



## Chapter 7: The Next Forest



The last 100 years have been a time of dramatic change for Chesapeake forests. Concern about the widespread loss and degradation of forestland at the turn of the 19th century led to increased focus of governments, universities, and environmental groups on forest health and function. This prominent social and political movement helped expand forest cover and gave birth to the conservation movement. However, forests are again being lost and damaged. It is unlikely that we can maintain our quality of life and restore the Chesapeake Bay unless forests and their conservation become a more prominent part of public discourse. Embarking on conservation over the next 100 years may need a movement no less dramatic than a century ago.

Today, more is known about the role of forests and trees in the regions environment, community, and economy than ever before. Years of research, management, and lessons learned have provided the tools and information necessary to sustain healthy forests in the Bay watershed for years to come. At the same time, the issues affecting the “next forest”—future forest cover, health and habitat, and functions—have become increasingly complex. Perhaps for this reason, decision makers and the public in general seem alarmingly unaware of the crucial role forests play in maintaining the quality of our environment and our lives. The question remains—will we learn from the past and use the experience gained or will we repeat the mistakes of the past?

Current trends point to the “next forest” being one that is far more dominated by people and requiring the attention of foresters and other professionals to manage its health and to produce the forest-dependent benefits on which we will depend. It is likely that the total area of forestland will decline in the future and remaining forests will be more heavily fragmented. On the one hand, a large percentage of the “next forest” will be located closer to where people live and for many this will be their most common contact with nature. On the other hand, it will require more management to balance multiple interests. As farmland is developed, new “urban forests” will emerge over time. These “urban forests” will be more valuable to public health because of the benefits they provide in improving air quality and moderating climate.

The restoration of forests and riparian forest buffers on farmland holds promise for reconnecting forest corridors in rural areas. Widespread acceptance of local stream corridor protection ordinances and the growing interest in smart growth and low-impact development points to the potential for local governments to embrace planning that includes both development and “green infrastructure” needs and functions.

The job of protecting and helping manage Chesapeake forests will also present new challenges as a greater number of private landowners will have smaller forest landholdings and many will own forest land for the first time. With more people and competition for resources, the need for important forested areas that protect water quality, habitat, local jobs and income, and drinking water sources will be even greater than it is today. The demand for forest recreation will rise as will the value of protected forest lands.

## FUTURE FOREST COVER

An estimated 19 million people will call the Chesapeake Bay watershed home by 2030.<sup>1</sup> If these people move to areas built using conventional sprawl development patterns, forests will suffer further wide-scale loss and fragmentation. Predictions for 2030 indicate that 40% or 9.5 million acres of all privately owned forestland will have experienced increased residential development in the Bay watershed.<sup>2</sup> This area is equivalent to the size of Maryland and West Virginia's portion of the Bay watershed.

### FORESTS CONTINUE TO BE LOST AND FRAGMENTED BY DEVELOPMENT

Most forest loss to development will occur in the metropolitan corridor between Harrisburg, Pennsylvania and Richmond, Virginia. Many traditionally rural, forested areas (especially those near water) are becoming increasingly popular for bedroom communities, retirement homes, and vacation destinations. Future growth scenarios developed for the Washington, D.C., metropolitan region showed that the amount of developed land could increase by almost 80% or more than 800,000 acres by 2030 under current development patterns. Almost all of the newly developed land would replace farms and forests.<sup>3</sup>



Source: Google Earth

### LESS FARMLAND BECOMES FOREST

After the massive clearing of forests in the 19th century, forest area increased by as much as 200% over the next century, mostly on abandoned farmland. This dramatic increase offset most of the forest loss to development until the late 1970s. As the supply of cheap farmland dwindles due to expanding development however, the net loss of forest will increase in the future, especially in the Ridge and Valley region and the Appalachian Plateau.<sup>1,4</sup>

New growth of “forest” will consist mainly of scattered trees planted in rapidly growing suburban developments. Suburban forests provide numerous benefits, but they do not approach the magnitude and range of benefits that large, contiguous forests provide.

### MORE PRIVATE LANDOWNERS HOLD SMALLER FOREST PARCELS

The parcelization of Chesapeake forests will continue through at least the next decade.<sup>1</sup> With increased parcelization of forest holdings, the risk of forest loss increases because of changing landowner objectives, rising barriers to management, and land values that have greatly increased. Over the past ten years, the Bay watershed experienced a 25% increase in the number of family forest owners. The average size of family ownerships decreased by 24% over the same time period so that today almost 70% of family forest owners hold less than 10 acres.

A significant portion of forestland—almost a third of family-owned forest acreage in the Bay watershed—is expected to be sold, converted to another land use, or passed on to heirs in the next five years.<sup>5</sup> Furthermore,

the Bay watershed will soon face the largest intergenerational transfer of family-owned forest in the region's history. Aging landowners—more than 70% are older than 55—will transfer a substantial proportion of Chesapeake forests to new owners and heirs.

There is also uncertainty that the next generation of family forest owners will be active managers of their land, increasing the risk that forests will be sold or forest health issues will go unmanaged. The owners of the “next forest” are more likely to:

- Have livelihoods less connected with the land
- Not be raised on, live near, or likely to live on their family forestland in the future
- Lack prior involvement in the management of family forestland and largely do not wish to be involved now
- Lack the knowledge to manage the land, but want to own the land in order to derive income from it.<sup>6</sup>



# FUTURE FOREST HEALTH AND HABITAT

## IMPORTANT FOREST HABITATS ARE LOST TO DEVELOPMENT

The “next forest” will still be significant in size and distribution. However, based on current development trends, 45% of the Bay watershed’s network of forests and wetlands is vulnerable to future development.<sup>7</sup> Many of these threatened forests are large, high-quality tracts that are not under public ownership or otherwise protected, especially along the western shore of the Bay and the areas surrounding Richmond and Fredericksburg, Virginia.

Over 50 imperiled plant and animal species are threatened by current development patterns in the metropolitan areas of Baltimore, Maryland; Washington, D.C.; Richmond, Virginia; and Virginia Beach, Virginia alone.<sup>8</sup> An analysis of the Mid-Atlantic region found that 8% of counties that contain sensitive ecological resources are in the path of future land use change.<sup>9</sup>

## GROWING NUMBERS OF FOREST PESTS CHANGE THE COMPOSITION OF FORESTS

Over the next 15 years, 17% of Chesapeake forests will be at a high risk to mortality from known pests and pathogens like the gypsy moth, beech bark disease, and hemlock wooly adelgid.<sup>10</sup> What is more alarming is the unknown number of new pests that will enter the region. These emerging threats include the:

- Emerald ash borer: Over 470 million ash trees in the Bay watershed are at risk to mortality from the emerald ash borer.

**INTERPRETATION:** Based on current development trends, 45% of the Bay watershed’s network of forests and wetlands is vulnerable to future development. Many of these threatened forests are large, high-quality tracts that are under private ownership and are not protected. Forestland was considered vulnerable if at a “moderate” or “high” risk to development. For the complete methodology, see <http://www.chesapeakebay.net/land.htm>.

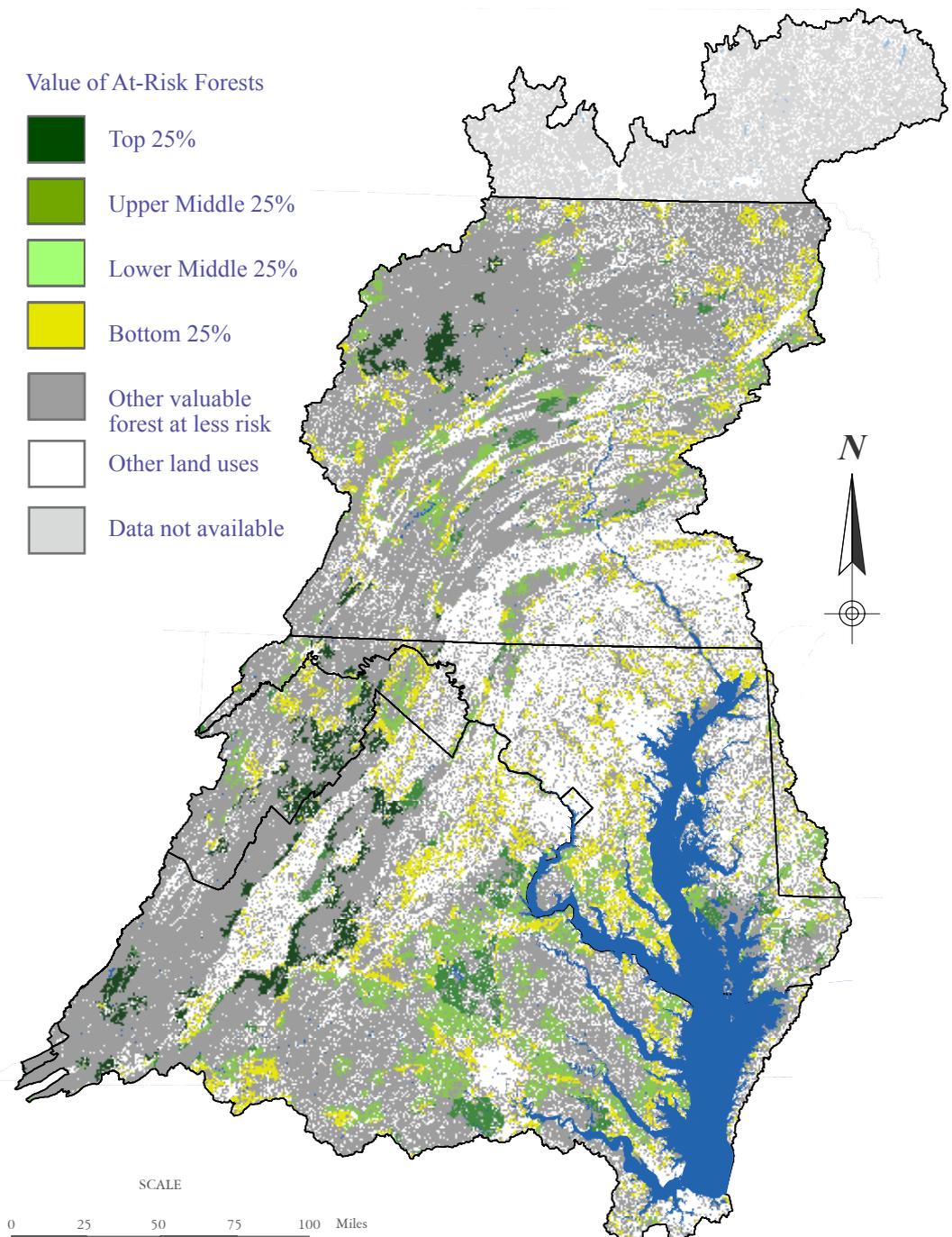
SOURCE: Chesapeake Bay Program 2005

- Sudden oak death: Though not currently known to affect eastern forests, sudden oak death is expected to spread to this area. The fungus-like organism has been found in 18 states since 2000, including Maryland, and affects many plants other than oak trees.<sup>11</sup>
- Asian longhorned beetle: This beetle will threaten many Chesapeake hardwood species including maple, birch, poplar, and sycamore with mortality in the future. Approximately 70% of trees in Pennsylvania and more



## ECOLOGICALLY VALUABLE FORESTLAND VULNERABLE TO DEVELOPMENT

### RESOURCE LANDS ASSESSMENT



than 50% in West Virginia are at risk to infestation.<sup>12</sup> If the beetle causes a die-off in the 47% of susceptible tree species that are in Baltimore, Maryland, the total compensatory value could reach more than \$1 billion.<sup>13</sup>

More than 70% of the forests at high risk to mortality exist on private land.<sup>10</sup> Because families own the majority of private forestland, they are best able to provide early detection and control. However, most family forest owners are not interested in or knowledgeable about forest pests and management. As development spreads across the Bay watershed, roads, suburban gardens, and other avenues will be created that allow invasive pests and plants to increase their presence in Chesapeake forests.

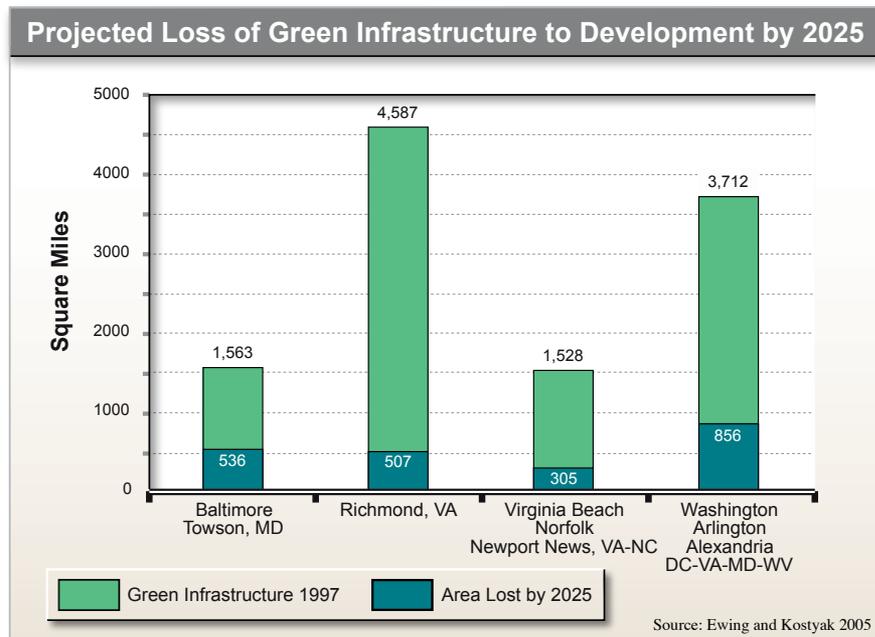
### Overabundant Deer Populations Change Biodiversity

By selectively feeding on certain plants, deer overbrowsing can change forest composition. Shifts in forest plant communities, in turn, affect wildlife species that depend on this vegetation for food and shelter. Continued overbrowsing in the northern Chesapeake forests could produce near monocultures of black cherry with remnants of red maple, American beech, and striped maple. Understories in old and second-growth stands could consist of primarily ferns, mosses, grasses, and seedlings of American beech, striped maple, and black cherry which are resistant to deer browse.

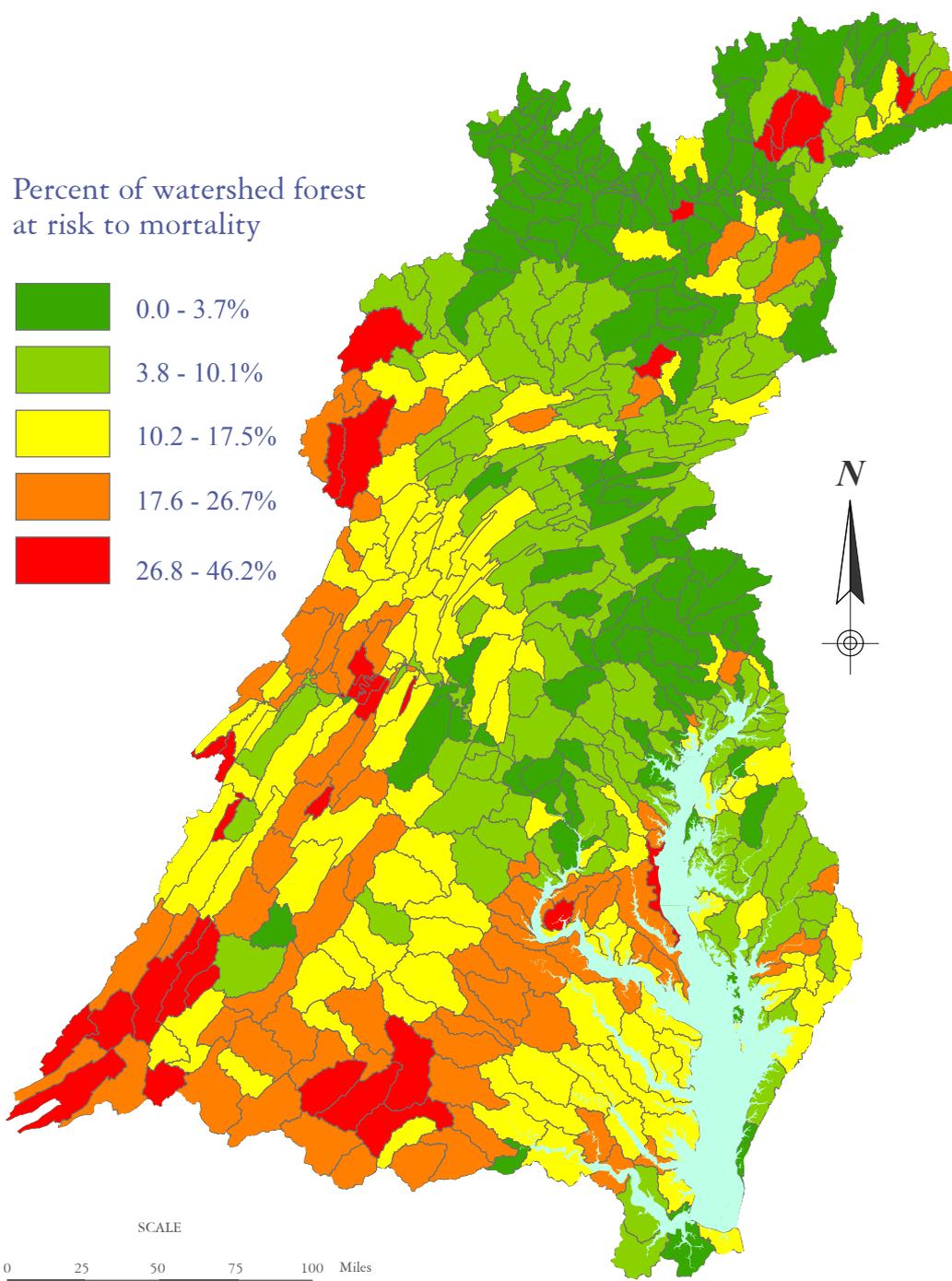
Regeneration of oak trees has been particularly affected by deer. Mixed oak forests with high deer densities and lack of natural fire events are often replaced by ferns, mountain laurel, rosebay rhododendron, flowering dogwood, sassafras, sweet birch, black gum, red maple, or yellow poplar.<sup>14</sup> In Pennsylvania, a more homogenous forest dominated by red maple and sweet birch is slowly replacing the once expansive and diverse oak forests.<sup>15,16</sup>

**INTERPRETATION:** Over the next 15 years, 17% of Chesapeake Forests will be at a high risk of mortality from pests and pathogens like the gypsy moth, beech bark disease and hemlock woolly adelgid. Forestland is considered at risk if 25% or more of trees can be expected to die over the next 15 years.

SOURCE: USDA Forest Service 2002



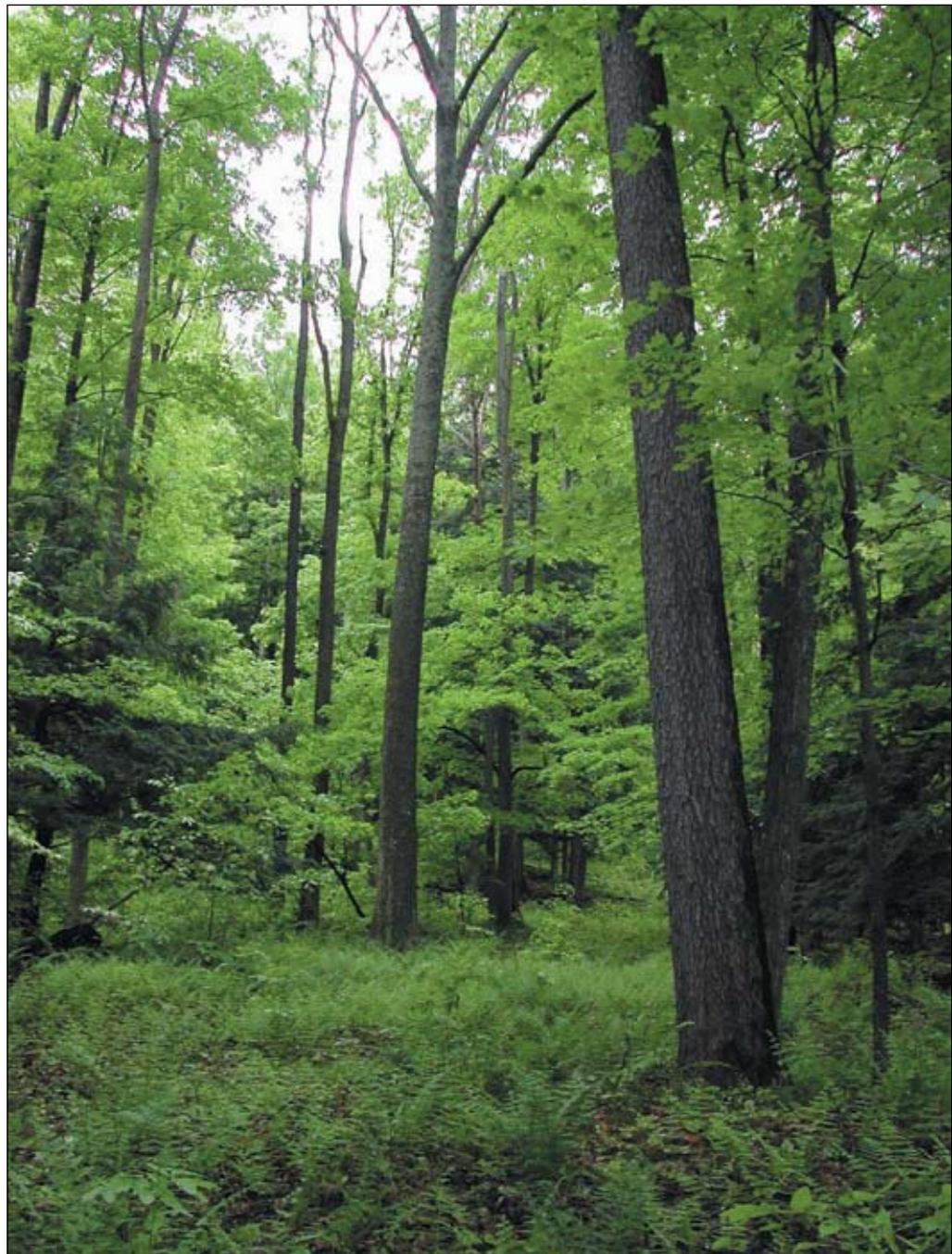
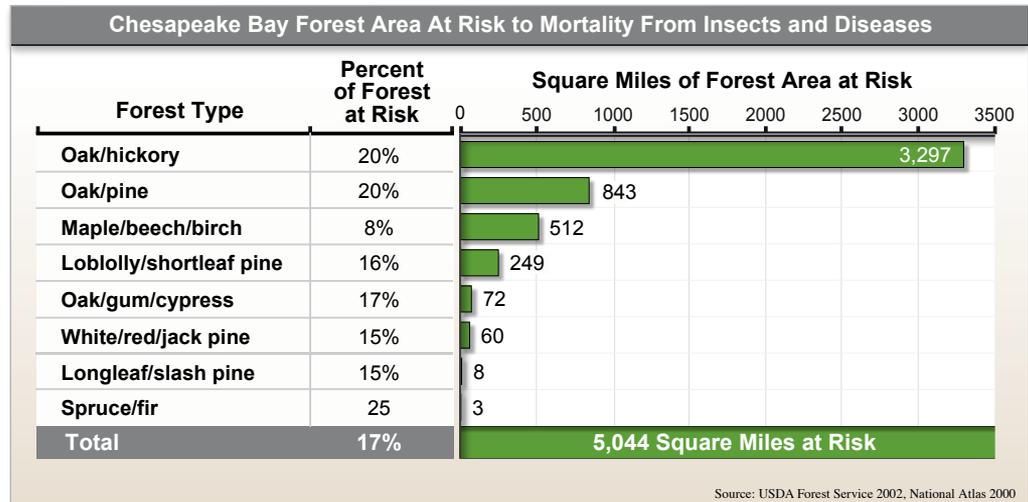
## WATERSHEDS AT RISK OF MORTALITY FROM INSECTS AND DISEASE



Densities greater than 20 deer per square mile restrict regeneration and diversity of woody vegetation.<sup>17</sup> Densities of even 10 deer per square mile can limit the full regeneration of forest understories.<sup>18,19</sup> Even with strong limitations on deer browsing, many forests may not return to their native conditions because of the introduction of problems like tree diseases, insect infestations, and invasive plants.<sup>15</sup>

Nowhere in the Bay watershed are the effects of deer overbrowsing more evident than in Pennsylvania. More than 50% of all forests lack sufficient numbers of seedlings and saplings to replace the existing forest with a similar tree composition. If deer control is not increased, more than 60% of desirable timber species will not be available to the Pennsylvania timber industry in the future.<sup>20</sup>

While Pennsylvania provides an example of the potential effects of overbrowsing, forests throughout of the Bay watershed have been impacted in similar ways. For example, a recent study of forests in Baltimore County, Maryland, found that they had virtually lost their natural ability to regenerate because of overbrowsing by white-tailed deer.<sup>21</sup> County officials have determined that managing the deer population is critical to protecting the forests that, in turn, protect the region's drinking water supplies.<sup>22</sup>



Lack of understory due to overbrowsing by deer.

Photo: Will McWilliams

# FUTURE FOREST FUNCTIONS



## BAY AND RIVER WATER QUALITY DECLINES BECAUSE OF FOREST LOSS

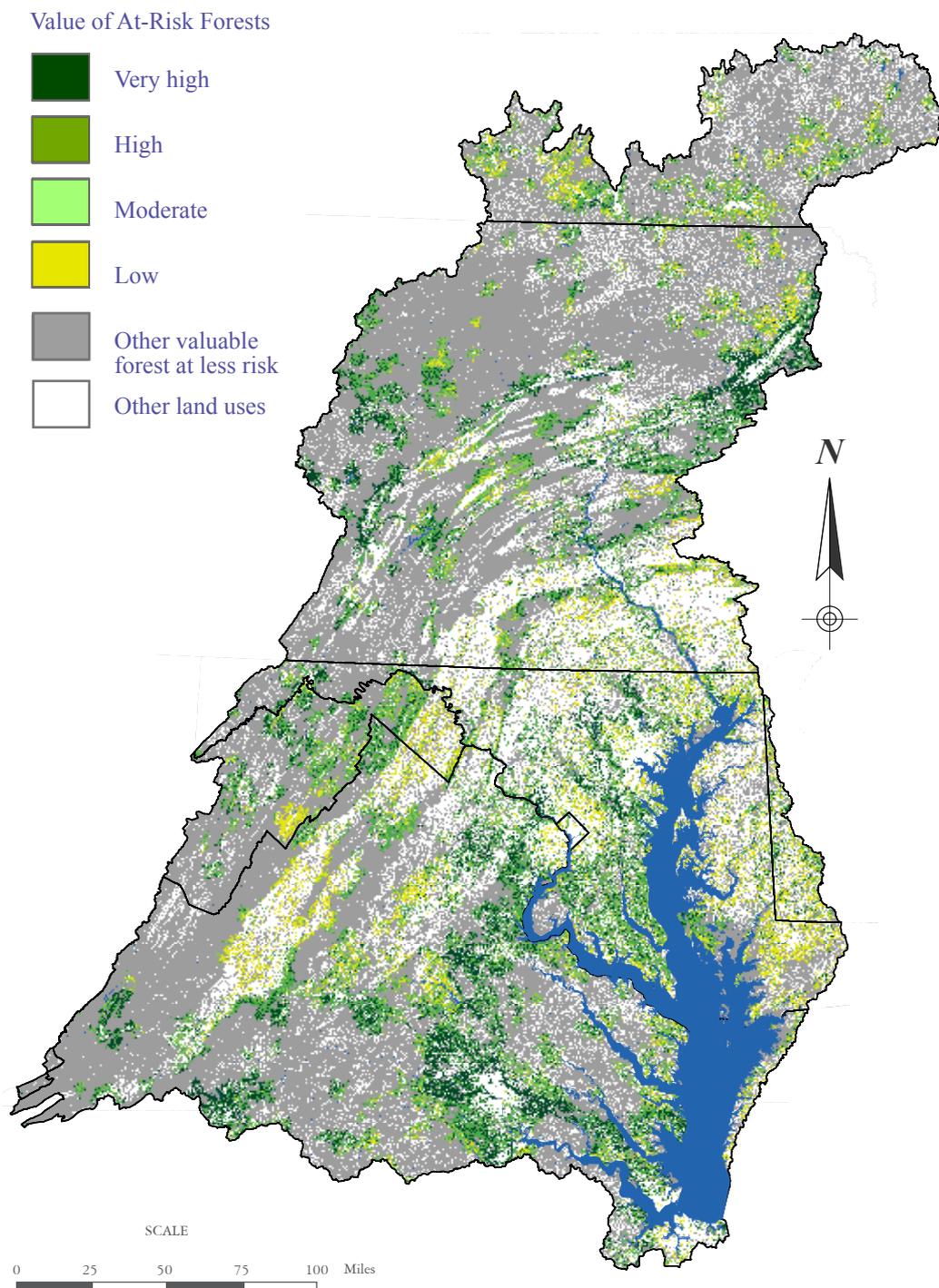
Based on current development patterns, 31% of the forests that are most valuable for water quality protection are threatened by development.<sup>7</sup> The loss of these forests will compromise or degrade water quality and watershed functions and our ability to protect the Bay. A loss in forest cover of as little as 10% can increase nitrogen loss to water by 40%. Conversely, a gain in forest cover can improve water quality.<sup>23</sup> The majority of vulnerable and highly valuable forestland, including riparian buffers, occurs in the heavily settled Coastal Plain. This is significant because forest loss and fragmentation near the Bay and its tributary rivers can have a proportionately greater impact than similar trends farther away.

Threats from development are not confined to metropolitan areas, however. Forest loss and fragmentation in headwater regions also will degrade drinking water sources and aquatic habitat.

## MORE NITROGEN FROM AIR POLLUTION REACHES THE BAY

If current efforts to control power plant and automobile emissions are unable to decrease the rate of atmospheric deposition of nitrogen in the Bay watershed, nitrogen loss from forests to streams could increase by 200%. If the rate were stabilized at current levels, nitrogen retention rates would still decline over time as some Chesapeake forests become nitrogen saturated. Under current trends the nitrogen loss to streams would increase by more than 30% by 2050 making it harder to reach water quality goals.<sup>24</sup>

## VULNERABILITY OF FORESTS IMPORTANT TO WATER QUALITY RESOURCE LANDS ASSESSMENT



**INTERPRETATION:** Based on current development patterns, 31% of the forests with the highest value for water quality protection are threatened by development. The loss of these forests will severely degrade water quality and watershed functions. The relative importance of forests to water quality was determined by grouping forest with similar values into four categories from “very high” to “low.” The most important forests at risk were in the top two water quality categories and were at a “moderate” or “high” risk to development. For the complete methodology, see <http://www.chesapeakebay.net/land.htm>.

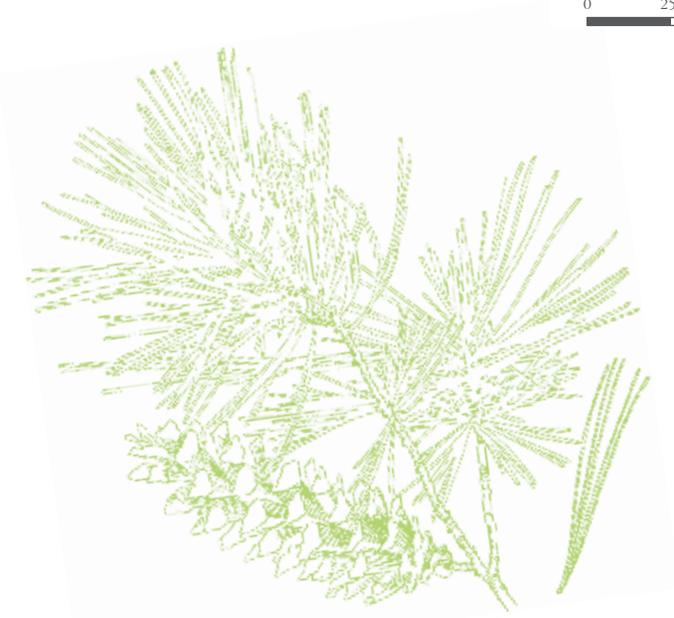
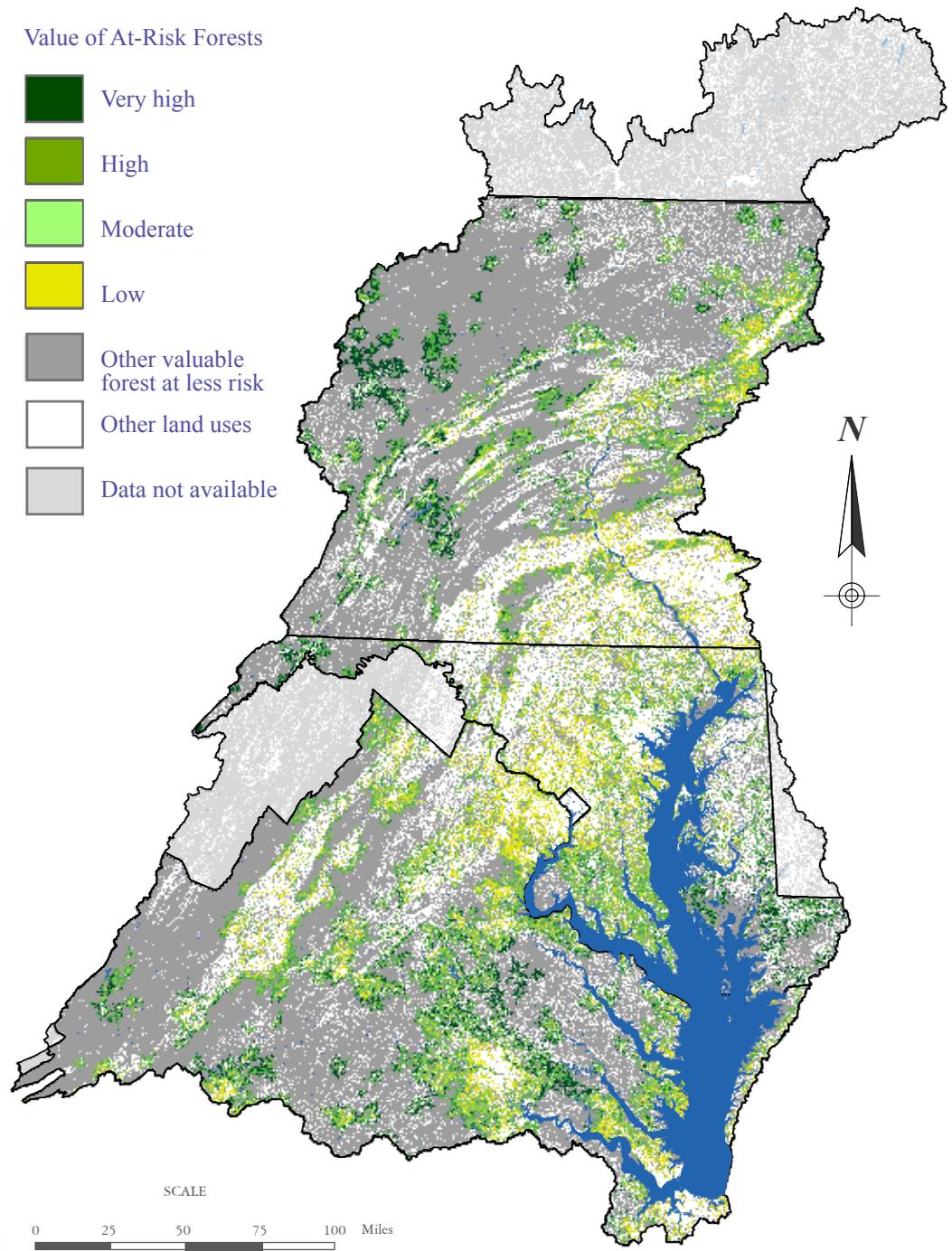
## DECREASED POTENTIAL FOR FOREST HARVESTING IN DEVELOPING AREAS

Based on current development patterns, 22% of forestland that currently supports the forest products industry—or has the potential to—is vulnerable to development.<sup>7</sup> These at-risk forests can be found throughout the Bay watershed, but the loss of forests in northwest Pennsylvania, along Maryland’s Eastern Shore, and between Washington, D.C., and Richmond, Virginia, would threaten valuable sources of local jobs and income. In Virginia, nearly 20% of all forests are considered incompatible with forest management because of their proximity to population centers. The commonwealth is approaching the point where demand for forest products will outpace the rate at which timber can be grown on available land.<sup>25</sup>

**INTERPRETATION:** Based on current development patterns, 22% of forestland that currently supports the forest products industry—or has the potential to—is vulnerable to development. The loss of these forests would diminish the constant supply and free source of ecological services like water and air quality protection and threaten valuable sources of jobs and income. The relative importance of forests to state economies was determined by grouping forest with similar values into four categories from “very high” to “low.” The most important forests at risk were in the top two economic value categories and were at a “moderate” or “high” risk to development. For the complete methodology, see <http://www.chesapeakebay.net/land.htm>.

**SOURCE:** Chesapeake Bay Program 2005

## ECONOMICALLY VALUABLE FORESTLAND VULNERABLE TO DEVELOPMENT RESOURCE LANDS ASSESSMENT



## ALTERED FOREST COMMUNITIES DUE TO CLIMATE CHANGE

Evidence is mounting that climate change will affect Chesapeake forests.<sup>26</sup> Despite the inability to make specific predictions, it is clear that higher temperatures and altered precipitation regimes will change forest composition and function and the benefits that forests provide to Bay watershed residents. Over the next 30 years, potential impacts include:

- Northward migration of forest types—loss of maple/beech/birch, and the expansion of oak/hickory and loblolly/shortleaf pine
- Enhanced activity of insects and diseases
- Increased incidence of fire and drought
- Extension of growing season, though net growth may not change due to increased respiration<sup>1,27</sup>

It is unlikely that climate change will drastically alter the overall environmental services provided by forests; more likely are gradual changes driven by new environmental conditions. This shift will change the abundance of many plant and animal species, altering the ecological composition of forests.



Photo: Ted Weber

*Submerged Pine Forest*

