MD Forest Service were primarily fire suppression.

On January 8, 1929, the state purchased 9,352 acres of cut-over forest land from the N.U. Bond Company. This was the beginning of Savage River State Forest. Then in the early 1930s the state acquired another large tract of cutover timber land from John Dimeling. Since 1929, state foresters have allowed the timber growing stock to build up. They have planted open spaces, initiated timber stand improvement practices, and harvested poorly stocked and economically mature stands. Forestry management practices provided protections from fire, insects, disease and grazing. These practices were not able to protect the American chestnut tree from being effectively eliminated by an exotic invasive disease – The American Chestnut Blight.

In the 1930s, the Civilian Conservation Corps camps were established throughout the county. Camps were located at Savage River, New Germany, Swallow Falls State Park, Potomac Camp, and Big Run. The men in the camps assisted the forest service with fire suppression efforts, tree planting, and constructing facilities for recreational activities. The CCC boys helped with the early snow skiing activities on the forest (this area later became New Germany State Park). They helped build numerous cabins, pavilions, and trails where hiking, biking, horseback riding, and ORV riding are still taking place.

2.14.2 Recent Population and Development Trends

Garrett County, while remaining largely rural, is within the “gravitational field” of a large (11 million people plus) urban population. The result is fairly intense pressure to convert farm and forestland to developed uses. While the full-time population of Garrett County has remained fairly steady (Table 2.15.2), the pressure has come from vacation/second home buyers.

Table 2.15.2: Population characteristics of Maryland and Garrett County

STATE	Population 2000	Population 2009 (est)	Increase %	Age-17 or less % of total, 2009	Age- 18 to 64 % of total, 2009	Age- 65 + % of total, 2009
Maryland	5,296,486	5,699,478	9.1%	23.7%	64.1%	12.2%
Garrett County	29,846	29,555	-1.0%	21.5%	61.1%	17.4%

Source: US Census Data (www.census.gov)

2.14.3 Maintaining Working Forests in an Urban-Affected Region

Urban populations require a constant inflow of natural services, such as food, fiber, and freshly cycled water and air. These needs create economic incentives to use undeveloped land for farming and forestry to produce these goods. But many of the natural services, such as cycling of water and air, or wildlife habitat, are not priced in a market where landowners can be financially rewarded for keeping land in forests. This lowers forest owners’ ability to compete as landholders when areas become more urbanized.

Urbanization also creates large outflows of influence that tend to push land uses such as farming and forestry further away. Used water, air, waste materials are exported from the urban areas to cheaper rural land. Farming, forestry and other open space uses are generally out-priced when push comes to shove and a large population center needs to expand or export a problem. The lands then move into higher priced uses that generally feature more houses, more highways and other developed amenities. As land use changes radiate outward, the industries, such as forest products manufacturing, experience supply reductions as well as growing urban attitudes that discourage or even legislate against activities like logging, trucking, or manufacturing. Where business leaders sense that the future of the industry is limited, they begin to limit investment in new facilities, and the future of the industry can become locally tenuous.

This situation is clearly affecting Garrett County and, while the Potomac-Garrett State Forest and Savage River State Forest can resist the pressures to be converted to other uses due to their status as public lands, the management of the lands will be affected by the fate of the private lands around them as well as the future of community factors such as the forest products industry and the pressures for outdoor recreation.

Knowledgeable estimates indicate that land in the Garrett County is attracting market prices that are two to five times higher than the land’s agricultural or forest value. The higher that ratio becomes, the more vulnerable the land is to conversion. By comparison, some Maryland watersheds on the Western Shore close to the Baltimore-Washington corridor have price ratios as high as 10 to 15.

Land prices cut both ways in a situation like this. High prices near the urban areas mean high taxes, and commodity producers are squeezed out of production because they can't afford to pay development-price taxes on farm or forestland. They are then forced to sell to protect their family's asset value. Garrett County, while not in the immediate high-pressure zone, is close enough to allow developers to think that distance is not as much a problem as price, so they are encouraged to build on the cheaper, more remote lands.

Vacation home and resort development is increasing. The fact that these uses are currently expanding in the county means additional focus will be on the area as a recreation destination. This spells more visitors, more traffic, and more residential development in the coming decades. Some of this growth will take agricultural land; some will take forests. The future of agricultural land is important to forestry, because as agricultural land gets developed, and agricultural cultural values are replaced by urban values in the region, the pressures against production forestry will mount. That trend is already well underway and seems destined to continue in the future.

In Garrett County, populations are older and less affluent than the averages for the state (U.S. Census, 1998). This sets the stage for significant amounts of land turnover, fragmentation, and land use change in the coming decades. And it leads to considerable concern for the future of rural lands as development pressures spread from Washington D.C., from Baltimore, and from Pittsburgh, PA.

2.15 Landscape Considerations

2.15.1 Shifting From Stands to Landscapes

In the past, management of forests was done primarily on a stand-basis, and most of the time, as stands within specific property holdings. From an ecological perspective, the stand was taken as a unit that could be accessed independent of others. Economic considerations, such as the desire to have a consistent product to sell from year to year and to minimize costs of treatments, linked the management of different stands. Otherwise it was assumed that a stand, by definition, was a management unit on which treatments could be scheduled independently of all others.

In recent years, however, there has been a strong movement toward management at a landscape level. Landscape level considerations means that the status of any specific stand, and what forestry treatments are applied to it, depend not only on its internal conditions (stand age and structure, site index, etc.) but on the condition of other stands and of other lands in a region. The landscape-level perspective leads to a view of stands within landscapes. The condition of other stands includes not only their stand age and structure, but also the frequency distribution of stands on the landscape of different kinds and stages. Landscape considerations also take into account land holdings by other landowners and government agencies. The management of a stand is perceived within a regional context.

All of the major goals of this project need to be examined from a landscape-level perspective, and decisions made in light of this perspective. Among the factors that are leading in the direction of management from a landscape level perspective are: the requirements of the Endangered Species Act; the Clean Water Act; the habitat needs of migratory species that make use of forest stands; the habitat needs of game species and other species of recreational value; the perception that recreational uses can benefit from a variety of stand types, not just from the existence of a certain kind of stand.

There are a number of examples that illustrate the landscape perspective. Recent approaches by Boise-Cascade illustrate landscape level forest management as a result of concerns with endangered species. Boise-Cascade has holdings in the southeast that are habitat of the Red-cockaded woodpecker. The company has taken the position that, while it can affect habitat for this species within its own holdings, it cannot be held responsible for the status of the species, specifically for the population abundance of the woodpecker. Instead, Boise-Cascade has initiated voluntary, cooperative agreements with other landholders and with government agencies so that planning for forest use is done on a regional basis. In this case, the decision about how a specific stand will be treated is influenced by more than the condition of that stand, and more than the holdings of Boise-Cascade. That treatment depends on the availability of habitat for the woodpecker in an entire region, and, by voluntary action, the corporation chooses to harvest stands under its own control to meet the regional needs of the endangered or threatened species, as well as to meet its corporate needs. A similar approach dealing with the endangered Delmarva fox squirrel is underway on the lower eastern shore of Maryland. The Blackwater NWR in conjunction with Maryland DNR and other partners are in the process of developing a Habitat Conservation Plan (HCP) for management of the fox squirrel for the entire peninsula.

Similarly, the desire to have clean water leads to a consideration of water quality within a region, as well as within a specific ownership. Water quality is affected by the condition of water in the bay, on lands that are in agriculture and housing, as well as on the forestland, making clean water a landscape

Thus, a landscape-level perspective is intrinsic, if generally unspoken, in forest planning in Garrett County, and is likely to become increasingly important in the future. As the experiences and practices of Boise-Cascade illustrate this level of planning and management can be done on a voluntary, cooperative basis, and can be driven by market forces. Landscape-level planning means that a stand is seen within a regional context, but this does not require that planning be done from an external or regulatory perspective.

2.15.2 Watersheds as a Landscape Issue

Regional attention to water quality in the Chesapeake Bay and its tributaries has led to concern for some of the resource management activities in use in Garrett County. Declining water quality in the Bay has resulted in major interstate efforts, many of which have identified the treatment of the land within the watershed as the primary factor in reversing the decline and restoring the Bay's aquatic environments.

In its Clean Water Action Plan, the State of Maryland identified 138 "8-digit" watersheds, averaging about 75 square miles each, as the unit of analysis most suited to identification of watershed condition and treatment priorities. The "Unified Watershed Assessment Report" published by the State, evaluated clean water and other natural resource goals on these watersheds. The clean water goals were based largely on the State's biennial water quality report, prepared in response to Section 305(b) of the Federal Clean Water Act. Waters that were reported to have violated water quality standards were assigned to "Category 1," as "in need of restoration." In addition, watersheds that were not in violation of water quality standards, but which were shown to need restoration in order to meet two or more natural resource goals, are also placed in Category 1.

Category 2 watersheds are those that meet current water quality and natural resource goals, but need preventative actions to sustain existing water quality. Category 3 is high quality pristine watersheds where protection was a high priority. In selecting water quality indicators that might be most affected by forest management within the watersheds, we chose nutrient loading. See chapter 3 for additional characterization of Watersheds on the State Forest.

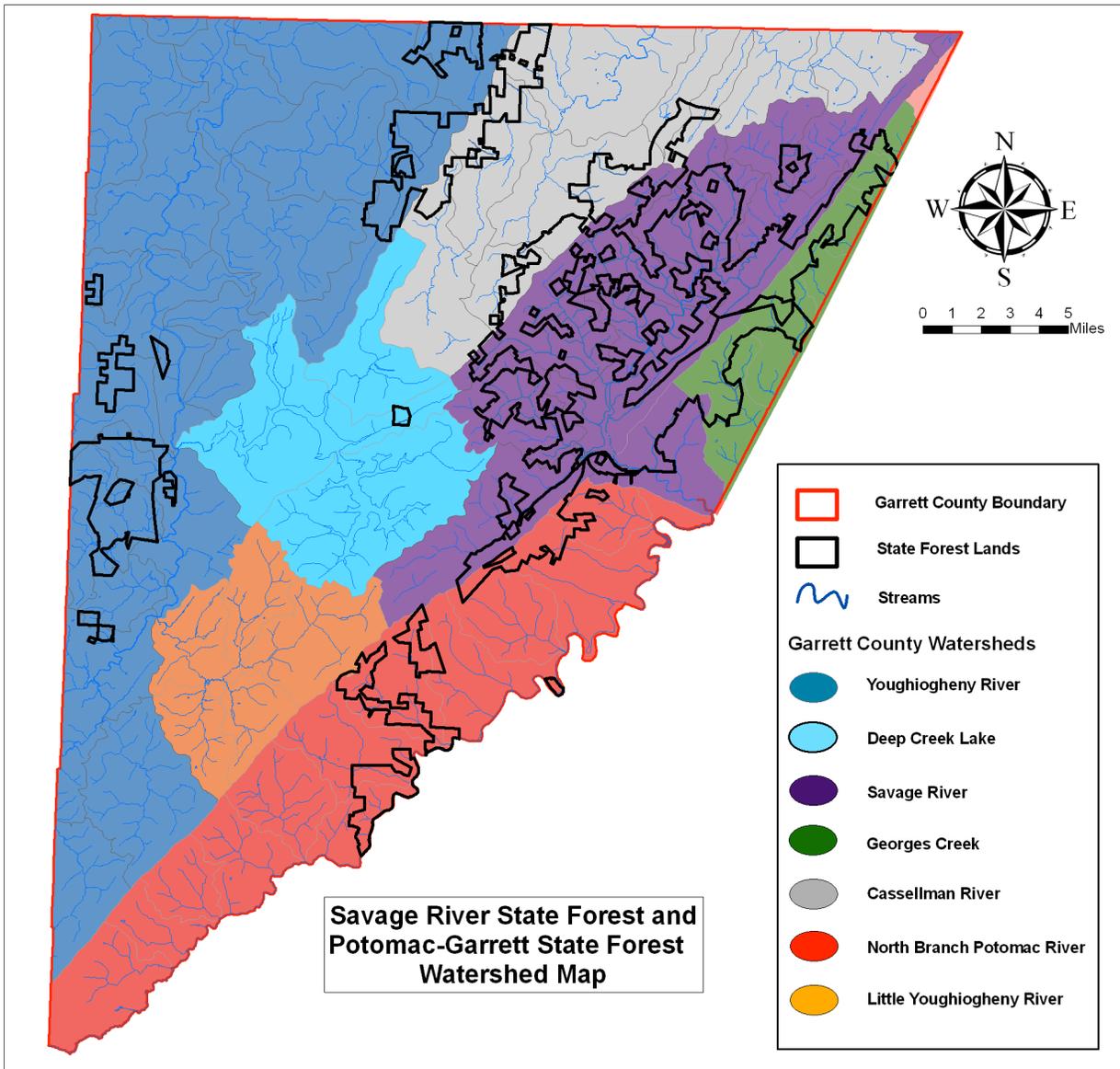


Figure 2.16.2: Watersheds in Garrett County

2.16 Water Quality Issues

Forests play a pivotal role in water quality in the Chesapeake Bay. Forestlands provide a steady source of clean water to streams and tributaries. Forests act as nutrient sinks across the landscape, absorbing more nutrients than they supply. Additionally, Potomac-Garrett State Forest and Savage River State Forest contain a large amount of land in Garrett County and therefore are critical to the viability of the timber industry and consequently to the forest cover in the region. Without the infrastructure of the timber industry, forestlands may be converted to other more polluting land uses. Finally, the location and landscape position of the state forests

provides opportunities to capture additional nutrients and sediments traveling across the watershed

Nutrients are the largest water quality concern in Garrett County due to their negative impact on the Chesapeake Bay and its tributaries. Forests are estimated to contribute only 2 pounds of nitrogen per acre per year at the same time that they are receiving 9.5 pounds of nitrogen per acre per year from the atmosphere.

The majority of streams in Garrett County had nitrate-nitrogen levels within the range found in mostly forested streams within Maryland. An estimated 70% of stream miles were below the 1 mg/l threshold level, and no streams had values which exceeded the 5 mg/l threshold for biological effects. There was no geographic trend in the distribution of sites with elevated nitrate-nitrogen in the county.

Similar to nitrate-nitrogen, 86% of the stream miles in Garrett County had total phosphorus levels in the range of those observed in forested Maryland streams. No streams had total phosphorus levels above the threshold associated with biological effects. Sites with elevated levels of phosphorus tended to be concentrated in the southern portion of the county. See Chapter 3 for additional characterization of water quality.

2.16.1 Potential Water Quality Impacts of Forestry Operations

Timber operations have the potential to create unacceptable impacts on water quality and the topography of Garrett County may increase the risk of causing significant water quality impacts relative to flatter areas. However, with proper best management practices, these impacts are generally minimal and temporary. See Chapter 5, for additional information on mitigating impacts from forestry operations.

CHAPTER 3

Savage River State Forest - Resource Characterization

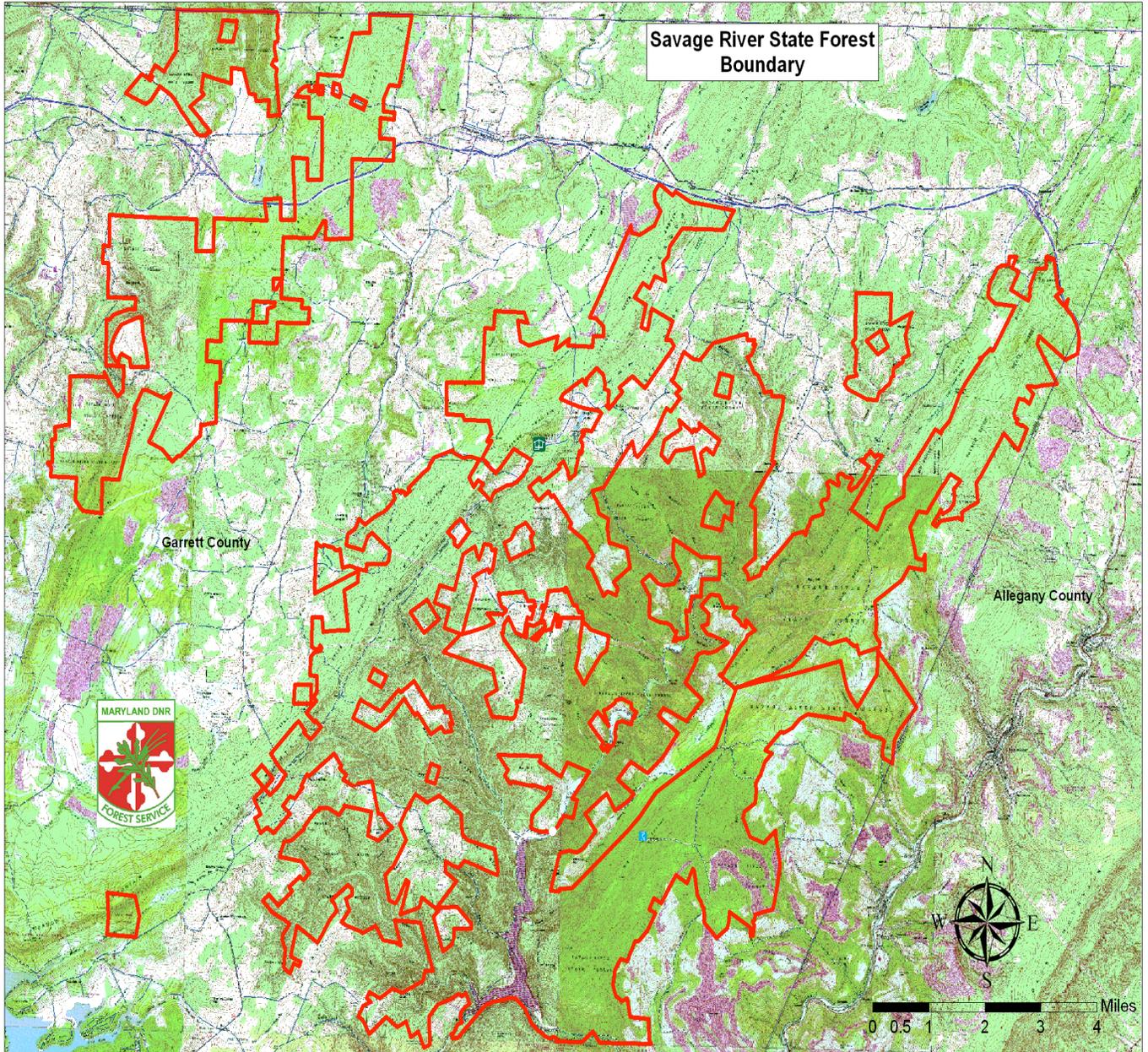


Figure 3.1 Savage River State Forest – Garrett County, Maryland

3.1 The Forests

The Savage River State Forest covers approximately 54,324 acres of land in Garrett County (40 acres are in Allegany County) (Figure 3.1). Mature mixed oak and northern hardwood forests comprise a large proportion of the Savage River State Forest, as illustrated in Table 3.1. In general, sixty-six percent of the stands are older, more mature forests, while thirty-four percent are younger and smaller. Table 3.1 lists the diameter classes and suggests a diversity matrix that provides a current baseline from which future changes in age structure or forest type diversity can be assessed for potential habitat or biodiversity effects.

Following are forest resource characterizations including forest type, size class and forest productivity for Savage River State Forest based on historic (2000) CFI data. The summaries in this plan will likely change as the result of the stand level data collection project that is being completed at the time of writing this plan. This project will likely take five years to complete and this plan will be updated periodically as the new inventory data is collected and analysis is completed.

Table 3.1: Forest Diversity Analysis:

Acres of forest type and forest structure by structural groups, with percentage of total area in each forest type/structure group combination (Total acres does not equal to 54,324 due to sampling error and acquisitions.)

Structure Stage	Seedling	Sapling	Pole-timber	Small Saw-timber	Large Saw-timber	Total	Stand. Error	% Total
Forest Type								
Hemlock	0.0	0.0	314.5	1,572.7	209.7	2,097.0	21.9	3.9
Northern Hardwood	524.2	733.9	1,887.3	4,927.9	1,048.5	9,121.8	9.8	17.1
Hardwood Hard Pine	0.0	0.0	104.8	0.0	0.0	104.8	100.0	0.2
Mixed Oaks	629.1	629.1	7,758.8	16,880.6	4,193.9	30,091.4	3.9	56.3
Cove Hardwoods	104.8	419.4	1,363.0	2,516.4	524.2	4,927.9	13.9	9.2
Red Maple	0.0	524.2	838.8	1,258.2	104.8	2,726.1	19.1	5.1
Black Locust	0.0	209.7	629.1	314.5	0.0	1,153.3	29.9	2.2
Hardwood White Pine	0.0	0.0	314.5	0.0	0.0	315.5	57.6	0.6
Loblolly Pine								
Hardwood	0.0	0.0	0.0	104.8	0.0	104.8	100.0	0.2
Plantations	419.4	104.8	838.8	1,467.9	0.0	2,830.9	18.8	5.3
Total	1,677.6	2,621.2	14,049.7	29,043.0	6,081.2	53,472.6	0.4	100.0
Standard Error	24.6	19.5	7.4	4.1	12.4	0.4		

3.2 Old Growth Forest

Old growth forests have generally been defined as forests in existence since pre-settlement times and lacking any significant Euro-American disturbance. The definition can differ according to climatic and eco-regional perspectives and the growth characteristics of specific native forest systems. In Maryland, an old growth forest is defined as a minimum of five acres in size with a preponderance of old trees, of which the oldest trees exceed at least half of the projected maximum attainable age for that species, and that exhibits most of the following characteristics:

1. Shade tolerant species are present in all age/size classes.
2. There are randomly distributed canopy gaps.
3. There is a high degree of structural diversity characterized by multiple growth layers (canopy, understory trees, shrub, herbaceous, ground layers) that reflect a broad spectrum of ages.
4. There is an accumulation of dead wood of varying sizes and stages of decomposition, standing and down, accompanied by decadence in live dominant trees.
5. Pit and mound topography can be observed, if the soil conditions permit it.

It is also important to recognize that old-growth forests are not static and may not be a permanent fixture on the landscape. The forests and trees within and around them change continuously. This would be true even if human influence could be eliminated. All forests, including old-growth, succumb to natural, destructive disturbances and regenerate over time. A functional old-growth ecosystem includes the loss of old trees due to natural disturbances and the death of old trees. An old-growth system is not static, nor is it always dominated by old trees. Natural processes dictate the age composition at any time. The important factor in this process is that the trees have the opportunity to reach old age if natural disturbances do not intercede.

Savage River State Forest has seven remnant areas of Old Growth Forest. These areas plus a 300 foot buffer around them total 1, 758 acres and are found in difficult to reach areas; this is not surprising given the logging history of Garrett County. At Savage River State Forest we are creating larger Old Growth Forest management areas around these small remnant patches (see map appendix I-1. The larger areas will be mapped as old growth ecosystem management areas. This process is fully described in the *Policy and Procedures Handbook for Western Maryland Forests*, appendix E, “Management Guidelines for the Conservation and Protection of Old-Growth Forest”. Also see Chapter 5 for management guidelines for the identified “nearly old growth forest areas”.

3.3 Forest Production

Savage River State Forest has been managed for industrial forest production for decades, and has been a major contributor to the region’s forest products industry. Numerous sawmills and New Page paper mill operations provide outlets for timber from local forests.

Savage River State Forest makes up about 19.0% of the productive forests in the Garrett County area, see (Table 3.3). However Potomac-Garrett State Forest is managed in a similar manner as Savage River State Forest and these two state properties comprise almost 25.4% of forest in the county.

Table 3.3: Savage River SF and Potomac-Garrett SF as a Percentage of Garrett County

State Forest	State Forest acres	SF as % of County Area	SF as % of County Forest
Savage River	54,324	12.8%	19.0%
Potomac-Garrett	18,242	4.3%	6.4%
Totals	72,566	17.1%	25.4%

*additional source: USDA Forest Service-Forest Statistics for Maryland: 1986 and 1999

3.4 Water Quality

Water quality is a major environmental concern, fueled by the fact that nutrient contributions from airborne pollution as well as local development and agriculture have been cited as a basic cause of water quality decline in recent decades. The Savage River State Forest management plan focuses on several aspects of this issue by focusing on water quality when managing for brook trout and riparian wildlife along our streams. This can be accomplished through the maintenance of healthy, growing forests that will maximize nutrient uptake and by controlling other management impacts on soils where the risk of direct nutrient transport into shallow groundwater or surface waters is high.

3.5 Watersheds

The Savage River State Forest is located within six (6) of Maryland’s 8-digit watersheds. Those watersheds are Savage River, Upper North Branch of the Potomac and George’s Creek in the Chesapeake Bay Drainage and Casselman River, Youghiogheny River and Deep Creek Lake in the Ohio River Basin. The majority of Savage State Forest is located within the Savage River watershed (57.8%) with smaller amounts in George’s Creek (12.7%), Casselman River (17.9%) and Youghiogheny River (10.7%) watersheds. Very small amounts of the State Forest are located in Deep Creek Lake (0.4%) and Upper North Branch of the Potomac (0.6%) watersheds.

Strahler Stream Order, as a percentage of total stream miles in each watershed, grouped by major drainage, is presented in Table 3.5.1.

Table 3.5.1: Strahler Stream Order by Watershed

Watershed	Stream Order				
	1st	2nd	3rd	4th	5th
Georges Creek	55.8775	15.08063	12.91313	0	0
Potomac River U N Branch	90.67313	22.13625	7.47625	33.07813	0
Savage River	96.27	21.82875	16.80875	4.98	0
Chesapeake Bay	242.8206	59.04563	37.19813	38.05813	0
Casselmann	60.95938	22.23813	13.105	0	0
Deep Creek Lake	24.4425	2.94125	1.70625	0	0
Youghiogheny River	166.7556	52.50938	30.00625	7.078125	19.84125
Ohio River	252.1575	77.68875	44.8175	7.078125	19.84125
Grand Total	494.9781	136.7344	82.01563	45.13625	19.84125

3.5.1 Stream Condition

The Maryland Biological Stream Survey (MBSS) has randomly sampled streams across the state of Maryland to assess stream ecological condition. Stream condition is measured two ways; by using information collected from the (1) fish and the (2) benthic macro invertebrate communities. This information is analyzed and reported in one of four categories; good, fair, poor or very poor. The results for the six Savage River State Forest watersheds are presented in Table 3.5.1.1 for fish and Table 3.5.1.2 for benthic macro invertebrates.

Table 3.5.1.1: Estimated Number of Stream Miles by Category; Fish Index of Biotic Integrity

Watershed	Good	Fair	Poor	Very Poor	Not Rated
Savage River	57.14	28.57	7.14	0	7.1
Georges Creek	20	20	60	0	0
Potomac River Upper North Branch	10	20	40	30	0
Casselman River	10	30	50	10	0
Youghiogheny River	18.75	31.25	50	0	0
Little Youghiogheny/Deep Creek Lake	0	10	70	20	0
STATEWIDE	26	25	21	19	9

Table 3.5.1.2: Estimated Number of Stream Miles by Category; Benthic Index of Biotic Integrity

Watershed	Good	Fair	Poor	Very Poor	Not Rated
Savage River	85.71	7.14	7.14	0	0
Georges Creek	40	20	30	10	0
Potomac River Upper North Branch	20	40	30	10	0
Casselman River	30	20	30	20	0
Youghiogheny River	37.5	25	25	12.5	0
Little Youghiogheny/Deep Creek Lake	10	60	20	10	0
STATEWIDE	26	28	30	16	0

3.5.2 Aquatic Biodiversity

The Savage River State Forest is located within portions of 14 of the 159 Stronghold Watersheds. Stronghold Watersheds are the 12-digit watersheds that are the most important to protect in order to preserve Maryland’s aquatic biodiversity. More information on Stronghold Watersheds can be found on the MBSS website <http://www.dnr.state.md.us/streams/pdfs/StrongholdFactSheet.pdf>). These stronghold watersheds in the Savage River State Forest are important for the conservation of several state rare, threatened, or endangered species. These species include: Johnny darter, striped shiner, mottled sculpin, stonecat, brook trout and hellbender. The Savage River watershed also contains the most intact and connected population of brook trout in Maryland. The Casselman River watershed is the only known watershed with recent records for the stonecat and hellbender.

The MBSS has collected information on non-native aquatic species. Seven non-native fishes have been found on or in close proximity to the Savage State Forest. The seven non-native species are fathead minnow, brown trout, rainbow trout, smallmouth bass, rock bass, pumpkinseed and bluegill.

The MBSS has a long-term monitoring network called the Sentinel Site Network. This is a network of twenty-seven sites used to monitor the natural variability of streams and to investigate the possible effects to streams due to global climate change. These sites are the

highest-quality sites identified by the MBSS with the least amount of anthropogenic influence in the upstream catchments. Eight of the twenty-seven Sentinel Sites are located on or adjacent to the Savage River State Forest.

3.6 Soils

The soils on the forest are strongly dissected by natural drainage patterns. The soils are often steep, stony, or both and are ideally suited for woodlands, wildlife habitat and recreation. In the process of plan development, the soils on the forest were classified into eight Soil Management Groups (SMG), based on soil characteristics directly affecting forest management. (See Appendix: D for a listing of soil types by soil management group of symbols used by soil survey reports.) The eight Soil Management Groups are defined as follows:

1. SMG 1 – Very poorly drained to poorly drained mapping units with moderate limitations affecting construction of haul roads and log landings.
2. SMG 2 – Very poorly drained to poorly drained mapping units with severe limitations affecting construction of haul roads and log landings.
3. SMG 3 – Somewhat poorly drained to moderately well drained mapping units with moderate limitations affecting construction of haul roads and log landings.
4. SMG 4 - Somewhat poorly drained to moderately well drained mapping units with severe limitations affecting construction of haul roads and log landings.
5. SMG 5 -- Well drained mapping units with slight to moderate limitations affecting construction of haul roads and log landings.
6. SMG 6 - Well drained mapping units with severe limitations affecting construction of haul roads and log landings.
7. SMG 7 - Soil mapping units that are variable and have no defined drainage class with moderate limitations affecting construction of haul roads and log landings.
8. SMG 8 - Soil mapping units that are variable and have no defined drainage class with severe limitations affecting construction of haul roads and log landings.

To facilitate plan development and future management, digital soils data were prepared for all the areas where the Savage River State Forest occurs. When the current land cover was compared to the soil survey data, it was clear that the majority of Savage River State Forest soils occur on SMGs 5, 6 and 8; with stony land, steep (SrF) being the largest single mapping unit. The distinctions within this soil are quite variable, and there is often considerable slope and aspect differences that make accurate identification and classification difficult, so experienced field personnel and accurate assessments are vital to the process.

3.7 Compartments

To facilitate management planning of the Savage River State Forest, the forest was grouped into Compartments. A Compartment is defined as contiguous area made up of individual stands that make sense to be managed as one unit. This involves some arbitrary decisions, since there are often minor gaps of private ownerships within individual units. The resulting management units provide a very useful tool for developing individual operating plans that comprise the annual

work plan on the forest. Table 3.7.1 and figure I-2 reflects the identification and distribution of the eighty-one Compartments.

Table 3.7.1: Savage River State Forest Compartments

Compartment	Total Acres	Compartment	Total Acres
1	524	39	169
2	623	40	1101
3	511	41	466
4	819	42	497
5	728	43	1057
6	713	44	315
7	781	45	543
8	533	46	183
9	993	47	986
10	1067	48	292
11	1331	49	578
12	367	50	497
13	513	50A	719
14	927	51	1730
15	1134	52	1035
16	766	53	576
17	1299	54	980
18	644	55	769
19	400	56	552
19A	96	57	458
20	189	58	1555
21	507	59	1299
22	410	60	663
23	604	61	140
24	567	62	599
25	892	63	955
26	1088	64	258
27	278	65	243
28	925	66	123
28A	440	67	149
29	1114	68	167
29A	263	69	535
30	930	70	635
31	497	71	176
32	1049	72	684
33	496	73	687
34	694	74	415
35	629	75	161
36	684	76	939
37	1835	77	232
38	1456		

The majority of the land base is in contiguous blocks (Table 3.7.2).

Table 3.7.2: Compartment Statistics by Size

Size Class	Count	Ac Sum	Ac Avg.	Min	Max
0-400	19	4,201	221	96	400
401-600	21	10,714	510	410	599
601-900	18	12,734	707	604	892
901 +	23	26,785	1,165	925	1835

Adjoining land uses such as agriculture or development, may constrain forest management activities such as prescribed fire. These forests provide needed habitat and esthetic diversity as well as the opportunity for water quality improvement projects to buffer the impact of surrounding lands. The Department must weigh the effects of various management activities as they may affect adjoining properties and seek to always maintain good community relations with neighbors.

Private forest landowners are under increasing economic pressure to convert their land to development as populations grow and industries expand. Maintaining local economic uses and technical resources that help individuals keep their land in forests is crucial to maintaining or expanding the amount of forestland in Western Maryland. Thus, the concern for the economic effects of this plan, and the value of these forests for transferring technical knowledge to other owners are both central to the management of Savage River State Forest. By maintaining these working landscapes and contributing to the timber industry, local markets and infrastructure (logging crews, mills, etc.) will be available to private landowners, thus reducing the need to convert land to other uses.

CHAPTER 4

Land Management Guidelines

4.1 Land Management

Due to the diverse landscape of the Savage River State Forest, this plan will not make specific prescriptions for each tract. Rather, the planning team identified specific areas based on physical attributes that need to dominate future management decisions.

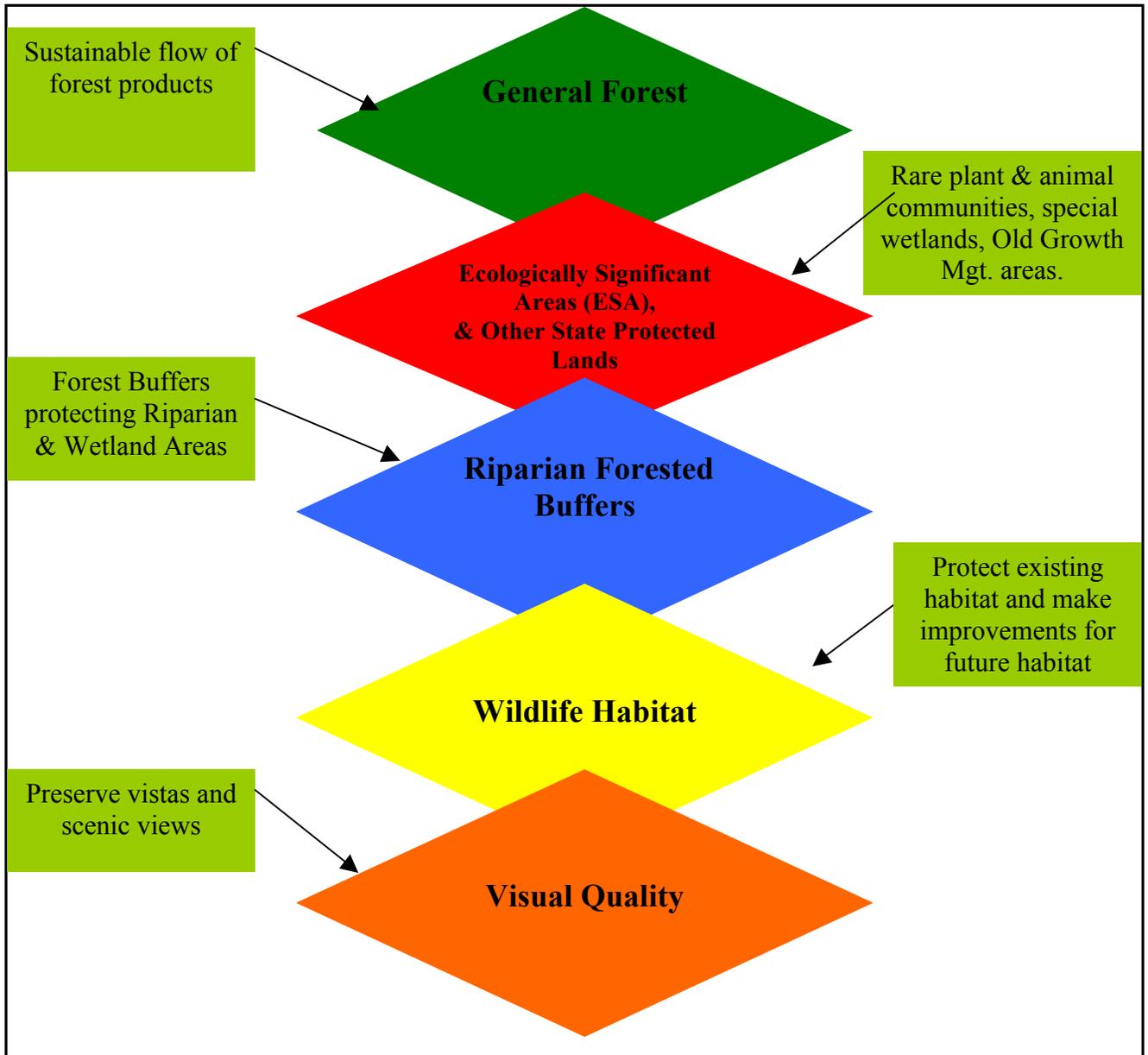


Figure 4.1: Schematic of Land Management Area guidelines

Figure 4.1 illustrates the sequence of identifying these areas for planning purposes. Beginning on top, the general forest management area is first constrained by identifying the ecologically significant areas where a particular site requires special management attention. This is followed by riparian forest buffers or wetland buffers. Next, wildlife habitat areas may need to be established, where a special combination of management recommendations are required by a species or suite of species. Finally, attention must be paid to the visual impact of a practice, considering its location or neighbor concerns. Recommendations for each area have been developed and are listed in this plan and they serve to provide guidelines to field managers, who will need to address each situation on the basis of good inventory, analysis, and planning methods. Additionally, there are special sites within each of these areas that fall into the High Conservation Value Forest (HCVF) designation, these are areas to be managed and protected because of identified unique conservation values, see chapter 5 for additional information.

4.2 General Forest

One of the goals of this project is to maintain an economically sustainable forest and contribute to the local economy by providing forest-related employment and products. Most of this forest area is in mixed hardwood stands. See chapter 5.

4.3 Ecologically Significant Areas (ESA) & Other State Protected Lands

Sites containing rare plant and or animal communities are identified and managed for their special qualities. The DNR Wildlife & Heritage Service is involved in assuring that special sites are properly inventoried, marked, and managed, and that adequate records are created and maintained for each site. Specific prescriptive management recommendations have been developed for each site with the Natural Heritage Program. A breakdown on the locations and description of the special sites that have been identified on Savage River State Forest can be found in chapter 7.

Other State Protected Lands: Most of these areas fall under an ESA. Those sites that do not are listed as an addition to ESAs. These land designations are State designated Heritage Areas, State Wildland Areas, Wetlands of Special State Concern (WSSC), and Old Growth Ecosystem Management areas. Many of these sites fall under some type of state protection through legislation.

4.4 Forested Riparian Buffers

Fifty foot (50 ft.) riparian forest buffers or wetland buffers will be marked, established and maintained according to the guidelines listed in Chapter 6. All management activities within these areas will be designed to protect or improve their ecological functions in protecting or enhancing water quality or wildlife habitat. The long-term goal is to achieve and maintain a mature mixed forest stand, except in those areas where early successional forest is preferred for wildlife such as woodcock or in deer wintering areas. Management will generally focus on marking boundaries so that field personnel and contractors can conduct adjacent operations properly, and closely monitoring activities to prevent soil disruption or damage and protect stream bank and wetland integrity. Some riparian areas may be managed to provide better diurnal habitat for species such as woodcock. These areas will be regenerated during winter when grounds are frozen to lessen impacts on soil and water quality. Some of these riparian areas are concentration areas where deer “yard” during significant snow events or periods. In some cases it may be preferred to conduct regeneration harvests to promote areas of browse for over-wintering deer.

4.5 Wildlife Habitat Areas

The rich diversity of wildlife species located within Savage River State Forest, from endangered to common game species, requires the use of a wide array of traditional and adaptive management techniques. The objective is to utilize adaptive management to address the ecological needs of this diversity of wildlife species and habitat types. Wildlife habitat is also enhanced in large measure, by providing a variety of habitat types that include young and mature forest, open habitats, as well as the riparian forest buffers and other corridors where needed. Riparian forest buffers expand on water quality protection and take advantage of the important habitat and life zones associated with riparian areas. Chapter 8 outlines the goals and guidelines for these areas. Forest harvests that are planned to maintain a mosaic of age classes in small blocks will ensure valuable cover and edge habitat that supports some popular and declining game and non-game species such as American woodcock, ruffed grouse, and golden-winged warblers. A few areas will have specific plans made to target a mosaic of age classes to benefit early succession wildlife species.

4.6 Visual Quality Areas

These are areas that are managed to serve as visual buffers along public roads and adjacent properties to protect existing scenic views or vistas. Buffers protecting views of the land from the water should also be addressed in the establishment of riparian forest buffers.

4.7 Non-Forested Lands

These lands, although not fully identified as a particular “area” in the management plan, are estimated to cover less than 1.0% of Savage River State Forest. They consist primarily of roads, transmission lines, wildlife openings, bogs and swamps. Some of these areas may need to be maintained in non-forest vegetation, either to allow management activities on the forest or to meet legal easement requirements. They can provide important wildlife habitat elements, such as grassy areas or food plots, which benefit game species management and do not interfere with forest management. These areas may be especially valuable as brood habitat for wild turkeys and ruffed grouse and as foraging areas for other species. As this is the least abundant cover type on Savage River State Forest, it may be important to consider additional open habitat areas where they are lacking. These can be efficiently produced by planting and maintaining log landings. Control of invading brush, trees and invasive species will be an ongoing maintenance issue for these areas. Roads that are not needed for fire or emergency access are considered for closure.