HOCKING HILLS HEALTHY WOODLANDS

A Plan for the Woodlands

2f ű́he Hocking Hills

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INTRODUCTION

This plan is designed to be a broad-scale woodland management plan to benefit the landowners in the Hocking Hills area, with a focus on small parcel woodland owners (2-10 acres) and woodland cabin owners who provide lodging (e.g. rental cabins, cottages, bed & breakfasts). This plan has been developed with the help of local woodland owners, local partners, and natural resource professionals. It is a collaborative effort to maintain functioning woodlands and to positively address issues and concerns stemming from the loss or fragmentation of the area's forest. The first sections of the plan set the stage with a general overview of the benefits and services provided by trees, woodlands, and the greater forest followed by a basic description of forest fragmentation. Next are several sections that describe the plan area ending with a description of the area's top woodland issues and concerns. Finally, the plan's goals and objectives are laid out followed by an outline for implementation. Additional supporting information is found in the appendices.

Woodland Benefits & Services

Environmental Benefits & Services Trees Provide—Trees are vital for much of life on earth. Trees purify the air by removing carbon dioxide and releasing oxygen, protect freshwater supplies by stabilizing the soil and preventing erosion, and moderate the earth's climate by blocking winds, providing shade, and by reducing floods through intercepting rainfall and absorbing water. Many wildlife species depend upon trees and woodlands to provide food and habitat. Trees produce nuts, berries, and leafy herbaceous materials that are consumed by a variety of omnivores and herbivores. Woodlands also provide wildlife with shelter and cover from natural predators, which is critical for successfully breeding. For example, bats, birds, squirrels, and other small mammals often nest in tree branches and tree cavities, while other birds like ruffed grouse depend upon thick stands of young woodland regrowth for nesting habitat and protection from predators.

Human/Social Services Trees Provide—Trees and woodlands have a positive effect on the human psyche. These benefits are hard to measure but there are several studies that show this relationship. One study showed that simply having a window view of trees will help shorten a hospital patient's recovery time (Ulrich 1984). Another study showed that trees may mitigate psychological precursors to crime, such as irritability, inattentiveness, and impulsive behavior (Kuo & Sullivan 2001). Trees can even positively affect our driving according to Cackowsky & Nasar (2003); tree lined streets have a calming effect on drivers, and this is known to slow down traffic (Wolf 2005). In addition, we know that forests provide opportunities for a variety of recreational pastimes such as hiking, bird watching, camping, fishing, and hunting. These activities have indirect effects that raise our quality of life, like keeping us active and reducing stress. Finally, woodlands are aesthetically pleasing and this improves everyone's quality of life. A world without trees is hard to imagine.

Economic Benefits & Services Trees Provide—There are numerous economic benefits gained from trees. Trees reduce home energy costs by providing shade in the summer and breaking the wind in the winter. According to the National Arbor Day Foundation, "the net cooling effect of a young, healthy tree is equivalent to ten room size air conditioners operating 20 hours a day". Trees also increase the value of a home or property. "Healthy, mature trees add an average of 10 percent to a property's value" (www.arborday.org/trees/benefits.cfm). At the community level, woodlands provide economic benefits by cumulatively reducing energy demands and thus reducing the amount of power plants and power infrastructure needed. They also prolong the life of the paved surfaces. McPherson and Simpson (1999) reported that pavement under full sun needed to be restored every 7 to 10 years, but restoration of pavement under dense shade may be deferred to every 20 to 25 years. Trees reduce the amount of stormwater that a community has to contain or treat and reduce the frequency of flooding by intercepting rainfall, taking up water, and slowing water movement.

Finally, woodlands that are managed wisely and sustainably can provide people with renewable materials. Woodlands provide us with wood for a variety of products such as lumber for homes, furniture, picture frames, handles, musical instruments, paper, and fuel for electricity. Woodlands also provide us with maple syrup, fruits, nuts, mushrooms, and a variety of herbs. We can ensure these materials do not run out by being good stewards of our woodlands.

Urban Development & Forest Fragmentation

Urban areas across the United States have been expanding into the surrounding rural areas at a high rate for several decades. This growth has generally been low density development that occupies large amounts of what once was rural land. This pattern of growth alters large amounts of land including woodlands and leaves the remaining forests fragmented and degraded. The result is what many refer to as urban sprawl. One factor influencing this growth pattern is people's desire to enjoy the amenities of urban life yet be close to nature. This transition zone between urban and rural areas is called the rural-urban interface.

In Ohio, from 1990—2000, the area classified as rural-urban interface increased by 15.3%. In the year 2000, an estimated 16.1% of Ohio's land area was classified as rural-urban interface (Figure 10, Appendix I). In the rural urban interface, forests become fragmented in terms of ownership and geographic location. Forest fragmentation leads to decreases in forest benefits and services such as water quality, wildlife habitat, woodland products, and biodiversity, while leading to increases in woodland threats, like invasive plants and pests. Also increased parcelization, or fragmented ownership of the land, has resulted in a mixture of land uses with a variety of management goals. The goal of this plan is to maintain functioning forests and the benefits they provide by supporting coordinated management of woodlands in the rural-urban interface.

PLAN AREA

Area Description

This plan was developed for a broad area of woodlands located in the Hocking Hills region and a portion of the U.S. 33 corridor in southeast Ohio. This area is known throughout the state for its unique combination of rocky gorges, cliffs, waterfalls, caves and hemlock trees. The largest concentration of native hemlock stands in the state of Ohio is found in the Hocking Hills. These unique features make the Hocking Hills area not only pleasing to the eye but also essential habitat for a variety of wildlife species. The plan area covers much of the Hocking Hills area consisting of six townships in Hocking County along with Berne Township in Fairfield County. The plan covers approximately 149,883 acres of land. The urban areas, townships and watersheds included in the plan area are listed in Table 1.

Table 1. Features Within The Plan Area

Urban Areas	Townships/County	Sub-Watersheds/Watersheds
Lancaster (borders the plan area)	Berne Township Fairfield County	Clear Creek Hocking River
Logan	Benton Township Hocking County	Duck Creek Hocking River
Sugar Grove	Falls Township Hocking County	Headwaters Hocking River
	Falls--Gore Township Hocking County Township,	Monday Creek Hocking River
	Good Hope Township Hocking County	Rush Creek Hocking River
	Green Township Hocking County	Scott Creek Hocking River
	Laurel Township Hocking County	Headwaters Raccoon Creek
		Headwaters Salt Creek Scioto River
		Pike Run Salt Creek Scioto River

Area Selection

This area was chosen for several reasons. Hocking and Fairfield Counties are part of a 17 county focus area identified in Ohio for having significant areas of state designated priority forests and significant amounts of rural-urban interface. The Hocking Hills region has many valuable woodlands and unique wildlife communities that are under pressure from land use conversion and further fragmentation. There are protected woodlands in the area that could serve as an anchor for an area-wide woodland plan. And because the Hocking Hills region and U.S. 33 corridor was identified for plan development by natural resource professionals and partners in southeast Ohio at a meeting to identify local sites and steer development of a broad-area woodland management plan.

Area Map

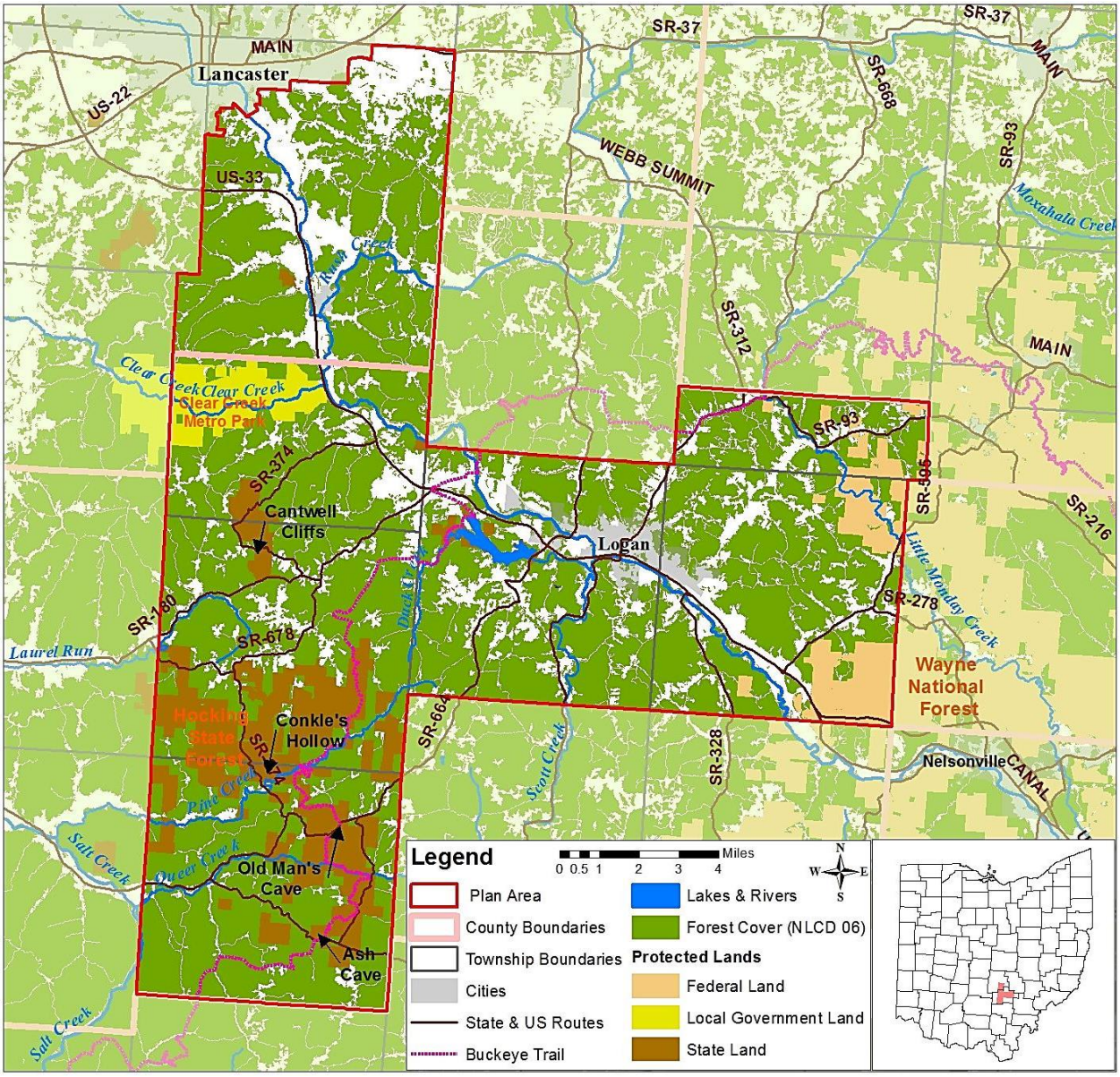

Figure 1. Hocking Hills Woodland Plan Area (ODNR-Forestry)

Features & Facts

The plan area has numerous rock outcrops, cliffs, caves, waterfalls, deep gorges, and unique forests including Ash Cave, Cantwell Cliffs, Conkle's Hollow, and Old Man's Cave (Figure 1) which are popular sites within Hocking Hills State Park and Hocking State Forest. The plan area also includes a significant portion of the Wayne National Forest. A variety of recreational opportunities exist including the Buckeye Trail which passes through the middle of the plan area (Figure 1). Also, the plan area has an impressive collection of parks and nature preserves (Table 2). Many of these parks and preserves are accessible to the public but some of them

have restricted entry. The popularity of the region has also spurred a growing number of cabins, cottages, campgrounds, and bed & breakfasts in the area.

Table 2. Hocking Hills Woodland Plan, Parks and Preserves	
Owner	**Parks and Preserves**
Appalachia Ohio Alliance	• Bison Hollow • Kleinmaier Preserve
City of Columbus	• Clear Creek Metro Park
City of Lancaster	• Charles F Alley Memorial Park Municipal Park
City of Logan	• Kachelmacher Park • Mingo Park • Old Town Creek Preserve
Crane Hollow, Inc.	• Crane Hollow Preserve
Hocking County Soil and Water Conservation District	• Bishop Educational Gardens
Ohio Department of Natural Resources	• Conkle's Hollow Preserve • Hocking State Forest • Hocking Hills State Park • Lake Logan State Park • Little Rocky Hollow Preserve • Rhododendron Cove Preserve • Rockbridge Preserve • Saltpetre Cave Preserve • Sheick Hollow Preserve • Wahkeena Preserve
U.S. Department of Agriculture Forest Service	• Wayne National Forest

History & Heritage

It is believed that the first humans visited the Hocking Hills region around 10,000 years ago at the close of the last ice age when nomadic hunters are believed to have frequented the state. Fluted projectile points from that era have been found in adjacent Ross County. Evidence suggests that the Adena culture (moundbuilders), who lived in Ohio from about 1 A.D. to 800 A.D., and then the Fort Ancient Native Americans, who lived in Ohio from the 1300s to the 1600s, used the area's rock overhangs for shelter.

By the mid-1700s this area was home to the Wyandot tribe whose village of Oldtown was situated along the banks of the Hocking River near present-day Logan. The Delaware and Shawnee nations also frequented this area. The Delaware nation named the Hocking River the Hockhocking, which means "bottle river", based off the bottle shape of the river north of Lancaster where the river rushed down a narrow gorge, over a waterfall, into a wide channel.

European pioneers did not permanently settle this region until the late 1790s. The formation of the Northwest Territories (1787) followed by the Treaty of Greenville (1795) between Native American tribes and the United States, cleared the way for European settlement. The first Europeans in the area found a nearly 100 percent forested landscape. It is estimated that 95% of Ohio was forested before it was settled (forestry.ohiodnr.gov/history). The settlers also had an abundance of game for food including deer, elk, wild turkey, bear, and even the occasional wood bison along the flat river bottoms. The last local bison was reportedly killed along the banks of Queer Creek in 1799.

The abundance of natural resources found in the area encouraged more settlement and Hocking became a county in 1818 with more than 2,000 residents by 1820. In 1840, the Hocking Canal was completed which encouraged further settlement. Hocking County was also on the edge of the great charcoal iron furnace district known as the Hanging Rock region. In the early 1850's two charcoal iron furnaces were built in Hocking County to extract the iron ore from the region's sandstone. The iron produced was used for farm implements as well as ammunition and cannons used by the Union Army during the Civil War. To fuel the charcoal iron furnaces vast stands of timber in the area were cut down to make charcoal. Eventually coal beds were discovered in the area, especially in eastern Hocking County, providing additional prosperity to the region.

By the late 1860s the cave and park regions started to became popular for picnicking and hiking but poor roads kept it almost an exclusively local attraction. However, these areas were threatened as more and more settlers arrived to the region and continued to clear forest lands for settlements, agriculture, timber, paper, and energy. Accessibility began to improve in the area and by the early 1900's the majority of the region's forest lands had been cleared. However during the early 1900's the area also saw the close of the last iron furnaces and desertion of many farms due to drought, depleted soils, and the Great Depression. Census records show a 40 percent drop in the population of the area between 1900 and 1930 (USDA Forest Service 2004), and this opened the door for reforestation.

During the early 1900's only 10 percent of Ohio's land remained forested; however since then, Ohio's forests have increased to about 33 percent of land in the state. The regrowth of forests in Ohio was fueled by several actions and started in 1916 when the Ohio Division of Forestry began purchasing and reforesting land, reforestation work continued during the Great Depression when the Civilian Conservation Corps planted millions of trees, and was also aided by the abandonment of many acres of unproductive agricultural lands that have naturally reverted back to woodlands (forestry.ohiodnr.gov/history). This general trend also occurred in the Hocking Hills area. Presently, forests cover approximately 75 percent of the land within the plan area (using National Land Cover Database (NLCD), Fry et al. 2011). In 1924 the state purchased its first parcel of land in the Hocking Hills which included Old Man's Cave. Additional acreage was purchased throughout the 1920s, and thanks to the Works Progress Administration (WPA) many improvements were made during the 1930s including trails, stone

steps, bridges, roads, and tunnels many of which can still be seen today. (www.hockinghills.com/area.htm) (Hocking Hills State Park Natural Resource Mgmt. Plan, 2009)

Social Conditions

I. Demographics – Within the plan area, there are approximately 23,448 residents (5,088 in Berne Twp., Fairfield Co.) and 10,427 housing units (2,042 in Berne Twp., Fairfield Co.). This information is based on 2010 Census Data for blocks within the plan area; the Census Block boundaries fall along township & county lines with only slight deviations. Figure 2 shows housing densities within individual 2010 Census blocks. More detailed information on the area's demographics can be found in Appendix III.

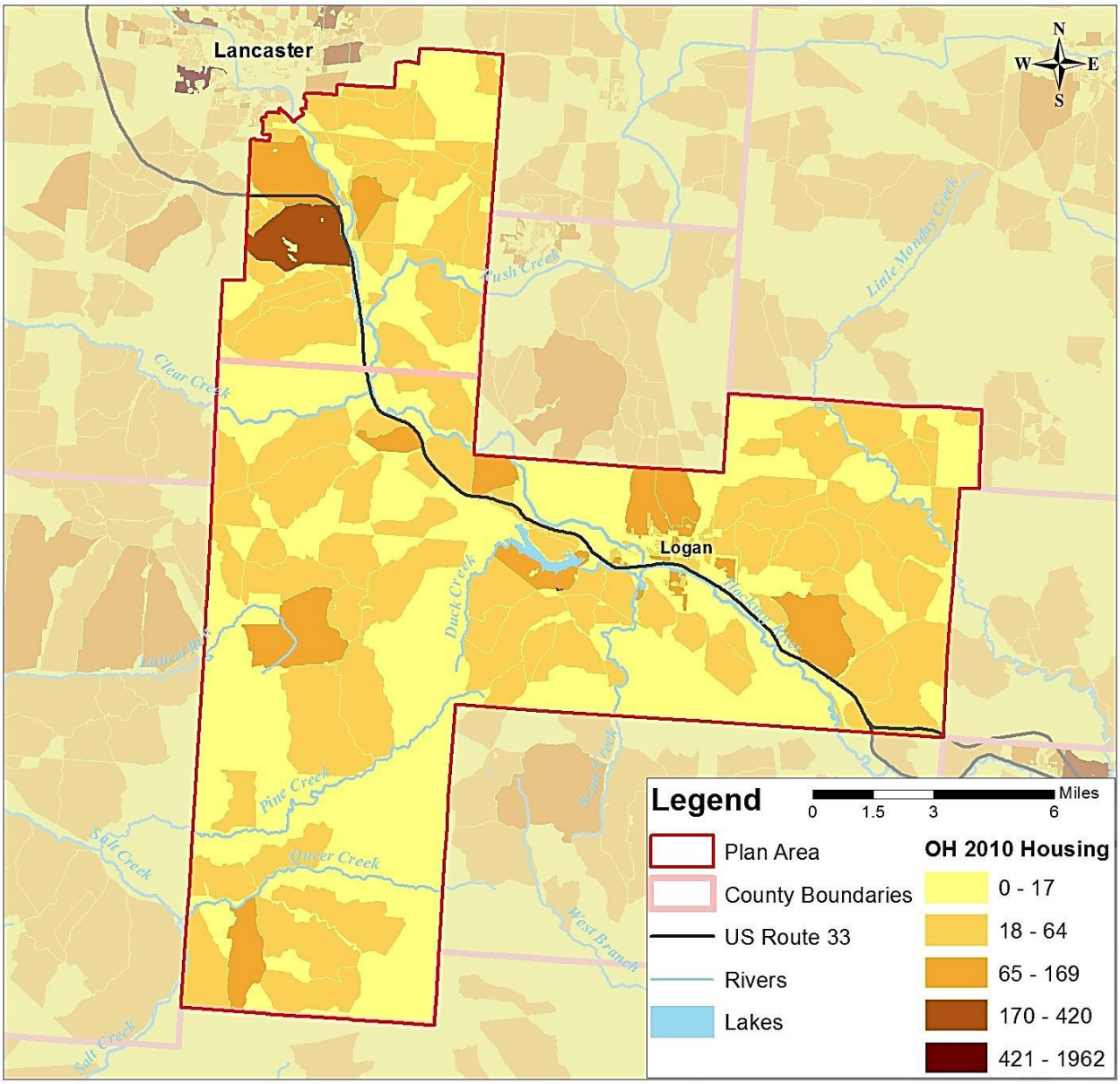

Figure 2. Housing Density Per Census Block (2010 U.S. Census Data)

II. Land Ownership Characteristics – The majority of land within the plan area is privately owned. There is about 22,862 acres of land (or 15.3%) that is publically owned. Figure 3 shows the percentage breakdown of ownership types (Fairfield County GIS Department & Hocking County Mapping Department). See Appendix III for a breakdown of the area's protected lands by ownership/type (Figure 13) and for a breakdown of parcels by size category (Figure 14).

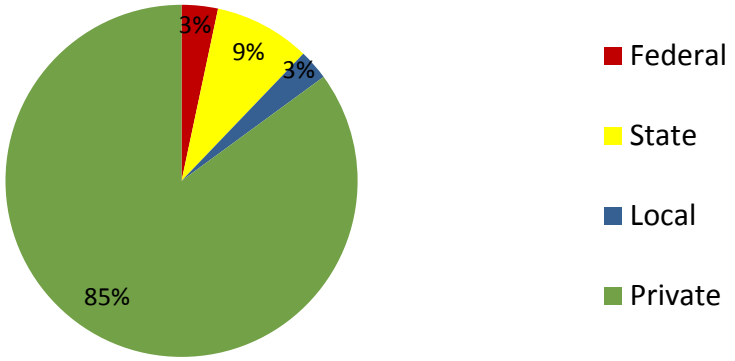

Figure 3. Land Ownership

III. Landowner Interests & Objectives – Information was found on local landowner interests and objectives from public meetings held in each township during the spring of 2003 for the development of the Hocking County Comprehensive Plan (2007). Attendees were asked their opinion about concerns and issues that affected them. Some of the top issues and concerns were flooding, ground water protection, landowner rights, land use, property taxes, scenic beauty protection, tax-exempt land, timber harvests, and zoning. Table 8 in Appendix III summarizes the top concerns mentioned during public meetings held in Benton, Falls, Good Hope, Green, and Laurel townships.

IV. On a broader scale the U.S. Forest Service's National Woodland Owner Survey (NWOS), found that woodland owners in southeastern Ohio (17 counties) with 10 acres or more of land listed beauty, biodiversity, hunting, privacy, recreation, timber, and keeping the land intact for heirs as top reasons for owning woodlands (www.engaginglandowners.org/new-landowner-research/sffi-landowner-types). Additional information from the NWOS on statewide landowner attitudes and objectives can be found in Figures 27 and 28 in Appendix III.

In order to better understand the local interests and objectives of small parcel woodland owners and woodland cabin owners and to develop the goals and objectives of this plan, we invited local landowners to give us feedback by attending a public landowner meeting and/or filling out a woodland owner survey. The survey and meeting were advertised on our website, in several partner newsletters, with a news release, with a public television interview, and by mailing targeted post card invitations. The feedback from the meeting and survey indicated that landowners in the Hocking Hills value their woodlands most for wildlife, privacy/aesthetics, recreation, supporting woodland conservation, and sustaining biodiversity and native plant communities. The most common concerns related to woods were invasive woodland insect

pests and diseases, conversion of woodlands (land use change), invasive plants, poor woodland management, and soil erosion/water pollution (Table 3). A more detailed summary of results from the meeting and survey can be found in Table 7 and Figures 15-26 in Appendix III.

Table 3. Hocking Hills Area Woodland Owner Feedback	
Top 5 reasons landowners value their woods: (combined results from meeting and woodland survey)	(1) Wildlife, (2) Privacy & aesthetics, (3) Recreation, (4) Supporting woodland conservation, (5) Sustaining biodiversity with native plant communities
Top 5 concerns that landowners have in regards to their woods: (combined results from meeting and woodland survey)	(1) Invasive insect pests & diseases, (2) Land use change & land use planning, (3) Invasive plants, (4) Poor woodland management, (5) Water pollution/soil erosion
Top 5 things this plan should focus on: (results only from meeting, this question wasn't asked in the survey)	(1) Landowner assistance/education, (2) Maintaining healthy woodlands, (3) Woodland protection (tied for 3rd), (3) Rare species protection (tied for 3rd), (3) Riparian protection (tied for 3rd), (3) Invasive plant control (tied for 3rd)

Economic Conditions

In the Hocking Hills area the economy has been shifting towards a more service-based economy. Increased exposure of the area's abundant natural resources, recreational opportunities, and scenic beauty has increased the tourism industry in this area, which is the second largest in the state (Appalachian Ohio, www.firstohio.com/main/histories.aspx?CoID=20). In 2011, tourists visiting Hocking County generated 115 million in business activity, 28 million in personal income, and 16 million in taxes, which supported 1 out of 7 salaried jobs in Hocking County (Tourism Economics). Hocking Hills State Park visitations have risen from 1.35 million/year in 2001 to over 3 million/year the last 3 years, 2010-2012 (Hocking Hills Tourism Association). At the same time manufacturing has been slowly declining over the years but still remains one of the largest employers in the area with longtime employers in the brick and refractory industries, automotive component suppliers, timber/hardwood processors, high-tech powder metallurgists, and others. The major agricultural commodity in the area is cattle. More detailed information on the region's economic conditions can be found in Appendix IV.

Biophysical Conditions

I. Land Cover – As a whole, the plan area is still predominately rural but land cover continues to change, especially near the cities of Lancaster and Logan. Based on 2006 National Land Cover Data (Fry et al. 2011), approximately 7.8% of the land in the plan area is developed, 75.6% is forested, 10.9% in pasture/hay, 3.8% is in crops, 0.7% in open water, 0.6% in grasslands/herbaceous cover, 0.5% in shrub cover, 0.1% in wetlands, and a negligible amount in barren lands (Figure 4). It should be noted that the plan area contains many gorges and ravines

which harbor unique mixes of northern and southern species. The area lies just south of the historic southern edge of the glacial ice sheets. Northern species that once inhabited this area, but have since migrated north with the retreat of the glaciers, now only remain in the cool moist micro-climates found within the area's gorges.

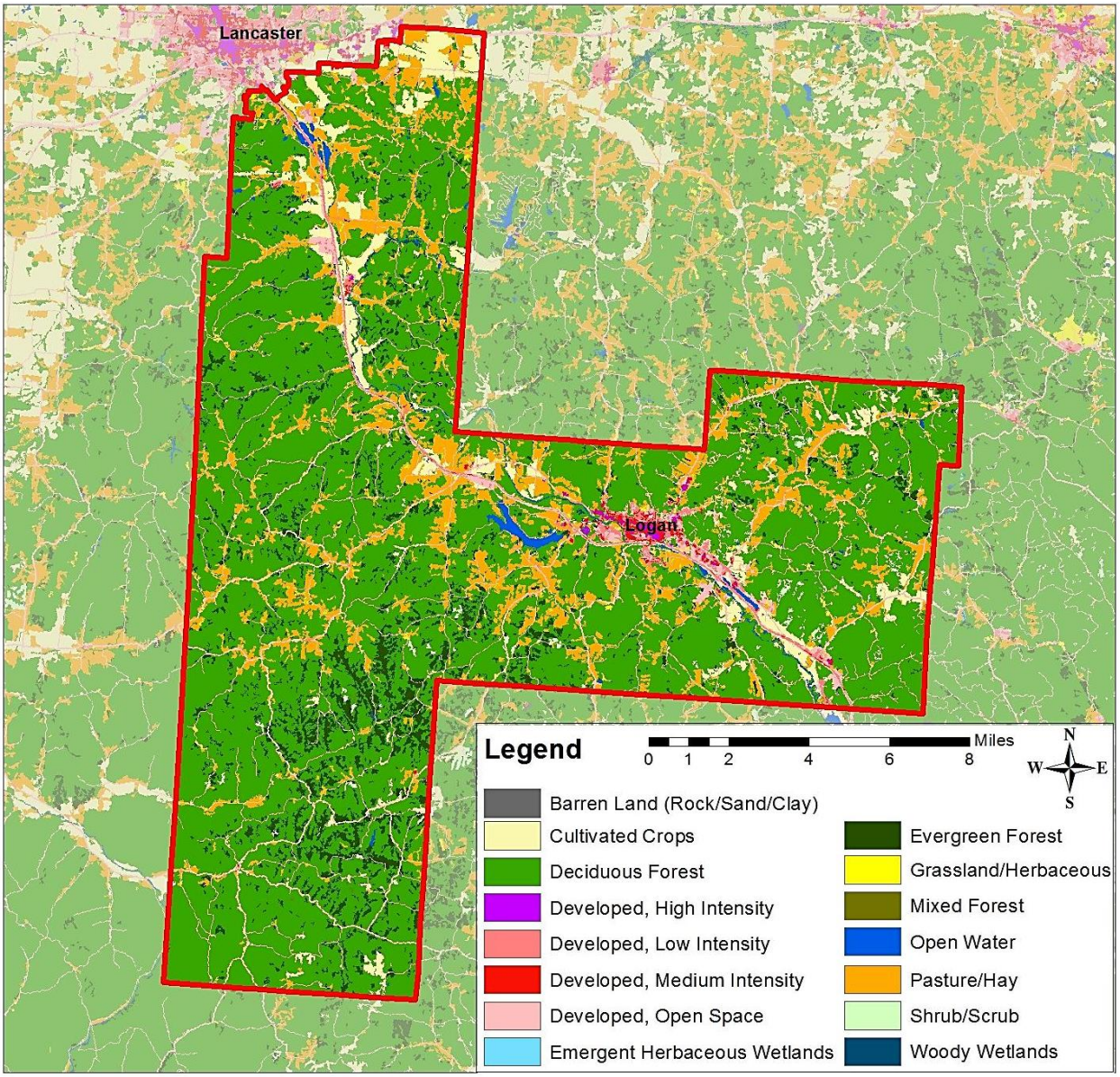

Figure 4. Land Use Map--Plan Area (NLCD 2006 data)

II. Forest Cover – In the plan area 32.3% of the forests are classified as Beech-Maple-Basswood Forest, 24% as Pine-Hemlock-Hardwood Forest, 22.6% as Allegheny-Cumberland Dry Oak Forest, 12.5% as Northeastern Interior Dry-Mesic Oak Forest, 3.5% as Eastern Floodplain Forest, 1.3% as Mixed Urban Forest (Developed), 1.3% as Ruderal Forest-Northern/Central Hardwoods & Conifers, 0.9% as Eastern Small Stream Riparian Forests, and the remaining 1.6% in a mix of other forest classifications (LANDFIRE 2008). Based off the forest vegetation description in Hocking State Forest brochure (forestry.ohiodnr.gov/Portals/forestry/PDFs/SF/hocking.pdf) black oak (*Quercus velutina*), chestnut oak (*Quercus prinus*), scarlet oak (*Quercus coccinea*), white oak

(*Quercus alba*), pitch pine (*Pinus rigida*), Virginia pine (*Pinus virginiana*), and sassafras (*Sassafras albidum*) are tree species likely to be found on the area's dry ridges and uplands. White ash (Fraxinus americana), American basswood (*Tilia americana*), American beech (*Fagus grandifolia*), black birch (*Betula lenta*), eastern hemlock (*Tsuga canadensis*), hickories (*Carya spp.*), red maple (*Acer rubrum*), sugar maple (*Acer saccharum*), northern red oak (*Quercus rubra*), and tulip tree (*Liriodendron tulipifera*) are tree species likely to be found in the gorges and riparian areas.

III. Wildlife – There are a wide variety of wildlife species found in the plan area. The woodland habitats support birds such as chickadees, eastern towhee, flycatchers, nuthatch, scarlet tanager, tufted titmouse, thrushes, warblers, woodpeckers, ruffed grouse, whip-poor-will, wild turkey, woodcock, barred owl, great horned owl, red-shouldered hawk, and sharp-shinned hawk. Many different mammals make their homes in the woodlands including bats, black bear, bobcat, coyote, opossum, raccoon, squirrel, weasel, and white-tailed deer. Also a variety of reptiles and amphibians inhabit woodlands such as the eastern box turtle, common garter snake, black rat snake, black racers, toads, tree frogs, and the inconspicuous red-backed salamander. In the more open areas and along the woodland edges fox, cottontail rabbit, skunk, woodchuck make their home. Birds found on the edges and open spaces include American robin, eastern bluebird, eastern kingbird, mourning dove, northern cardinal, sparrows, swallows, wrens, American kestrel, red-tailed hawk, Cooper's hawk, black vulture, and turkey vulture. Species that prefer habitat in and along the wetlands, ponds, and lakes include beaver, mink, muskrat, frogs, salamanders, snapping turtles, and water snakes. Waterfowl that spend their summers in the area including mallards, wood ducks, Canada geese and a variety of other species during the spring and fall migrations. Other birds prefer the wetland environments including heron, kingfishers, and redwing black birds. In the lakes and ponds there are largemouth bass, bluegill, crappie, catfish, muskie, northern pike, and saugeye. (ODNR DNAP, ODNR DOW, Crane Hollow 2012).

IV. High Priority Bird Species – The plan area provides valuable woodland habitat for a variety of bird species, including a number of priority species for conservation. The Ohio All-Bird Conservation Plan (Ohio Bird Conservation Initiative 2010; www.obcinet.org) designates high priority species for conservation based on population trends at regional and continental scales. Data from the Ohio Breeding Bird Atlas II (2006-2011) indicates that the plan area contains three highest priority species and five high priority species that depend upon woodland habitat. The highest priority species, or those requiring immediate conservation action and having high conservation threats and concern across their range, include cerulean warbler (*Setophaga cerulea*) worm-eating warbler (*Helmitheros vermivorus*) and wood thrush (*Hylocichla mustelina*). The cerulean warbler, also an Ohio Species of Conservation Concern, prefers a landscape of predominately (>60%) mature woodland cover for breeding, preferentially nesting in white oak (*Quercus alba*) (Rodewald 2012). Worm-eating warblers also require extensive forest cover, nesting in mature deciduous woods and woodland habitat with mixed deciduous

and coniferous tree species (Hanners and Patton 1998). Wood thrush breed in mature deciduous and mixed woodlands containing American beech (*Fagus grandifolia*), sweet gum (*Liquidambar styraciflua*), red maple (*Acer rubrum*), oaks (*Quercus* spp.), and pines (*Pinus*) (Roth 1996).

The plan area also supports individuals of five species ranked as high priority species for Ohio, meaning that they have widely decreasing populations at regional and continental scales, but the current threat is not as strong as for highest priority species. These species include Kentucky warbler (*Geothylpis formosa*), hooded warbler (*Wilsonia citrine*), black-billed cuckoo (*Coccyzus erythropthalmus*), Louisiana waterthrush (*Parkesia motacilla*), and the Acadian flycatcher (*Empidonax virescens*). Kentucky warblers prefer large patches of mature forest habitat containing streams, but avoid oaks and hickories (McShea et al. 1995). Suitable habitat for the Louisiana waterthrush requires a forested riparian corridor along a gravel-bottom stream (Robinson 1995). Like the waterthrush, the Acadian flycatcher and hooded warbler frequently nest in riparian forests (Whitehead & Taylor 2002, Sargent 1997). For information on bird watching areas within the plan area check out the Hocking Valley Birding Trail found on line at birdhocking.com.

V. Rare Species – The U.S. Fish & Wildlife Service (2012) lists the Indiana bat (*Myotis sodalist*), American burying beetle (*Nicrophorus americanus*), running buffalo clover (*Trifolium stoloniferum*), clubshell mussel (*Pleurobema clava*), and rayed bean mussel (*Villosa fabalis*) as Federally Endangered species found in Hocking and/or Fairfield Counties. Northern monkshood (*Aconitum noveboracense*) and small whorled pogonia (*Isotria medeoloides*) are listed as a Federally Threatened plant species, the eastern massasauga rattlesnake (*Sistrurus catenatus catenatus*) is a Federal Candidate for the endangered list, and the timber rattlesnake (*Crotalus horridus*) and American bald eagle (*Haliaeetus leucocephalus*) are listed as a Federal Species of Concern.

Yearly records indicate that Hocking County has a fairly high number of state listed rare species. It is ranked 19th out of 88 counties in Ohio for the number of state listed rare plants and animals. On the other hand Fairfield County is ranked 50th. Table 5 (Appendix II) shows the number of state listed species recorded in Hocking & Fairfield Counties by category and by state status. (Crane Hollow & ODNR Division of Wildlife; Ohio Natural Heritage Database & Ohio Wildlife Diversity Database)

There are a total of 46 state listed rare species that have been recorded in the plan area or near the plan area boundary (within 5 km). A list of these state listed rare species is found in Table 6 (Appendix II). Also Figure 11 (Appendix I) shows sections of the plan area that have been designated as High Quality Environmental Communities by the Ohio Natural Heritage Database and approximate locations where rare plant or animal species have been recorded.

VI. Water Resources – The plan area has a limited amount of natural surface water resources. There are small lakes and ponds scattered throughout the plan area but many of them are manmade. The most notable body of water in the plan area is Lake Logan reservoir. On the other hand there are an abundance of streams and rivers in the area. The largest river in the plan area is the Hocking River which flows southeast from Lancaster to Logan and then on to Nelsonville. The Hocking Watershed drains the northern and eastern sections of the plan area and includes the following sub-watersheds: Clear Creek, Headwaters of the Hocking, Monday Creek, Rush Creek, and Scott Creek. The Scioto Watershed drains the western section of the plan area and includes the following sub-watersheds: Headwaters of Salt Creek, and Pike Run of Salt Creek. The Raccoon Creek Watershed drains a small sliver of the southern section of the plan area (Figures 1 & 5).

According to Hocking County's Comprehensive Plan (2007) groundwater is the primary source of drinking water in the area. This is also the case in Fairfield County according to Ohio State University Extension fact sheet on the "Water Resources of Fairfield County" (ohioline.osu.edu/aex-fact/0480_23.html). More information on groundwater is found in Appendix V.

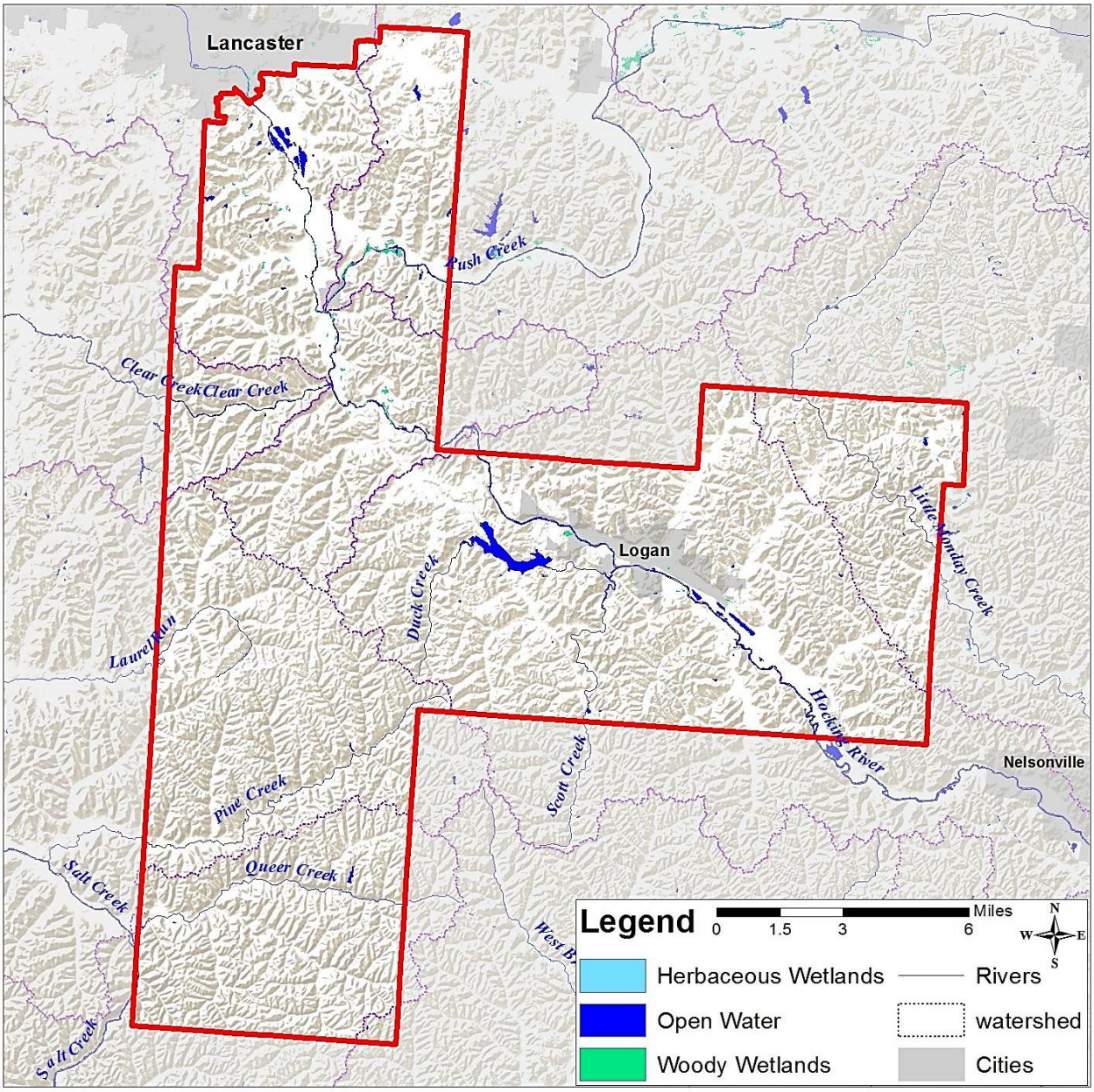

Figure 5. Water Resources—Plan Area (NLCD 2006 data)

VII. Soils & Geology – The majority of the plan area is part of the Western Allegheny Plateau, Major Land Resource Area. However there is a very small sliver in the northern part of the plan area that is part of the Indiana and Ohio Till Plain, or the Southern Illinois and Indiana Thin Loess and Till Plain. There are 8 Soil Series Associations found within the plan area and 22 different Soil Series. For a description of each Soil Series or a map of the plan area's Soil Series Associations see Apendix VI. Information on the area's geology is found in Appendix VII.

Top Issues, Concerns, & Needs

Feedback received from the public landowner meeting on December 6th and from the Hocking Hills Woodland Survey (Nov. 5th – Dec. 10th) was used to determine the area's top issues, concerns, and needs related to woodlands. A summary of results from the private landowner

meeting and woodland survey are found in Table 3, with a more detailed summary found in Table 7 and Figures 15-26 in Appendix III. The following sections describe the area's top rated woodland issues, concerns, and needs as well as a couple of other threats to the top woodland benefits and services.

I. Invasive Insect Pests & Diseases – In recent years one of the biggest threats to forest health has been the inadvertent introduction of non-native tree diseases and woody insect pests. Several major native tree species have declined in numbers from non-native insects and diseases, some to the extent of being practically eliminated from our natural environment. Unfortunately, this has been occurring for over 100 years and new diseases and insect pests have been discovered every few years. The following is a list of non-native insects and diseases that have, or potentially could have, substantial negative impacts to the woodlands in the plan area:

- American Chestnut Blight (www.fs.fed.us/r8/chestnut/index.php),
- Asian Longhorn Beetle (www.agri.ohio.gov/topnews/asianbeetle),
- Beech Bark Disease (na.fs.fed.us/fhp/bbd),
- Butternut Canker Disease (www.na.fs.fed.us/spfo/pubs/howtos/ht_but/ht_but.htm),
- Dutch Elm's Disease (ohioline.osu.edu/hyg-fact/3000/pdf/3308.pdf),
- Emerald Ash Borer (emeraldashborer.info),
- Hemlock Woolly Adelgid (na.fs.fed.us/spfo/pubs/pest_al/hemlock/hwa05.htm),
- Sudden Oak Death (ohioline.osu.edu/hyg-fact/3000/pdf/HYG_3309_08.pdf),
- Thousand Cankers Disease (www.thousandcankers.com)

One invasive insect that is a particular concern for the plan area is the Hemlock Woolly Adelgid (HWA). Native to Asia, HWA was first discovered near Richmond, VA in 1951 and since then has been decimating native hemlock stands throughout the eastern Appalachian Mountains. The Hocking Hills has the largest concentration of native hemlock stands in Ohio. This past year (2012) HWA was discovered in 2 Ohio Counties (Meigs & Washington) with the nearest known infestation about 43 miles away from the nearest hemlock stand in the Hocking Hills (Figure 6). The loss of hemlock stands in the Hocking Hills would be significant. Hemlocks not only provide a scenic backdrop for the region's caves, cliffs, and gorges but they also provide essential habitats for a variety of wildlife. The hemlock's evergreen canopy provides shelter from winter winds and snow for many kinds of wildlife. The hemlock's multi-layer evergreen canopy also provides a unique habitat that a variety of birds use for foraging and nesting (Stump 2008). The black-throated green warbler (*Dendroica virens*), hermit thrush (*Catharus guttatus*), and blue-headed vireo (*Vireo solitaries*) are species which breed almost exclusively in eastern hemlock ravines (Stump 2008 & ODNR 2012). Other species that would be sensitive to the loss of hemlock stands are the blackburninan warbler (*Dendroica fusca*), Acadian flycatcher (*Epidonax virens*), and eastern redback salamander (*Plethodon cinerus*) (Tingley 2002 & Brooks 2001).

HWA is spread by wind, carried by mammals or birds, and by human transportation of wood and trees. Therefore it is hard to predict when HWA will show up in the Hocking Hills area. The only proven method of controlling HWA is through chemically treating individual trees every 4-

5 years. This method limits treatments to trees in readily accessible and non-environmentally sensitive areas. At this point it is not feasible to treat hemlocks in vast forests, particularly when a large numbers of trees are infested. However, research has identified several natural enemies (predators/pathogens) that could be the key to controlling HWA. Initial tests on these biological controls are promising. For now, the best line of defense is detecting HWA early enough to eradicate it through treatment or tree removal. It is important for landowners in this area to know how to identify HWA. Early detection will allow scientists more time to find the key to controlling HWA. Undetected infestations will quickly spread beyond the means for eradication and allow HWA to become firmly established. If HWA becomes established in the Hocking Hills area then control efforts will be limited to saving only the highest valued hemlock trees until a better method of control is discovered.

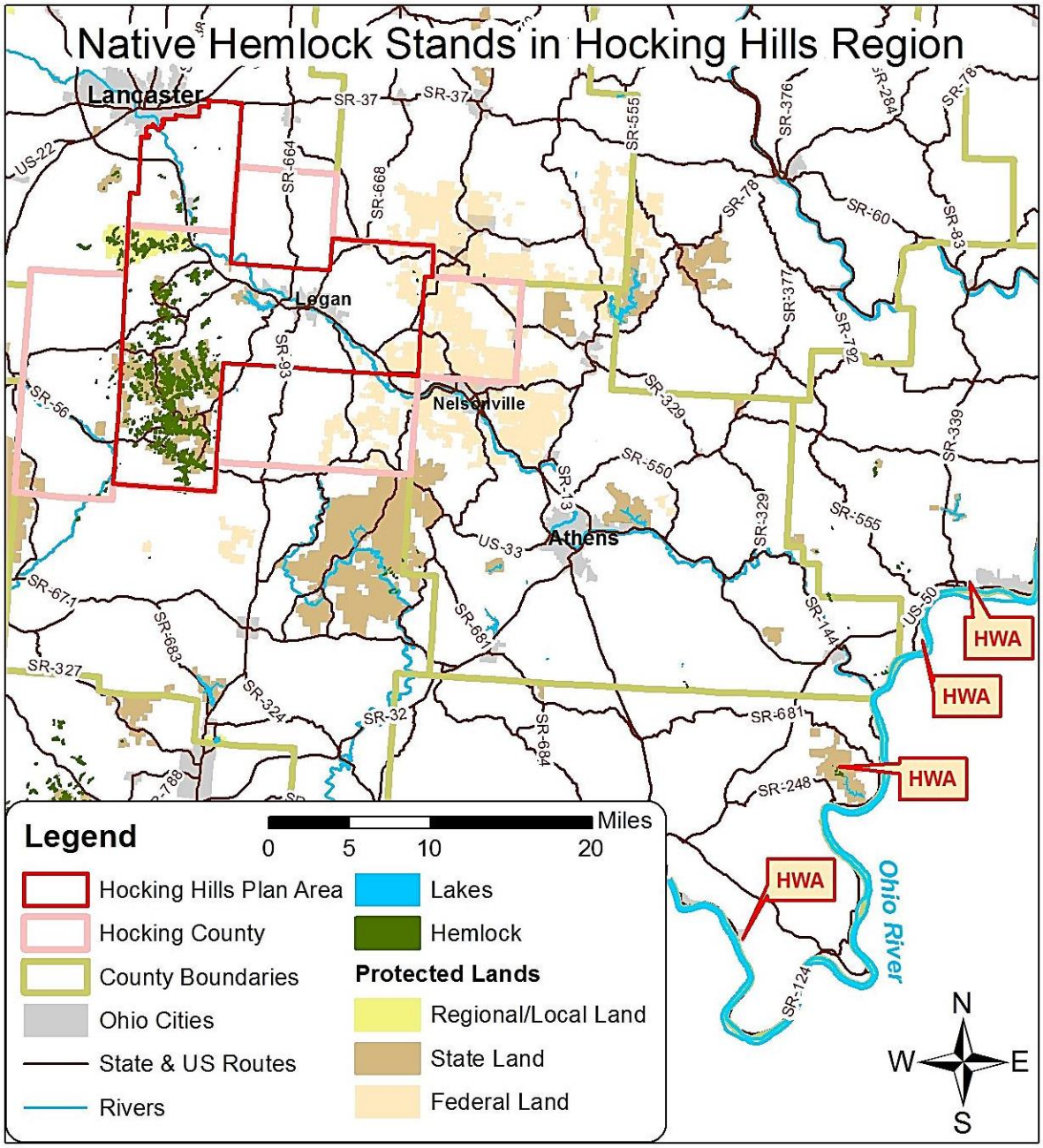

Figure 6. Native hemlock stands in the Hocking Hills & known Hemlock Woolly Adelgid Infestations (Jan 2013).

II. Land Use Change & Land Use Planning:

- Forest Loss – The area has a significant amount of forest cover, with approximately 75% of the plan area in woodlands; this is up from a low point in the early 1900's when forest land in Ohio was at 10%. However, in recent decades the trend has been reversed, with woodlands shrinking due to land use change and development. As woodlands are lost, the benefits and services they provide also diminish. This is a concern across Ohio and is a real threat in the plan area as development continues to spread south from Columbus and Lancaster along the US 33 corridor. The popularity of this region and its proximity to major urban areas makes it an attractive area for development and thus there is a real threat of continued forest loss.

- Forest Fragmentation – The permanent clearing of wooded areas leaves the remaining forests fragmented and this diminishes the benefits they provide, such as wildlife habitat, water quality, and stormwater protection. For example, several studies have shown that forest fragmentation is a major cause of population decline in many species of neotropical migrant birds in North America (Whitcomb et al. 1981; Lynch and Whigham 1984; Askins et al. 1990; Hagan et al. 1996; Bayne and Hobson 2001; Nol et al. 2005; Sauer et al. 2005; Zuckerberg and Porter 2010). When large parcels of land are divided and sold as many smaller parcels (called parcelization), benefits from forests can also diminish, even if trees are not cleared. For example, heavily parcelized forests may be more susceptible to forest health impacts, like invasive species or diseases, since there are more potential pathways for entry. In addition, once introduced, forest health issues are often more difficult to control in parcelized forests, as treatment of the problem is often spotty and inconsistent across ownership boundaries. Another issue is that parcelized and fragmented forests are still at risk from forest fires, which means a raised potential for loss of human life and homes. Human-wildlife conflicts are also likely to increase as a forest becomes more fragmented. For example, black bears wandering into backyards and deer-vehicle collisions appear to be on the rise in many areas. The popularity of the Hocking Hills also presents a unique challenge. While, tourism may present a good reason to sustain the forests it also leads to the development of a high number of seasonal homes, rentals, cabins, and cottages in the area (Figure 4), (Figure 12, Appendix III). This type of development has also fragmented the forest and is a continued concern for the area.

  One way you can get a feel for forest fragmentation is to look at forest patches. The area occupied by one continuous forest block is referred to as forest patch size. As the forest becomes more fragmented average forest patch size decreases. Simply put, if an area of forest is not fragmented it will be one patch, but if it is fragmented then it will be divided into many smaller patches. Figure 7 illustrates the arrangement and size of forest patches in the plan area.

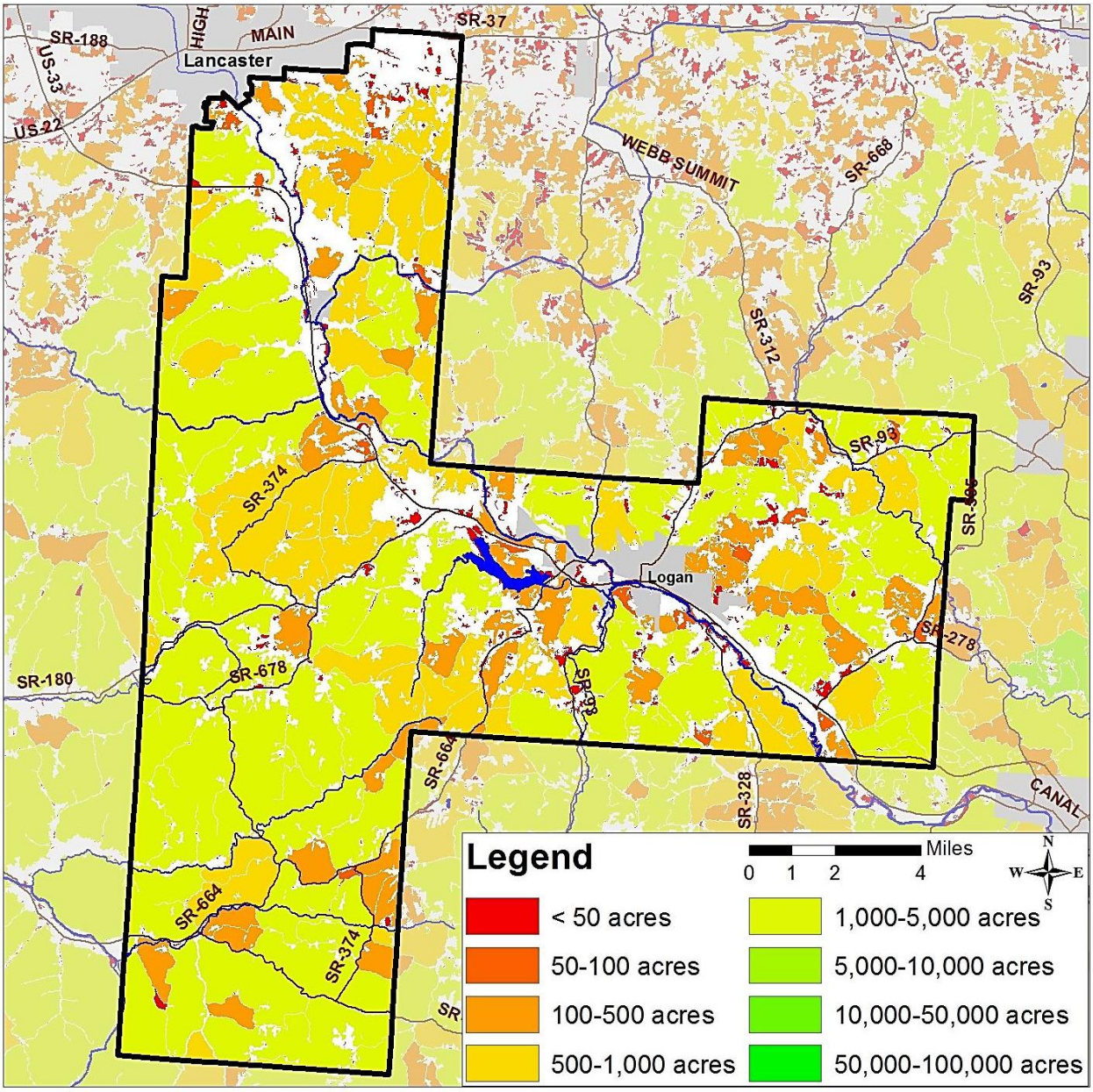

Figure 7. Forest Patch Size—Plan Area (NLCD 2006 data)

Another way you can measure forest fragmentation is by looking at forest edge. As forests become fragmented, not only do forest patch sizes decrease but the amount of forest edge increases. Forest edge is the area where the forest transitions into non-forest land. Most often a natural edge is a soft edge with a transition zone between non-forest land and forest land. In this transition zone you will often find sun loving pioneer species—a mixture of shrub and tree species that are the first to become established in an open field. This soft edge provides unique wildlife habitat, buffers the inner woods, and enables natural woodland expansion. However when woodlands are cleared for developing subdivisions, houses, businesses, or roads, hard edges are often created with no transition zone. Trees that were sheltered by other trees on all sides suddenly find themselves with no buffer and exposed to wind, sunlight, new diseases, different insects, invasive species, road salt, and automobile exhaust. These new pressures often lead to some die-off and blow downs of previously interior trees and leads to a shift in the

mix of plants and animals inhabiting the new edge area, with edge-loving species coming in. The result is a decrease in interior forest habitat. Therefore, the area covered by forest edge and transition zones is an important measure of how fragmented forests are. Figure 8 shows the arrangement of forest edge and forest interior areas within the plan area.

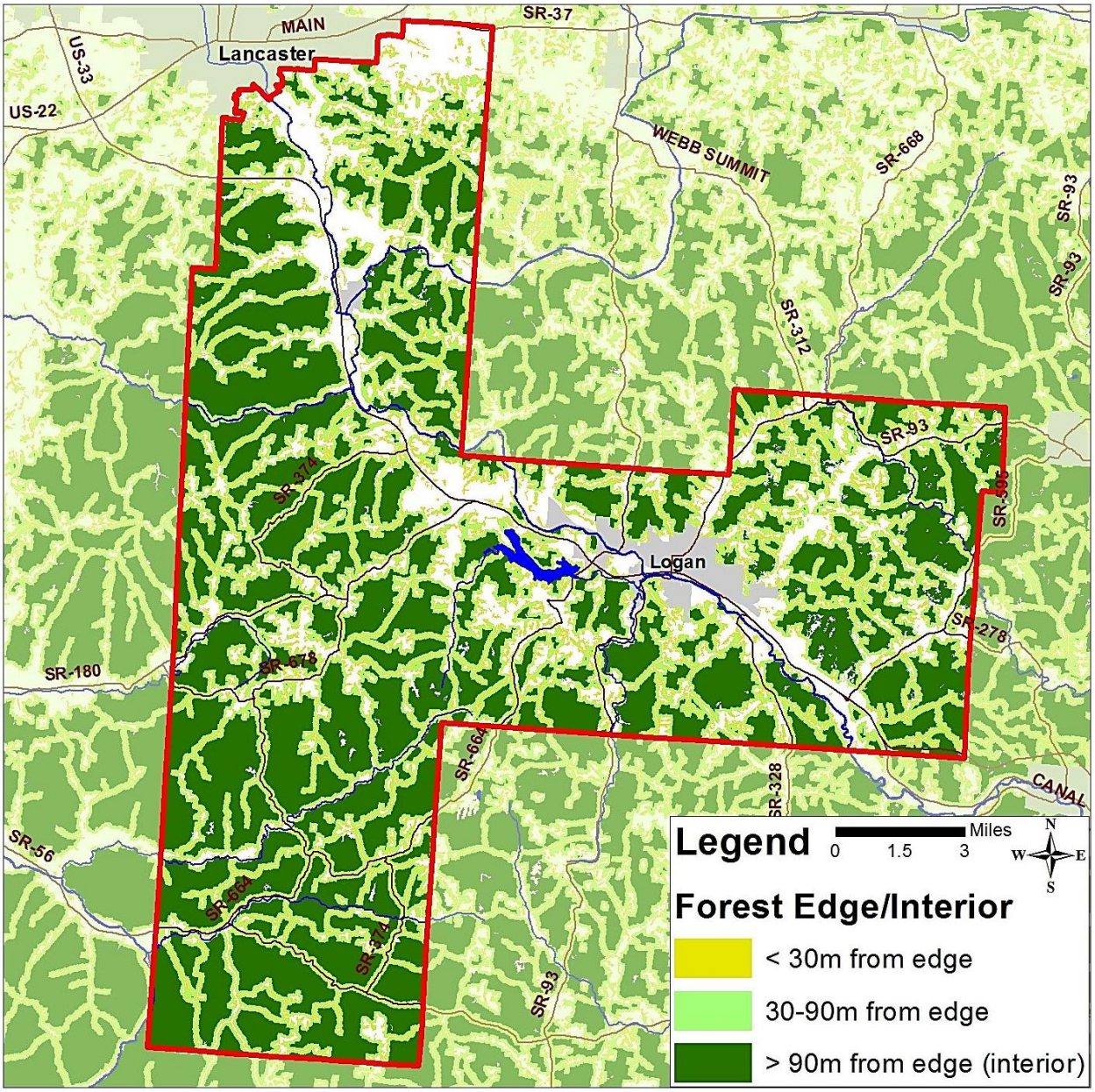

Figure 8. Forest Edge—Plan Area (NLCD 2006 data)

Figures 7 and 8 portray the issue of forest fragmentation in the plan area. The recent economic recession (2007-2009) seems to have slowed the trend, but as the economy improves, the threat of forest fragmentation will likely increase.

- Land Use Planning – In the past, lack of land use planning has resulted in the development of some areas that should not have been developed. For example, in many communities development has occurred in river flood plains. Proper planning encourages smart growth,

growth in the right areas, while discouraging growth in priority conservation areas such as riparian buffers and forests. Many communities have improved land use through the development of a comprehensive planning document; in fact both Hocking County and Fairfield County have developed county wide land use plans. Hocking County developed a Comprehensive Plan in 2007 that is available at the Hocking County Regional Planner's Office. This plan recommends beneficial conservation tools that can be used to maintain woodlands such as Conservation Development, Conservation Easements, Floodplain Regulations, and Purchase of Development Rights. However this plan does not directly address the value and benefit of conserving forested areas nor does it recommend this.

Fairfield County developed a Land Use Plan in 2002 and in 2008 updated the plan including a new Active Transportation and Open Space Plan. These documents are available online at: www.co.fairfield.oh.us/rpc/county_development_strategy_land_use_plan.htm#plan. Fairfield's plan goes over recommend conservation tools that can be used to maintain forests such as Conservation Development, Floodplain Regulations, and Purchase of Development Rights. The plan also encourages the preservation of natural areas including woodlands. Goal 5.3 is to "Provide strong support for retaining and protecting scenic and natural areas such as greenbelts, streams, creeks, woodlands, wetlands, and historic sites." The plan has designated certain areas as "Critical Resources" including significant tree stands, 150 ft. river buffers, and 100 year flood plains. The plan also proposes the future use of Transfer of Development Rights (TDR) which is a unique way to discourage future development in critical resource areas while encouraging development in designated urban service areas. The plan recommends that critical resource areas be defined as voluntary sending zones for Transfer of Development Rights (TDR). If TDR was in place, development rights would be awarded for use in urban service areas in exchange for every five acres of critical resource-designated soils set aside by conservation easements. TDR credits would have to be utilized in areas designated for urban services. As it stands now TDR needs legislature approval before it can be implemented.

III. Invasive Plants – The introduction of invasive plant species can also degrade a woodland over time. Invasive plant species are non-native species that have been documented to outcompete native plant species on many sites to the point of harming ecosystems. Invasive species often grow very quickly, spread quickly, and have few or no natural enemies. If left alone, invasive plant species can eventually form a monoculture, which provides minimal benefits compared to diverse native ecosystems. For example, the invasive tree species called tree-of-heaven (or ailanthus) will outcompete most native trees in woodland openings or edges. If left alone, tree-of-heaven can often become the dominate tree species in a woodland stand. Tree-of-heaven produces a chemical that suppresses the growth of many native plants (a biological phenomenon called allelopathy). Without management a monoculture of tree-of-heaven can form which has very low wildlife value and very little timber value since tree-of-heaven is not a sought after wood. The following is a list of non-native plant species that are degrading or could degrade woodlands in the plan area:

- Buckthorn (*Rhamnus frangula, & Rhamnus cathartica*) (na.fs.fed.us/spfo/invasiveplants/factsheets/pdf/common-and-glossy-buckthorn.pdf),
- Bush Honeysuckle (*Lonicera spp.*) (forestry.ohiodnr.gov/Portals/forestry/pdfs/invasives/F-68Honeysuckle.pdf),
- Japanese Honeysuckle Vine & Asian Bittersweet (*Lonicera japonica & Celastrus orbiculatus*) (www.oipc.info/FactSheets/9Fact_sheetJaphoneysuckleAsianbittersweet2.pdf),
- Japanese Knotweed (*Fallopia japonica*) (www.in.gov/dnr/files/Japanese_Knotweed.pdf),
- Kudzu (*Pueraria Montana*) (www.na.fs.fed.us/fhp/invasive_plants/weeds/kudzu.pdf),
- Mile-A Minute Weed (*Polygonum perfoliatum*) (na.fs.fed.us/fhp/invasive_plants/weeds/mile-a-minute_weed.pdf),
- Privet, Border & European (*Ligustrum obtusifolium Sieb./Zucc. & Ligustrum vulgare L.*) (www.invasive.org/browse/subinfo.cfm?sub=10087) (www.invasive.org/browse/subinfo.cfm?sub=3036),
- Russian & Autumn Olive (Eleagnus umbellate and Eleagnus angustifolia) (forestry.ohiodnr.gov/portals/forestry/pdfs/invasives/F-69Olive.pdf),
- Tree-of-Heaven (Ailanthus altissima) (forestry.ohiodnr.gov/portals/forestry/pdfs/invasives/F-65Ailanthus.pdf).

IV. Poor Woodland Management – There are a variety of woodland management mistakes that are commonly made which degrade woodlands and the benefits they provide. Poor woodland management on one parcel can also have indirect impacts to surrounding woodlands. A poor practice that is occasionally made is allowing livestock to graze in woodlands. Consistently allowing livestock in a woodlands will compact the soil, damage roots, destroy forest understory, reduce wildlife habitat, increase erosion, and reduce the overall health of a woodland.

A more common mistake is allowing your woods to be 'high graded', which occurs when the largest and most valuable tree species are cut during a timber harvest, and the low value and/or undesirable trees are left. The result is a woodland that has only low quality poorly formed trees (which is often linked to poor genetics), and species with no timber value. Ironically, one of the biggest losses from high grading is potential for future timber harvests. Sustainably and properly managed woodlands provide better quality timber products and more volume of wood over-time than a one-time high grade harvest. Other harvesting activities such as improperly placed skid trails, woodland roads, stream crossings, and log loading sites can also degrade a woodland by causing erosion and compacting high quality soils. Given that it takes considerable time and additional management to correct poor harvesting practices, it is important to work with a professional forester before a harvest to minimize potential mistakes and ensure that woodland benefits are protected. A harvest done the right way can improve wildlife habitat and woodland health while providing renewable resources. In fact some woodlands become over-crowded and stressed without a proper woodland thinning or harvest and thus more vulnerable to insect pests, diseases, and wildfire. Wise management of our woodlands is needed maintain healthy forests and the benefits and services they provide especially in our fragmented environments where our forests are faced with so many threats

like invasive plants, exotic insects, and diseases which can significantly alter the mixture of tree species and natural reforestation processes.

V. Water Pollution & Soil Erosion – Since the Dust Bowl and Civilian Conservation Corps in the 1930's and the Clean Water Act of 1972 great strides have been made in preventing soil erosion and improving water quality. However, there is still concern over present day water quality and increases in the magnitude and frequency of flood events which intensify soil erosion. Forest loss and fragmentation, especially along rivers, streams, lakes, and wetlands, has contributed to lower water quality, soil loss, and increased flooding. Forests that immediately border rivers and streams are called riparian forests. Riparian forests provide multiple benefits to surface water resources and help prevent soil erosion by providing a buffer between surface waters and open land uses such as crops, pastures, and parking lots. Forests are effective in removing excess nutrients, pollutants, and sediment from surface water runoff during heavy rain events or from snow melt. Forests also mitigate flooding by absorbing water through their roots; by increasing the structure of soils—through root development and by supporting healthy biotic communities—which translates into a greater ability to soak up rainwater and floodwaters; and by simply slowing the movement of flood waters. Furthermore, riparian forests shade rivers and streams, which keep water temperatures cool for aquatic plants and animals. Thus forest loss and fragmentation adjacent to surface water resources is an important concern. (na.fs.fed.us/spfo/pubs/n_resource/buffer/cover.htm)

Continued forest loss and fragmentation threatens the area's water quality and could increase the frequency and intensity of flood events and soil erosion. Figure 9 portrays a well-designed riparian buffer left along a body of water. This figure shows a 95 ft. wide buffer, but it should be noted that the recommended width of a riparian buffer differs based on soil types, slope, and other values (e.g., scenic or ecological) and can be anywhere from 75 ft. to over 300 ft. wide on each side of the river. In riparian areas, woodlands play a critical role in maintaining proper hydrologic function. Inside the plan area there is a total of 14,442 acres of land found within 300ft of a lake, pond, river or perennial stream, with 58.6 percent (8,462 acres) of this riparian zone being forested based off 2006 National Land Cover Data. The percentage of forest cover in riparian areas is a bit of a concern given the importance of trees in these areas and given the fact that the overall percentage of forest cover in the plan area is higher than this at 75.6%. Maintaining current woodland cover in riparian zones and planting new woodlands is critical to addressing multiple issues including water quality protection, stormwater management, and soil erosion.

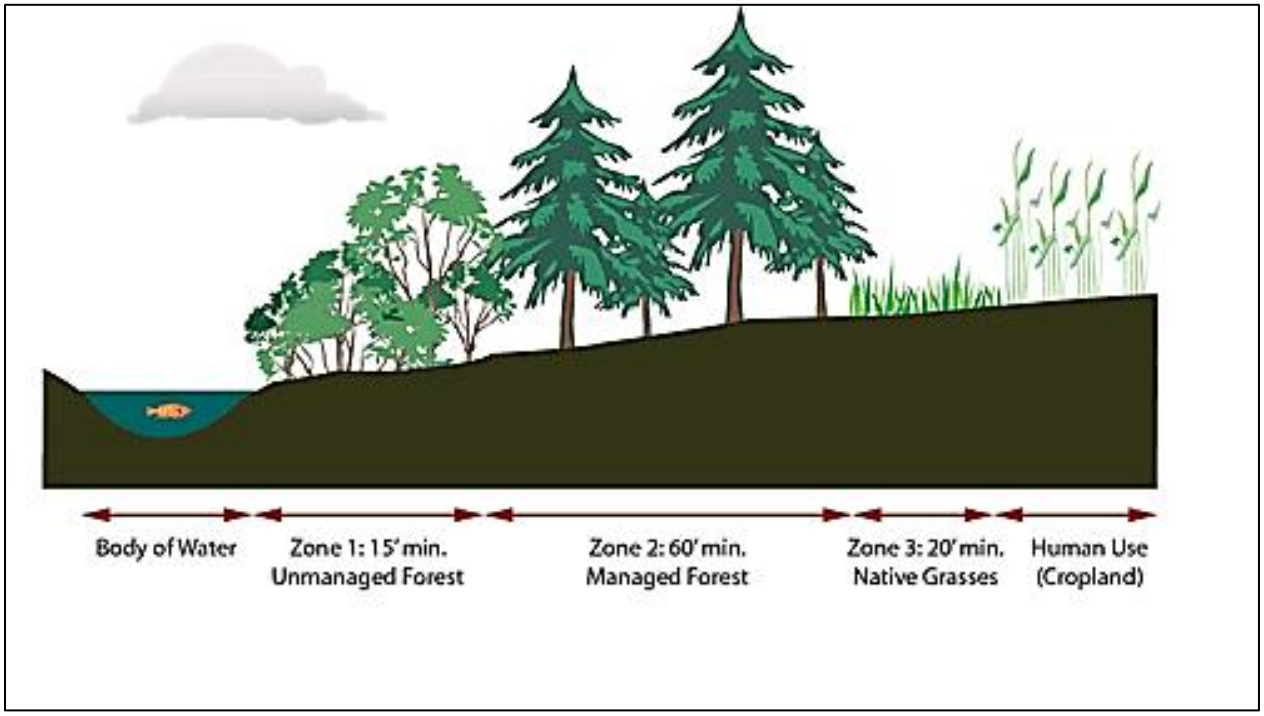

Figure 9. USDA 3-Zone Riparian Buffer Planning Model (www4.ncsu.edu/~acpierc3/world_forestry)

VI. Wildlife – Results from the public landowner meeting and woodland owner survey indicate that wildlife is the most valued benefit that woodlands provide (including game species, non-game species, and rare/endangered species). Loss of wildlife habitat including woodland habitat is a major concern since most native wildlife species rely on woodland habitat or woodland benefits. The plan area is home to several rare and high priority wildlife species that either require extensive forest habitat or benefit indirectly from services provided by woodlands. For example, the rare fish and invertebrates found in the area require high water quality and woodland habitat along rivers and streams supports this. Also black bears and bobcats (endangered & threatened) are rare species that have been seen in the area and both require woodland habitat.

Woodland habitat is also needed by all of the high priority bird species found within the plan area. Studies show that the priority bird species inhabiting the plan area prefer non-fragmented forests and undisturbed riparian forests for breeding habitat and that nest success rates are higher in these areas. For example, cerulean warblers prefer large patches of forest for breeding habitat (Parker et al. 2005), and nest success of worm-eating warbler and wood thrush is higher in larger forest patches (Gale et al. 1997, Hoover et al. 1995), suggesting populations of these species could benefit from less fragmented woodlands. Also Louisiana water thrush, Kentucky warbler, hooded warbler and Acadian flycatcher make extensive use of riparian forests (Whitehead and Taylor 2002, Sargent 1997, Robinson 1995), suggesting populations of these species may benefit from increased forest cover within riparian corridors. Thus, given the habitat requirements of these rare and high priority species, we can see that forest loss and fragmentation is a contributing factor to declines in wildlife diversity.

On the other hand, one species of wildlife that has benefited from decreases in woodland habitat and increases in forest fragmentation is the white tailed deer. Over-abundant deer populations have degraded some woodlands by eating beneficial plants including tree seedlings. High deer populations can prevent natural reforestation in an area or significantly change the mixture of tree species that develop since deer prefer to browse on some tree species over others. Deer can also make it very difficult to plant or establish new trees. Consistently high deer herds in an area will leave the forest floor bare of plants or left with mostly with undesirable plants and this can force deer into urban areas in search of food.

VII. Privacy, Aesthetics, & Recreation – The Hocking Hills is an increasingly popular vacation destination that is valued for its natural beauty, solitude, and recreational opportunities. Millions of people visit the area each year to get away from the busyness of life, to enjoy nature, and for an array of recreational opportunities. Many people desire to own a piece of this great area. While these facts give great reason to maintain the area's woodlands, they also give reason for concern. Over using woodlands can end up degrading many of the original benefits and services that attract us to them in the first place. Wise management and planning is needed to balance the positives and negatives related to this issue.

VIII. Landowner Assistance & Education – Results from the woodland owner survey indicated that lack of knowledge was the second biggest factor, behind lack of time, keeping landowners from woodland improvement work. Also, landowners who attended the public landowner meeting thought the number one issue this plan should focus on was landowner assistance and education. For wise woodland management decisions to be made woodland owners need to have adequate awareness and access to knowledge and information regarding woodland benefits, threats, and proper management techniques. An increase in landowner and community knowledge and awareness should result in wiser woodland management decisions and overall healthier forests. Also increased publicity is needed to keep the benefits of woodlands and the threats to them on the forefront of people's mind.

WOODLAND ACTION PLAN

Woodland Action Plan Purpose – A collaborative plan of action to maintain functioning woodlands in the rural-urban interface and a plan to positively address issues and concerns stemming from forest fragmentation and parcelization. The Woodland Plan will provide information and natural resource professional assistance to woodland owners in these environments and also be a framework for coordinated woodland management across property boundaries. The plan will focus on small parcel woodland owners (2-10 acres) and woodland cabin owners who provide lodging (e.g. rental cabins, cottages, bed & breakfasts). Large parcel woodland owners can play an important role in achieving the goals of this plan but will not be our main focus. Our goals and objectives center on providing landowner assistance in two areas: **maintaining healthy woodlands** and **enhancing wildlife habitat.** Based on feedback received from the public landowner meeting and woodland owner survey we believe there are

many small parcel woodland owners and woodland cabin owners concerned about these issues who would be willing to work together to positively address them when provided assistance and framework.

Short Term Goals & Objectives

(Target completion date—April, 2014)

Goal #1, Maintain Healthy Woodlands in the Hocking Hills.

- Objective #1a – Increase knowledge and awareness among small parcel woodland owners and woodland cabin owners on what they can do to maintain the health of their woodlands and how to address threats to their woodland health by providing information through various media and through at least two local workshops or field days.
- Objective #1b – Increase landowner awareness of the unique benefits provided by native hemlock stands in the Hocking Hills region and the Hemlock Woolly Adelgid threat to these stands through at least two workshops or field days that support the Hocking Hills Tourism Association's effort to save these unique stands.

Goal # 2, Enhance Wildlife Habitat in the Hocking Hills

- Objective #2 – Increase knowledge and awareness among small parcel woodland owners and woodland cabin owners on what they can do to enhance their woodland wildlife habitat by providing information through various media and through at least two local workshops or field days.

Goal #3 – Support Woodland Owners in the Hocking Hills with Direct Assistance.

- Objective #3 – Identify and assist at least 20 small parcel woodland owners, or woodland cabin owners, who would like assistance in developing a personal woodland management plan that addresses woodland health issues (e.g., insect pests and diseases, invasive plants, woodland thinning, and establishment of native plants) and/or enhances wildlife habitat.

Long Term Goals

Long Term Vision – Our long term vision is a healthy forest in the Hocking Hills region sustained by landowners, businesses, and organizations working to improve their woodland health and coordinating with their neighbors to address issues that threaten the forest and thereby collectively sustain and enhance wildlife habitat, water protection, and recreational opportunities in the Hocking Hills region.

Long term goal # 1 – Connect woodland landowners, cabin owners, cottage owners, organizations, and professionals who are interested in working together to raise awareness

about the benefits and services of woodlands in the Hocking Hills area and addressing issues that threaten the area's forest health.

Long term goal # 2 – Work with the Wayne National Forest on developing an additional demonstration site on Wayne National Forest located in the plan area that supports the goals of this plan and the U.S. Forest Service's goal of providing woodland owners with interpretation (signing, publications, tours, news coverage, etc.) and demonstration of woodland management practices.

Long term goal # 3 – Seek and obtain additional funding for continued future implementation of this plan and to address future threats to the area's forest health.

Implementation

I. Marketing – The plan will be marketed to the area through a variety of means including:

- Targeted press releases
- Direct mailings
- A Rural-Urban Interface website
- Short Videos
- Factsheets on recommended practices
- Through field days & educational workshops
- Publications in local magazines or newsletters (e.g. Ohio Woodland Journal, Soil & Water Conservation District)

II. Provide Landowner Education & Assistance Opportunities

- With the assistance of our partners, we will hold a variety of field days and educational workshops designed to increase landowner awareness of woodland benefits and services and to demonstrate how to best maximize those benefits and services on a property.
- Identify and provide assistance to landowner groups and home owner associations where coordinated woodland management is a possibility.
- Make on-site visits to assist interested landowners in planning and implementing recommended plan practices.
- Prepare management plans and paperwork for landowners interested in EQIP funds.
- Prepare specialized woodland management plans for landowners interested in completing activities to support woodland health and/or enhance wildlife habitat.

III. Demonstration Sites

- Provide grant funding for the development of at least one demonstration site within the plan area on local protected woodlands, such as local parks or non-governmental organization lands (grant funds must be matched 1:1, state & federal Lands are not eligible)
- The purpose of a site will be to demonstrate how local concerns identified in the plan can be addressed through recommended woodland management activities and to encourage coordinated woodland management across public and private property boundaries.

- A site will be publicly accessible and provide private landowners with a visual and narrative demonstration of recommended woodland management activities. Activities will be explained through signs, brochures, and/or website information.

IV. Action Steps

Table 4. Action Steps, Timeline, Responsibilities

Action Step	Completion Date	Responsibility
Woodland Owner Survey & Public Landowner Meeting	12/06/2012	Ohio Division of Forestry & Partners
Draft Plan	01/02/2013	Ohio Division of Forestry & Partners
Draft Plan Public Comment	02/01/2013	Ohio Division of Forestry
Demonstration Site Application Due	March 2013	Interested Applicants with help of Ohio Division of Forestry
Final Plan	February 2013	Ohio Division of Forestry & Partners
Develop Social Marketing Tools and Launch Campaign	April 2013	Ohio Division of Forestry, & NNFP
1 on 1, EQIP sign-up	Fall 2013	Ohio Division of Forestry & Partners
Identify potential funds to continue future Plan implementation	Continuous	Ohio Division of Forestry & Partners
Target funds for future Plan implementation	Continuous	Ohio Division of Forestry & Partners
Field Days & Educational Events	Spring 2013 – Spring 2014	Ohio Division of Forestry & Partners
Demonstration Site Completion	December 31, 2013	Locally Protected Lands Partner & Ohio Division of Forestry
Short Term Goals & Objectives	April 2014	Ohio Division of Forestry & Partners
Project Evaluation	April 2014	Ohio Division of Forestry & Partners
Form a group of landowners & partners to continue Plan implementation	April 2014	Partners & Ohio Division of Forestry
Long Term Goals	Continuous	Partners & Ohio Division of Forestry
Plan Reassessment	2018	Plan Partners

Plan Partners

Many groups and organizations have helped with the planning and development of this plan. The following groups and agencies have been involved in this process:

- American Tree Farm System
- Appalachia Ohio Alliance
- Appalachian Ohio Weed Control Partnership
- Buckeye Trail Association
- Camp Oty'Okwa, Big Brothers Big Sisters
- City of Logan
- Crane Hollow, Inc.
- Fairfield County Regional Planning Commission
- Fairfield Soil & Water Conservation District
- Hocking College
- Hocking County Regional Planning
- Hocking Hills Tourism Association
- Hocking Soil & Water Conservation District
- Light on the Land Services
- Logan Tree Commission
- Monday Creek Restoration Project
- National Network of Forest Practitioners
- Ohio Bird Conservation Initiative
- ODNR Division of Wildlife
- ODNR Division of Forestry
- Ohio State University Extension
- Ohio University
- Rural Action
- Southeastern Ohio Woodland Interest Group
- USDA Natural Resource Conservation Service
- Wayne National Forest

The following partners are part of the steering committee for this plan:

- Appalachia Ohio Alliance
- Camp Oty'Okwa, Big Brothers Big Sisters
- Fairfield County Regional Planning Commission
- Hocking County Regional Planning
- Hocking Soil & Water Conservation District
- Hocking Hills Tourism Association
- Logan Tree Commission
- National Network of Forest Practitioners
- ODNR Division of Forestry
- Ohio State University Extension
- Rural Action
- USDA Natural Resource Conservation Service

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- Brian Armitage, ODNR Division of Wildlife
- Amanda Conover, Ohio Bird Conservation Initiative
- Cotton Randall, ODNR Division of Forestry
- Greg Schneider, ODNR Division of Wildlife
- Heather Stehle, Crane Hollow, Inc.
- Jason Van Houten, ODNR Division of Forestry

* *And thanks to all the landowners who attended the December 6th public landowner meeting and/or filled out the survey.

APPENDICES

I. Additional Figures

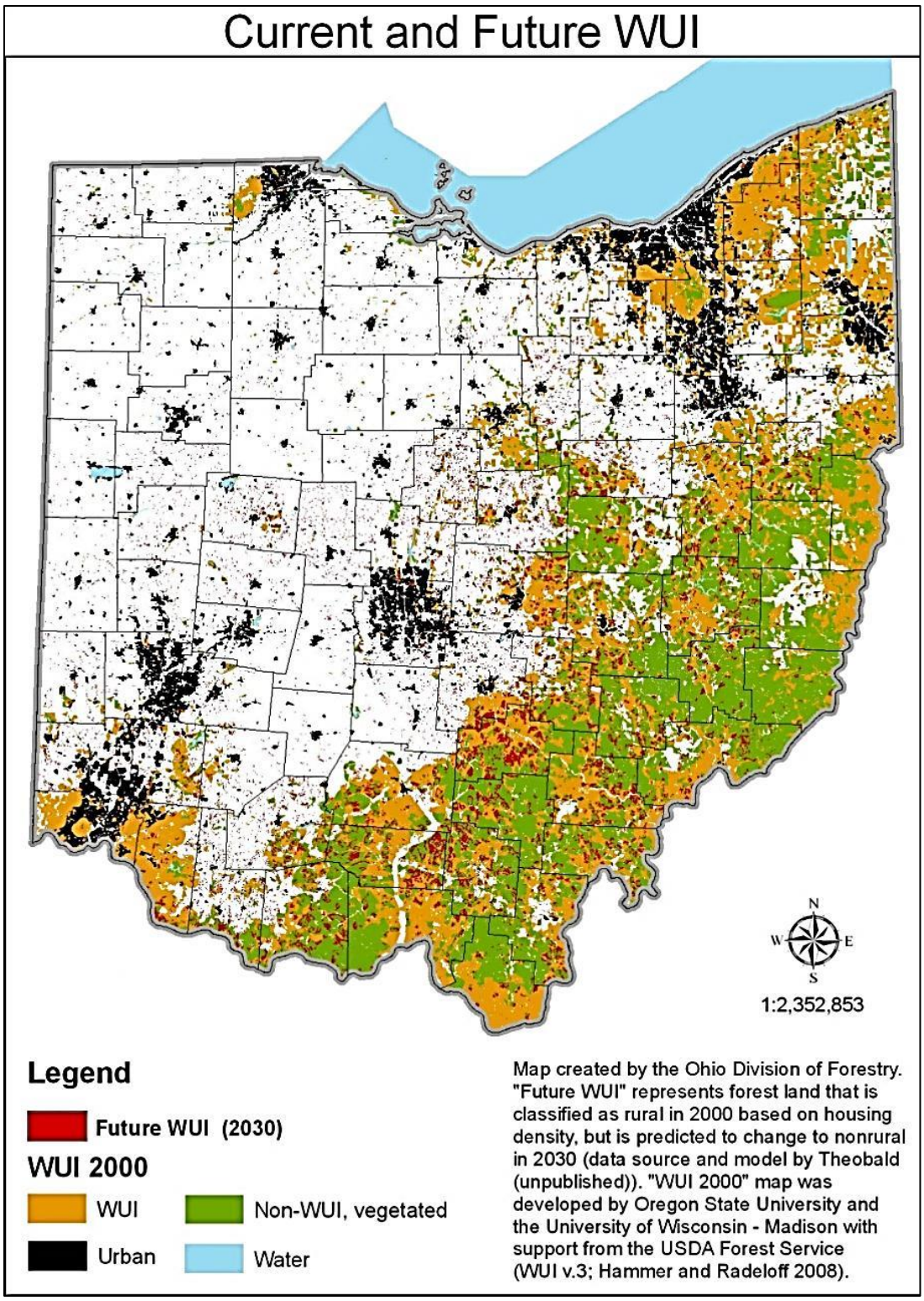


Figure 10. Ohio's Rural-Urban Interface (also known as Wildland-Urban Interface--WUI) (ODNR-Forestry 2010)

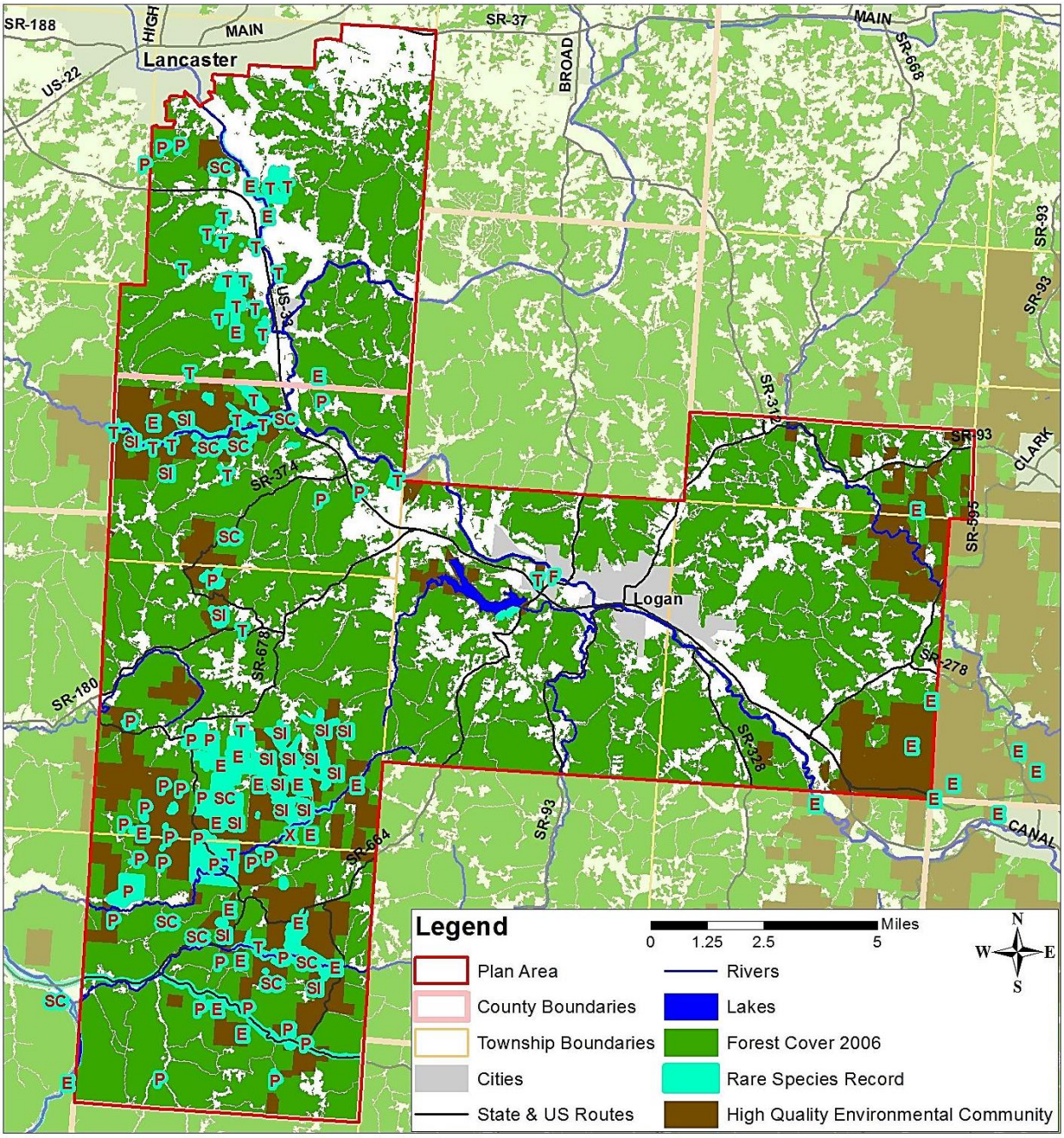


Figure 11. High Quality Environmental Communities.
[Capital red letters represent the State Status of the recorded species (E = Endangered, T = Threatened, P = Potentially Threatened, SI = Special Interest, & SC = Species of Concern). (Ohio Natural Heritage Database, 2012)]

II. Additional Tables

Table 5. Hocking & Fairfield Counties, State Listed Species (Crane Hollow, Ohio Natural Heritage Database, & Wildlife Diversity Databases)						
Category	**Endangered Species**	**Extirpated**	**Potentially Threatened**	**Special Interest**	**Species of Concern**	**Threatened**
Amphibians					2	
Birds				11	5	1
Fish	2				1	1
Insects	4				5	
Invertebrates	3				3	
Mammals	3	3			8	1
Plants	13	1	20			14
Reptiles	1				4	1
Totals	**26**	**4**	**20**	**11**	**28**	**18**

Table 6. State Listed Species—Plan Area. (Crane Hollow, Ohio Natural Heritage & Wildlife Diversity Databases)						
Species Name	**Common Name**	**Category**	**State Status**	**Inside Project Area**	**Within 1 km of boundary**	**Within 5 km of boundary**
Acris crepitans blanchardi	**Blanchard's Cricket Frog**	**Amphibian**	**Species of Concern**			✓
Hemidactylium scutatum	**Four-toed Salamander**	**Amphibian**	**Species of Concern**	✓	✓	✓
Dendroica fusca	**Blackburnian Warbler**	**Bird**	**Special Interest**	✓		
Dendroica caerulescens	**Black-throated Blue Warbler**	**Bird**	**Special Interest**	✓		
Coragyps atratus	**Black Vulture**	**Bird**	**Species of Concern**	✓		
Dolichonyx oryzivorus	**Bobolink**	**Bird**	**Species of Concern**	✓	✓	✓
Certhia americana	**Brown Creeper**	**Bird**	**Special Interest**	✓		
Wilsonia canadensis	**Canada Warbler**	**Bird**	**Special Interest**	✓		
Dendroica cerulea	**Cerulean Warbler**	**Bird**	**Species of Concern**	✓	✓	✓
Junco hyemalis	**Dark-eyed Junco**	**Bird**	**Special Interest**	✓		
Regulus satrapa	**Golden-crowned Kinglet**	**Bird**	**Special Interest**	✓		
Ammodramus henslowii	**Henslow's Sparrow**	**Bird**	**Species of Concern**	✓	✓	✓
Catharus guttatus	**Hermit Thrush**	**Bird**	**Special Interest**	✓		
Empidonax minimus	**Least Flycatcher**	**Bird**	**Special Interest**	✓		
Dendroica magnolia	**Magnolia Warbler**	**Bird**	**Special Interest**	✓		
Sitta canadensis	**Red-breasted Nuthatch**	**Bird**	**Special Interest**	✓		
Accipiter striatus	**Sharp-shinned Hawk**	**Bird**	**Species of Concern**	✓		
Ammocrypta pellucida	**Eastern Sand Darter**	**Fish**	**Species of Concern**		✓	✓
Etheostoma tippecanoe	**Tippecanoe Darter**	**Fish**	**Threatened**	✓	✓	✓

Atrytonopsis hianna hianna	Dusted Skipper	Insect - butterfly	Species of Concern	✓	✓	✓
Pyrgus centaureae wyandot	Grizzled Skipper	Insect - butterfly	Endangered	✓	✓	✓
Speyeria idalia	Regal Fritillary	Insect - butterfly	Endangered	✓	✓	✓
Cordulegaster erronea	Tiger Spiketail	Insect - dragonfly	Species of Concern	✓		
Hemileuca maia	Buck Moth	Insect - moth	Species of Concern	✓	✓	✓
Chytonix sensilis	no common name	Insect - moth	Species of Concern	✓	✓	✓
Catocala maestosa	Sad Underwing	Insect - moth	Species of Concern	✓	✓	✓
Cycnia inopinatus	Unexpected Tiger Moth	Insect - moth	Endangered	✓		
Helocordulia uhleri	Uhler's Sundragon	Insect - odonate	Endangered	✓	✓	✓
Lasmigona compressa	Creek Heelsplitter	Invertebrate - fw bivalve	Species of Concern			✓
Neotoma magister	Allegheny Woodrat	Mammal	Endangered	✓	✓	✓
Eptesicus fuscus	Big Brown Bat	Mammal	Species of Concern	✓	✓	✓
Ursus americanus	Black Bear	Mammal	Endangered	✓	✓	✓
Lynx rufus	Bobcat	Mammal	Threatened	✓	✓	✓
Myotis leibii	Eastern Small-footed Myotis	Mammal	Species of Concern	✓	✓	✓
Myotis sodalis	Indiana Bat	Mammal	Endangered	✓	✓	✓
Myotis lucifugus	Little Brown Bat	Mammal	Species of Concern	✓	✓	✓
Myotis septentrionalis	Northern Long-eared Bat	Mammal	Species of Concern	✓	✓	✓
Sorex hoyi	Pygmy Shrew	Mammal	Species of Concern	✓	✓	✓
Lasiurus borealis	Red Bat	Mammal	Species of Concern		✓	✓
Sorex fumeus	Smoky Shrew	Mammal	Species of Concern	✓	✓	✓
Synaptomys cooperi	Southern Bog Lemming	Mammal	Species of Concern	✓	✓	✓
Aconitum noveboracense	Northern Monkshood	plant	Endangered	✓		
Isotria medeoloides	Small Whorled Pogonia	plant	Endangered	✓		
Terrapene c. carolina	Eastern Box Turtle	Reptile	Species of Concern	✓		
Thamnophis sirtalis sirtalis	Eastern Garter Snake	Reptile	Species of Concern	✓	✓	✓
Regina septemvittata	Queen Snake	Reptile	Species of Concern			✓
Totals	46			40	25	28

III. Social Conditions

a. Demographics – The 2010 U.S. Census shows that Hocking County has a total population of 29,380 people, a 4% increase from 2000 Census data. On average, this equals 69.7 people per square mile. The county per capita income per year is $19,048. There are 11,369 households in the county with an average of 2.49 people per household and a median yearly household income of $39,586 in 2010 dollars (2006-2010). There are 13,417 housing units in Hocking County, about 2,000 of them vacant, and about half of the vacant housing units are for seasonal and recreational use (Figure 12). The average density of housing units in the county is 31.8 per square mile. 2010 U.S. Census Data indicate that 96.7% of the county population is White, 0.9% African American, 0.7% Hispanic or Latino, 0.4% Native American/Alaskan, 0.2% Asian, and 1.1% mixed. Of those 25 years or older, 84% are high school graduates and 10.2% have graduated college with a Bachelor's degree or higher. Based on 2006-2010 data, 15.3% of the population is living below poverty level.

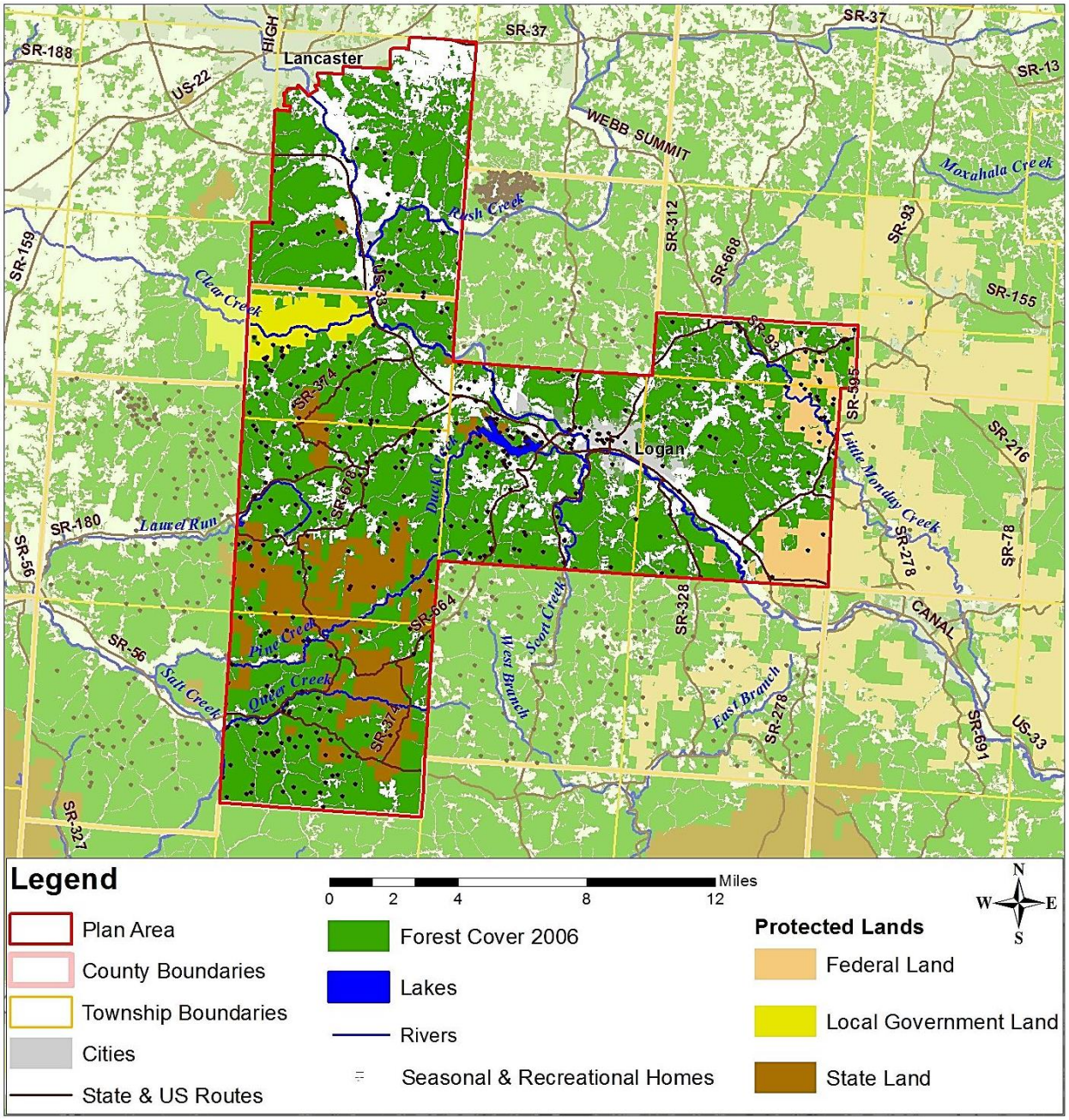


Figure 12. Approximate distribution of seasonal & recreational homes within the plan area (US Census Data)

b. Land Ownership Characteristics – Approximately 95% of the publicly owned land within the plan area is in protected parks or managed areas, roughly 21,756 acres. In addition, there are approximately 4,175 acres of private lands that are either owned by conservation oriented non-governmental organizations or protected by conservation easements for a total of 25,931 acres of protected lands. Figure 13 shows a breakdown of ownerships and/or types of protected lands (ODNR, Appalachian Ohio Alliance, and County Mapping Departments).

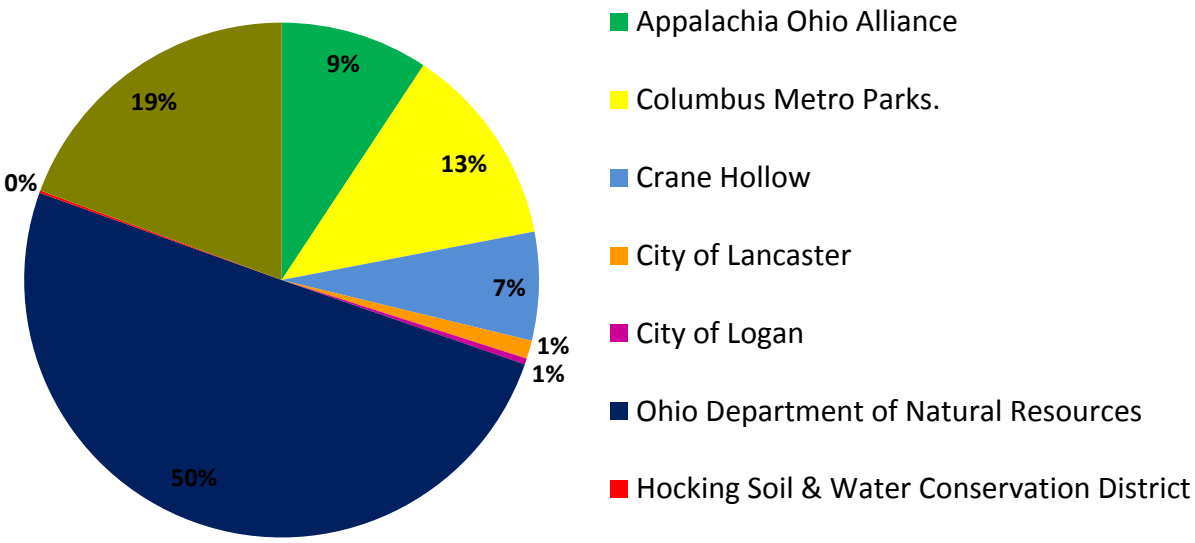


Figure 13. Protected Lands

There are a total of 10,393 parcels in the plan area. Parcels were divided into 3 size classes: < 2 acres, 2-10 acres, and >10 acres. The following figures show the distribution of parcels, acres, and forested acres among size classes (Fairfield County GIS Department & Hocking County Mapping Department).

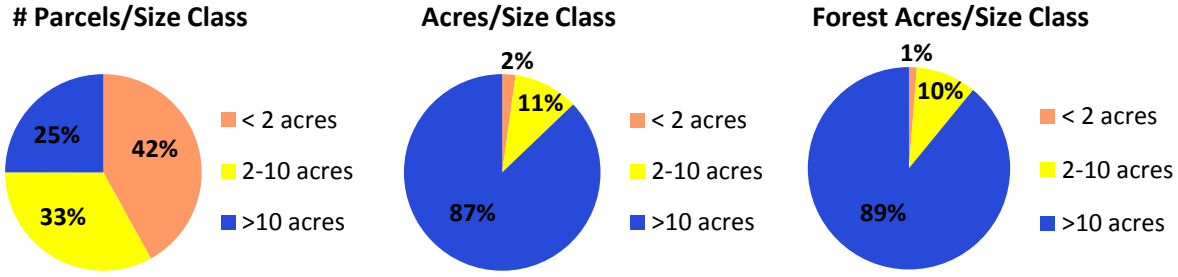


Figure 14. Distribution of Parcels, Acres, & Forested Acres

c. Landowner Interests & Objectives

i. Hocking Hills Woodland Plan Public Landowner Meeting – A total of 35 landowners attended the December 6th meeting. Feedback received from the meeting during small group sessions is shown in Table 7.

Table 7. Hocking Hills Woodland Plan Public Landowner Meeting Small Group Feedback	
Why are your woods important to you? (top 5 reason given)	**(1) Wildlife** **(2) Recreation** **(3) Aesthetics** **(4) Providing Woodland Protection** **(5) Supporting Native Plant Communities**
Why are your woods important to you? (other reasons mentioned)	• privacy, timber quality, tourism, hunting, biodiversity, investment, social value/family, solace, peace & quiet, soil protection, educating others, heritage/history, restoring past splendor of woodlands, water protection.

What issues or concerns do you have related to your woods? (top 5 reasons given)	**(1) Woodland Health/Insect Pests & Diseases** **(2) Invasive Plants** **(3) Need to Manage Woodlands for Future Generations** **(4) Soil Erosion** **(5) Water Pollution**
What issues or concerns do you have related to your woods? (other issues/concerns mentioned)	• poor woodland management on neighboring properties, property taxes, over-development, illegal dumping, off-road vehicles, mineral rights, fracking, wetland loss, stream erosion, wildfires, hunting, trespassing, access, fencing, lack of available information, loss of diversity.
Across the broader Hocking Hills region, what should this plan focus on? (top 5 reasons given)	**(1) Landowner Assistance/Education** **(2) Maintaining Healthy Woodlands (insect & disease problems)** **(3) Woodland Protection (tied for 3rd)** **(3) Rare Species Protection (tied for 3rd)** **(3) Riparian Protection (tied for 3rd)** **(3) Invasive Plant Control (tied for 3rd)**
Across the broader Hocking Hills region, what should this plan focus on? (other things mentioned)	• land-use change/planning, timber stand improvement, biodiversity protection, stopping fragmentation, woodland regeneration, global warming, maintaining property values, address transfer of land issues, bring together diversity of people and divergent goals/interests, educating the general public.

ii. Hocking Hills Woodland Owner Survey – From Nov 5 – Dec 10, a total of 76 landowners filled out the survey (19/76 survey participants also attended the public landowner meeting). Results of the woodland owner survey are shown in Figures 15 – 26.

Figure 15a. Woodland Survey Question # 3: How long have you owned your woods? (<10 acres)

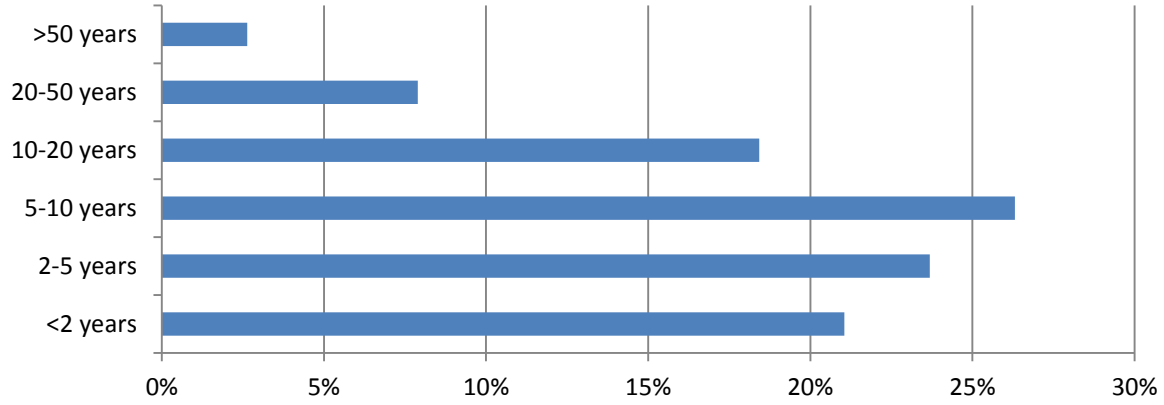


Figure 15b. Woodland Survey Question # 3: How long have you owned your woods? (>10 acres)

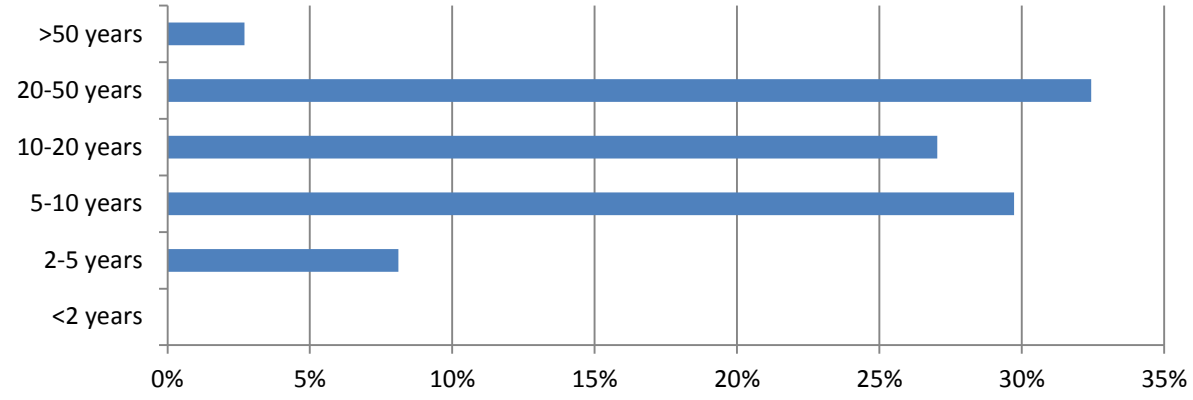


Figure 16a. Woodland Survey Question # 4: Do you live on your wooded property? (<10 acres)

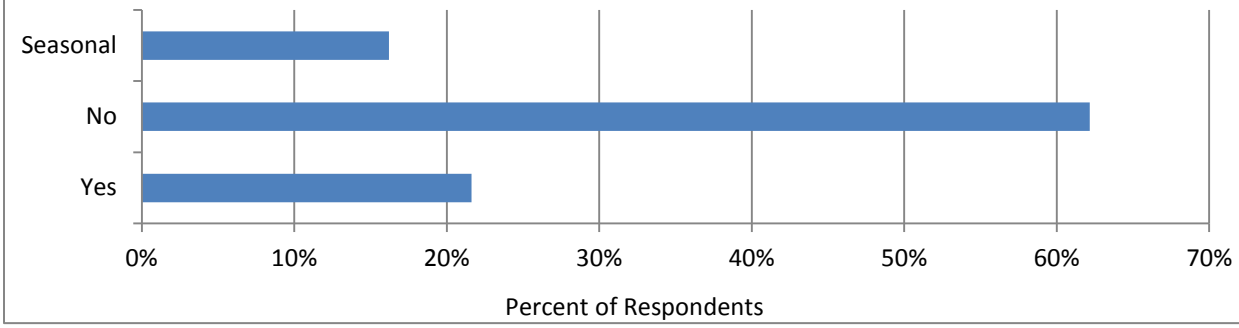


Figure 16b. Woodland Survey Question # 5: Do you live on your wooded property? (>10 acres)

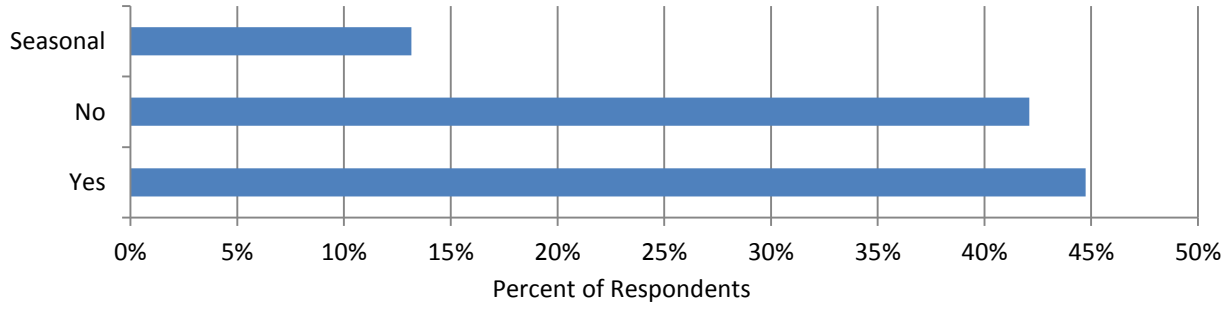


Figure 17a. Woodland Survey Question # 6: Please rate the following woodland benefits and services on a scale of 1 to 5, with 5 being the highest and 1, the lowest. (<10 acres)

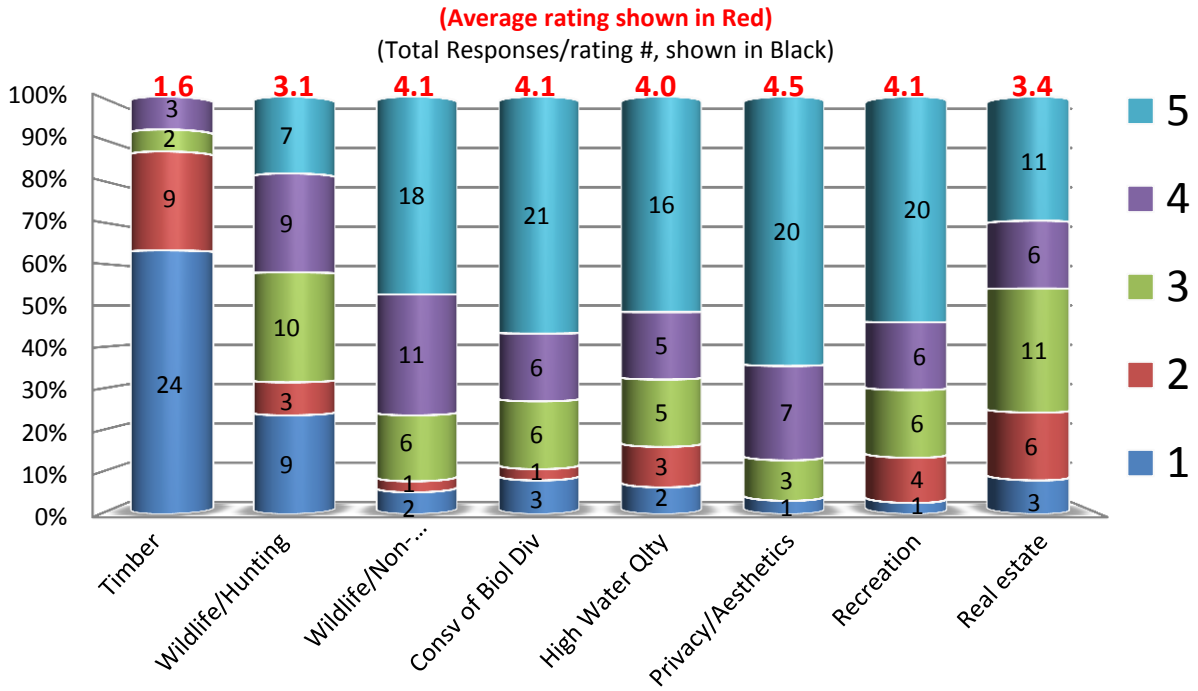


Figure 17b. Woodland Survey Question # 6: Please rate the following woodland benefits and services on a scale of 1 to 5, with 5 being the highest and 1, the lowest. (>10 acres)

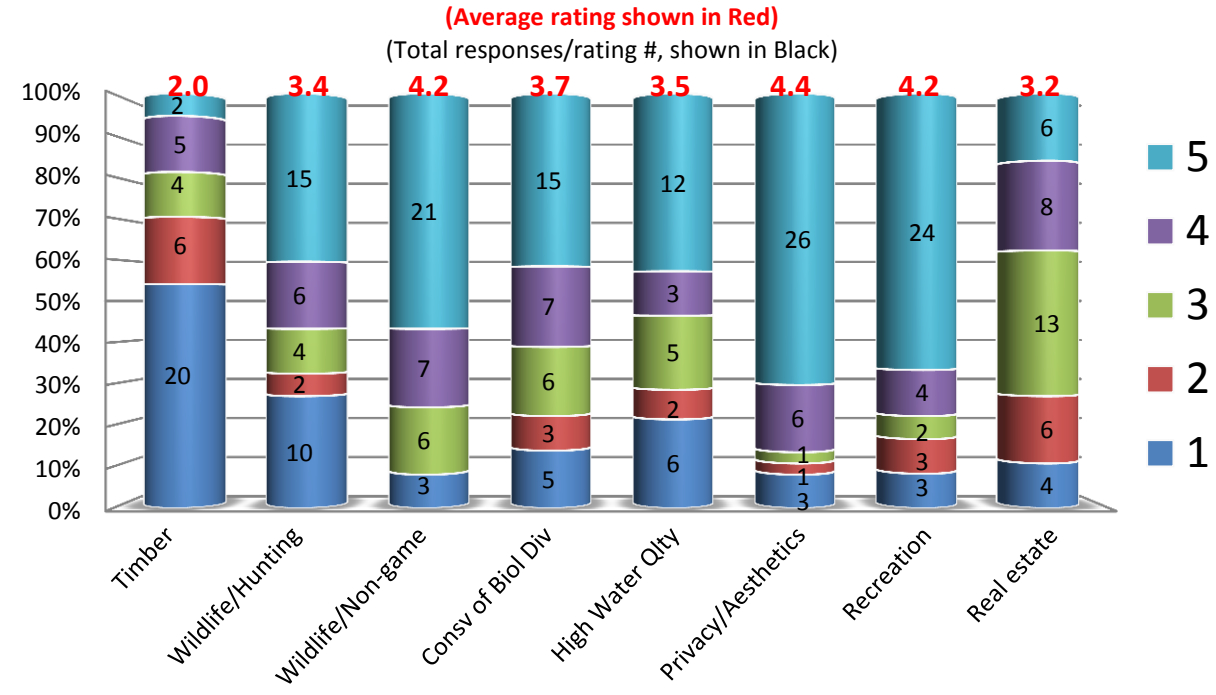


Figure 18a. Woodland Survey Question # 7: Please rate the following woodland threats on a scale of 1 to 5, with 5 being the highest and 1, the lowest. (<10 acres)

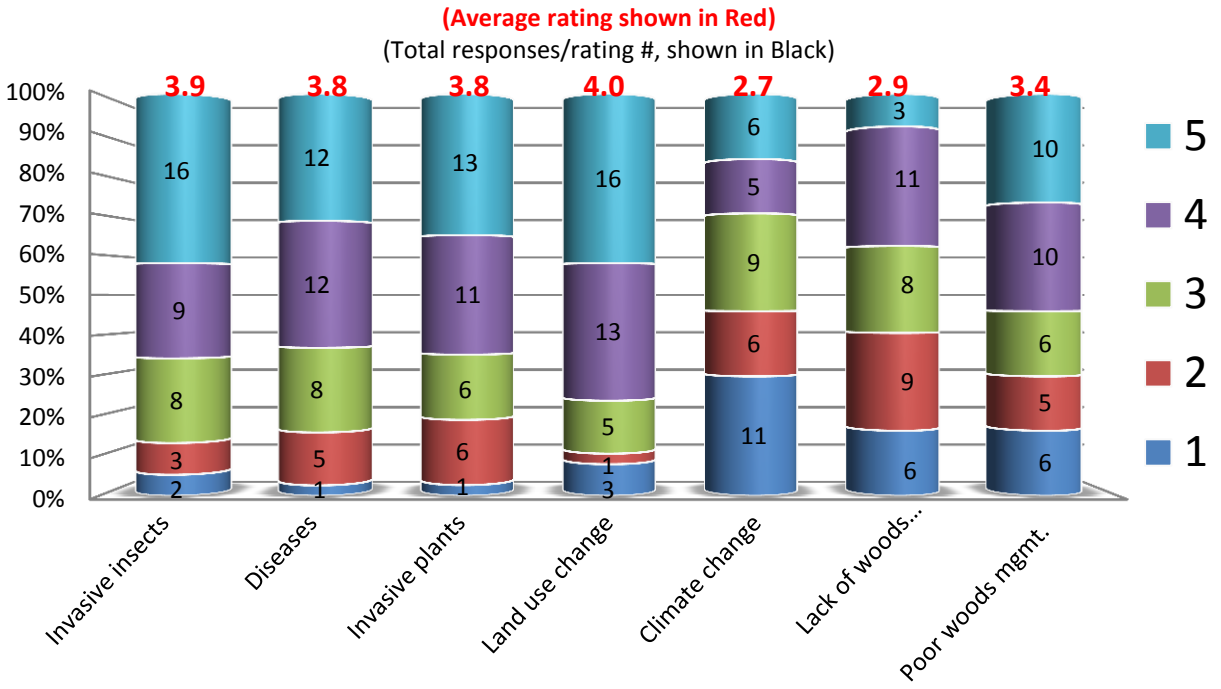


Figure 18b. Woodland Survey Question # 7: Please rate the following woodland threats on a scale of 1 to 5, with 5 being the highest and 1, the lowest. (>10 acres)

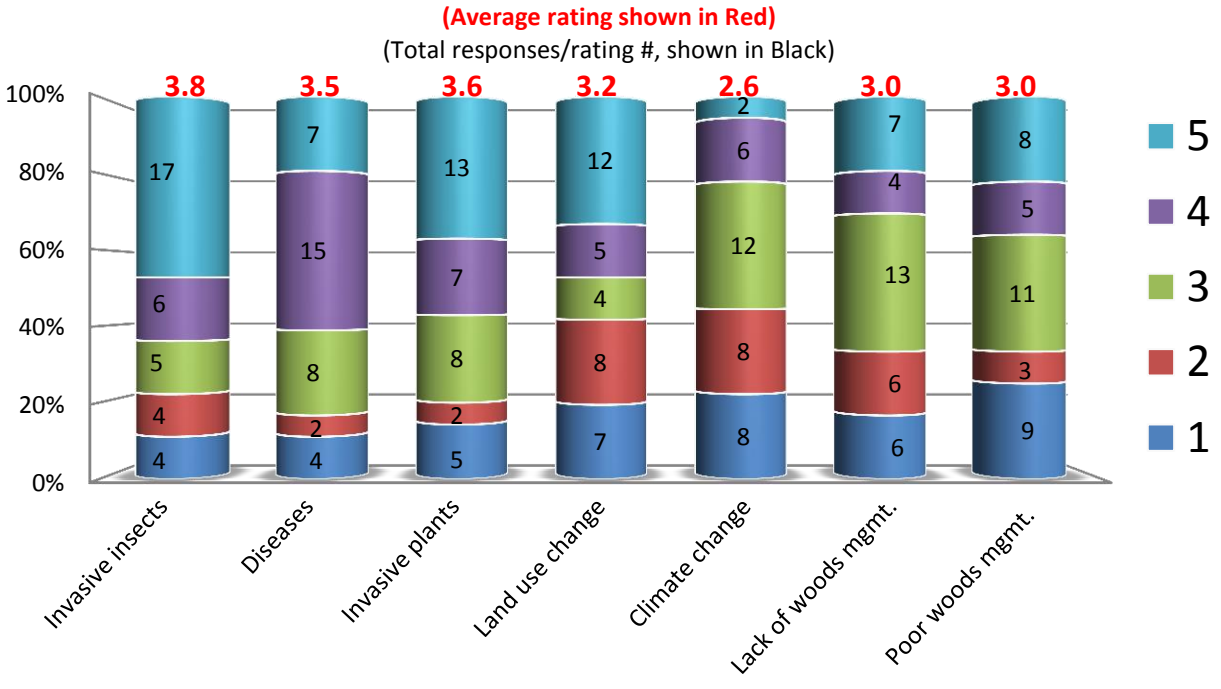


Figure 19a. Woodland Survey Question # 8: Where do (or would) you go to get information about trees, woods, woodland wildlife, or other related topics? Rate your preference for each on a scale of 1 to 5, with 5 being highest and 1, the lowest. (<10 acres)

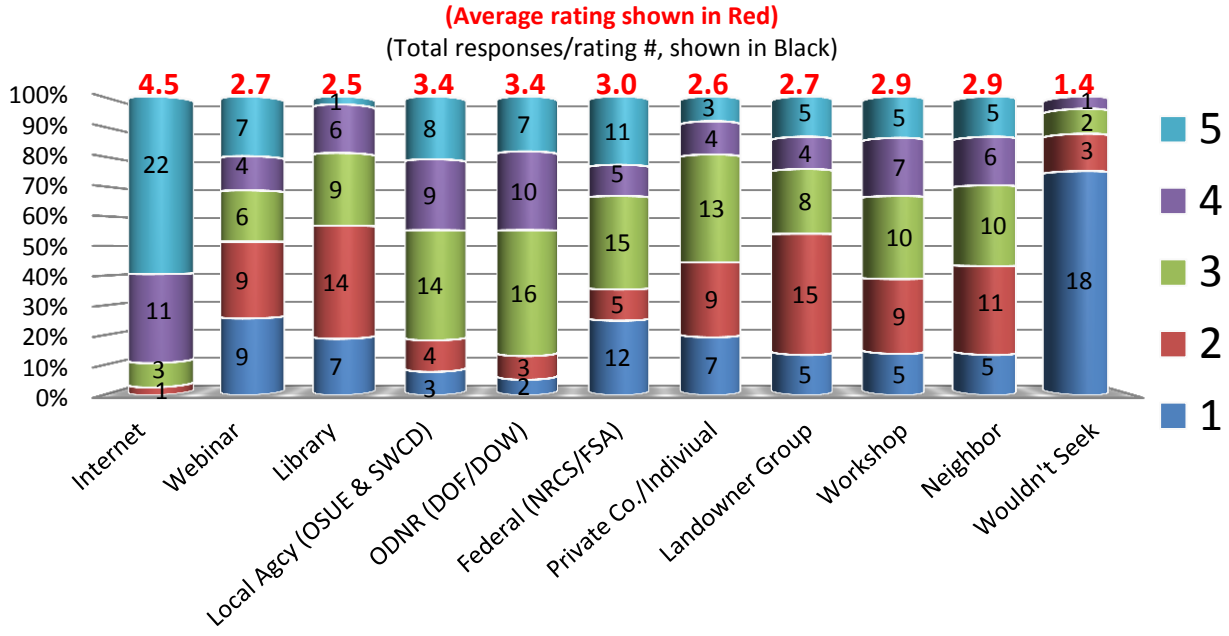


Figure 19b. Woodland Survey Question # 8: Where do (or would) you go to get information about trees, woods, woodland wildlife, or other related topics? Rate your preference for each on a scale of 1 to 5, with 5 being highest and 1, the lowest. (>10 acres)

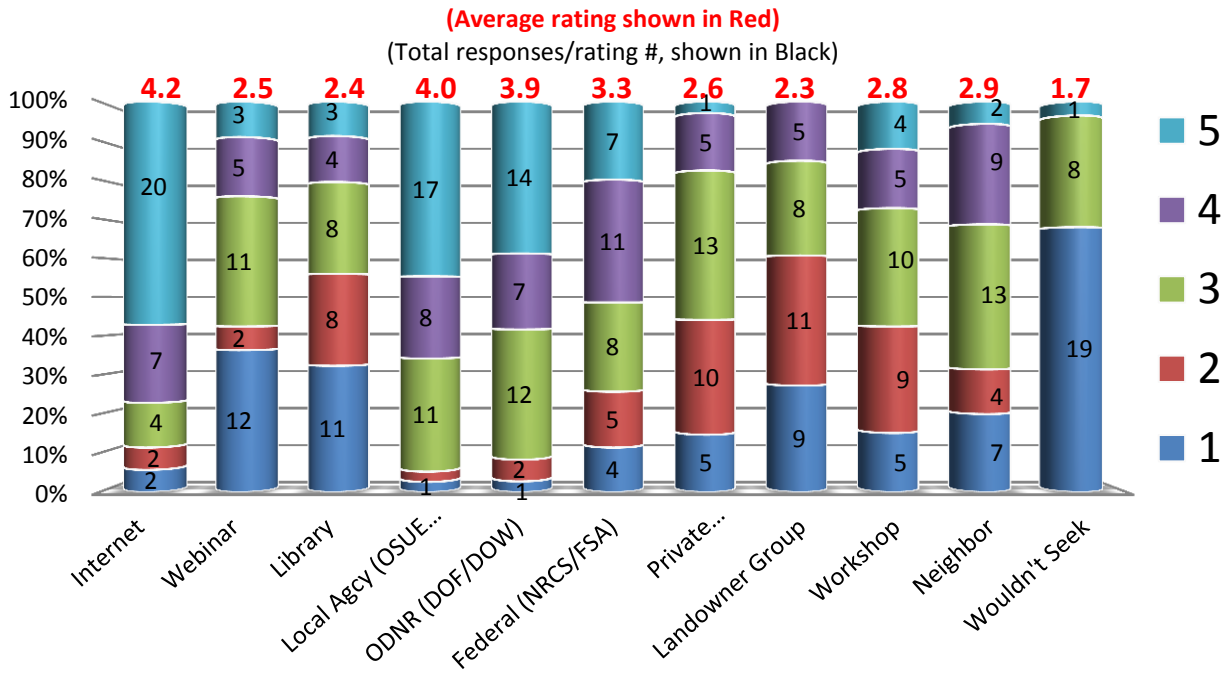


Figure 20a. Woodland Survey Question # 9: What makes you interested in improving your woodland property? Rate the following with 5 being your greatest motivation and 1, the lowest. (<10 acres)

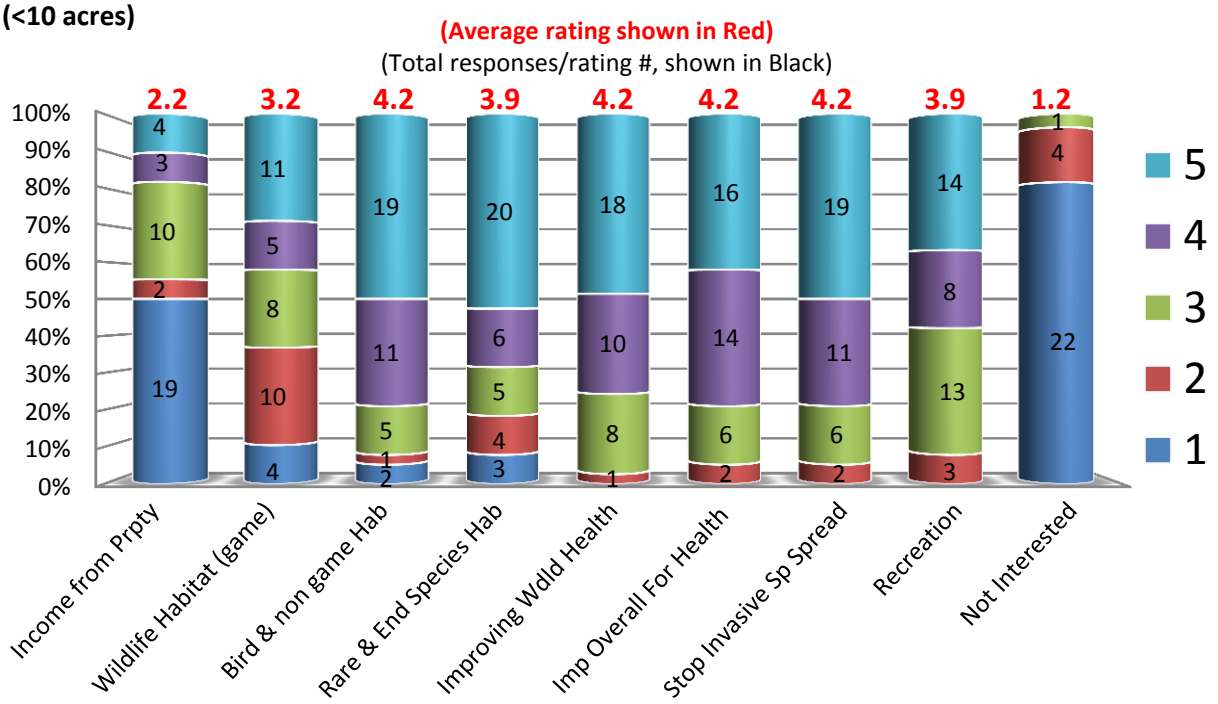


Figure 20b. Woodland Survey Question # 9: What makes you interested in improving your woodland property? Rate the following with 5 being your greatest motivation and 1, the lowest. (>10 acres)

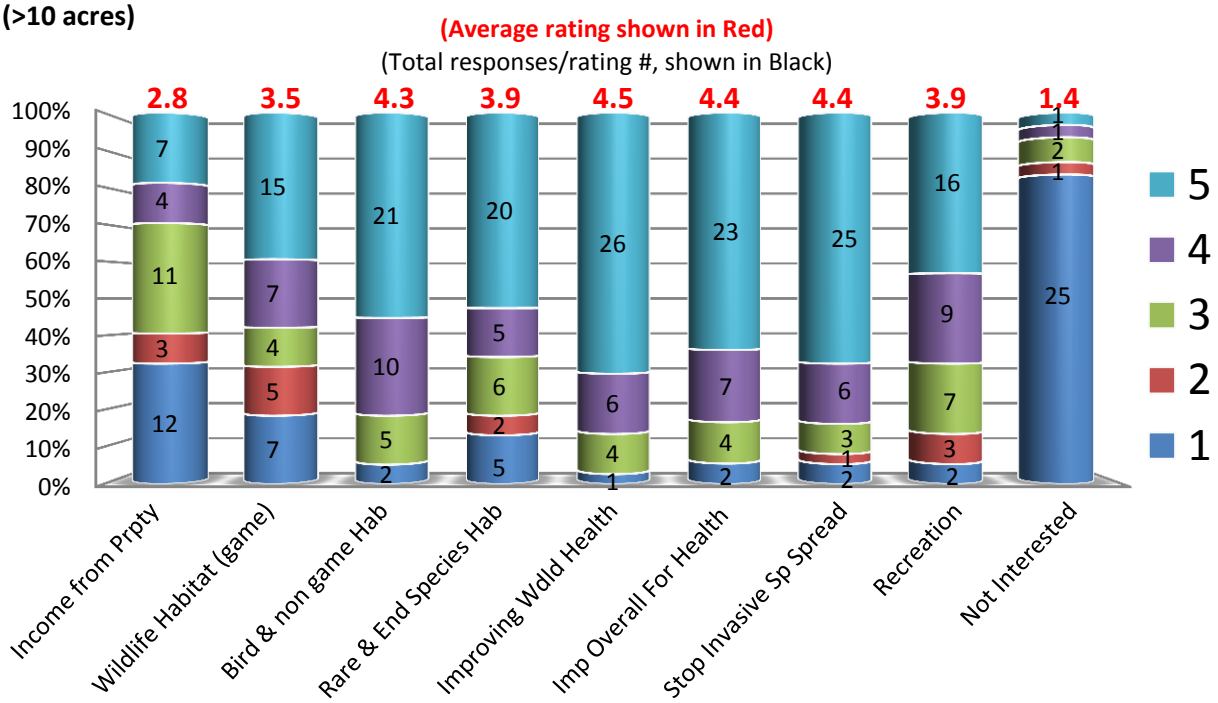


Figure 21a. Woodland Survey Question # 10: Have you ever received advice from a natural resource professional (forester, wildlife biologist, etc.) on managing your woods? (<10 acres)

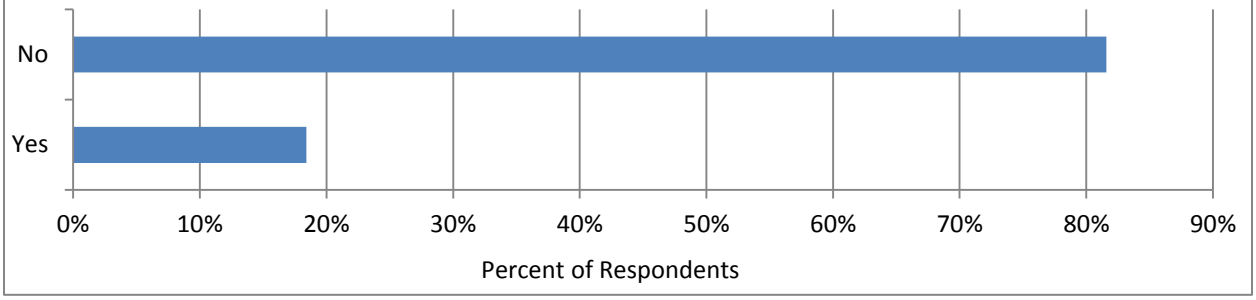


Figure 21b. Woodland Survey Question # 10: Have you ever received advice from a natural resource professional (forester, wildlife biologist, etc.) on managing your woods? (>10 acres)

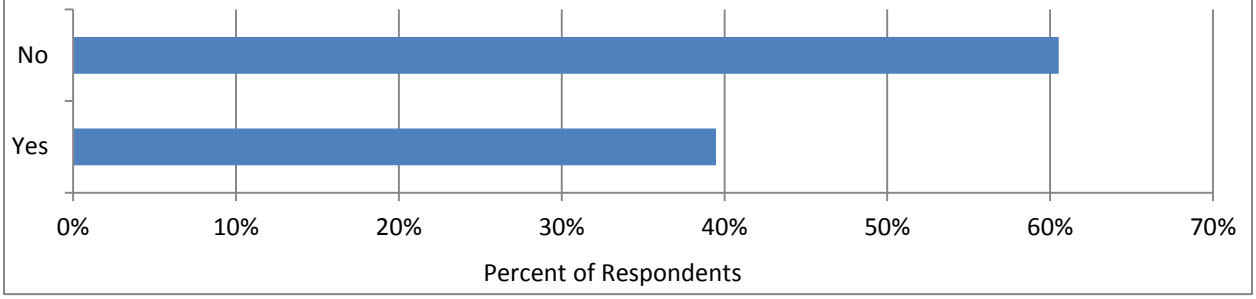


Figure 22a. Woodland Survey Question # 11: What option best describes your participation in woodland managment? (<10 acres)

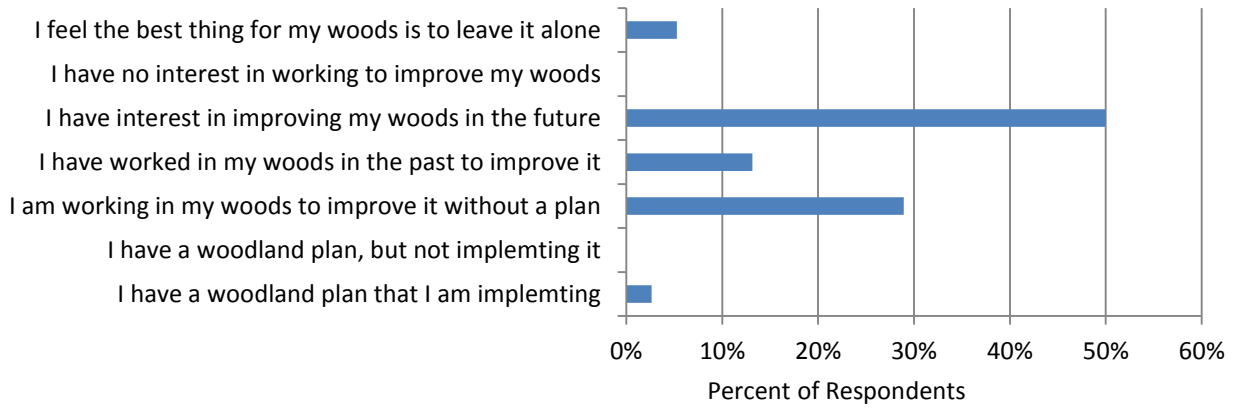


Figure 22b. Woodland Survey Question # 11: What option best describes your participation in woodland managment? (>10 acres)

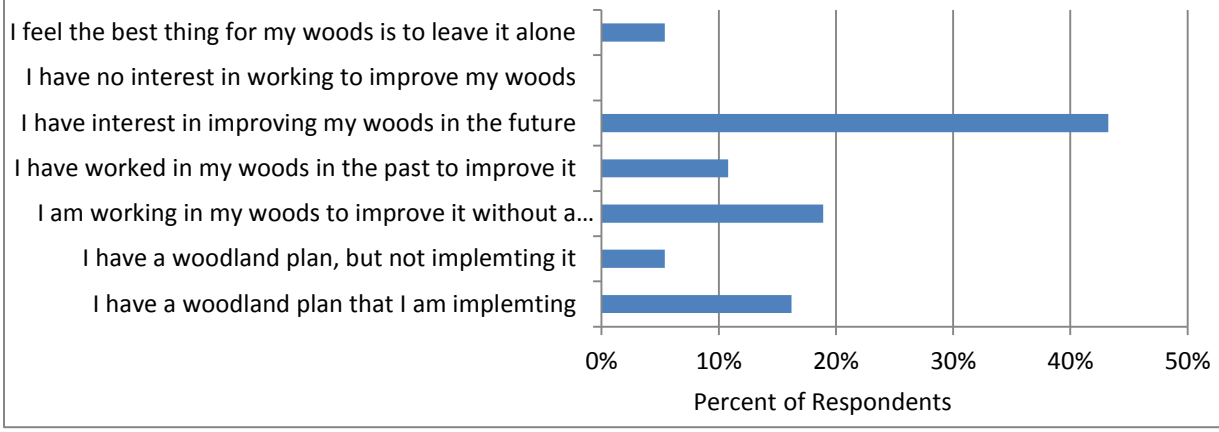


Figure 23a. Woodland Survey Question # 12: If you have a woodland management plan who wrote it? (<10 acres)

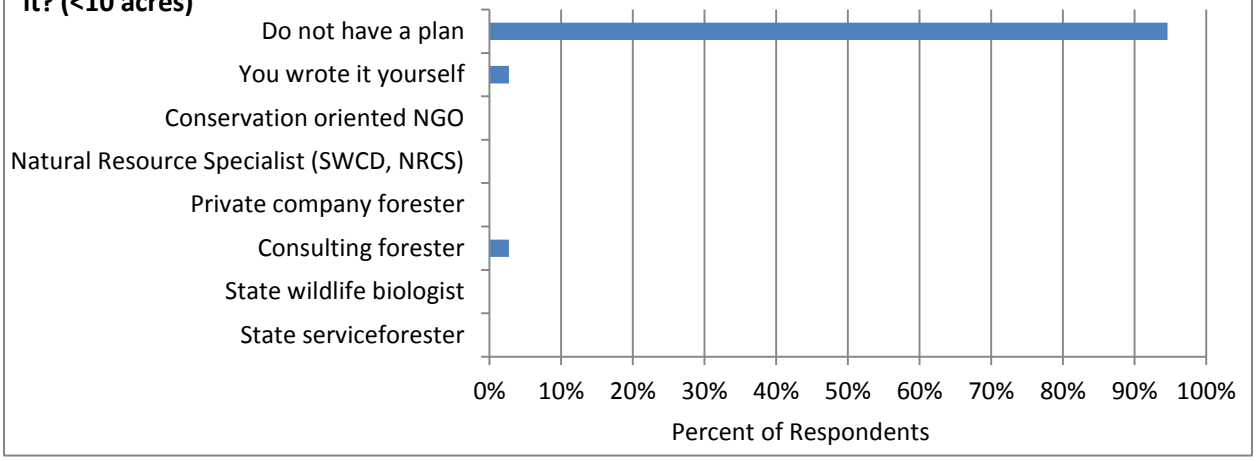


Figure 23b. Woodland Survey Question # 12: If you have a woodland management plan who wrote it? (>10 acres)

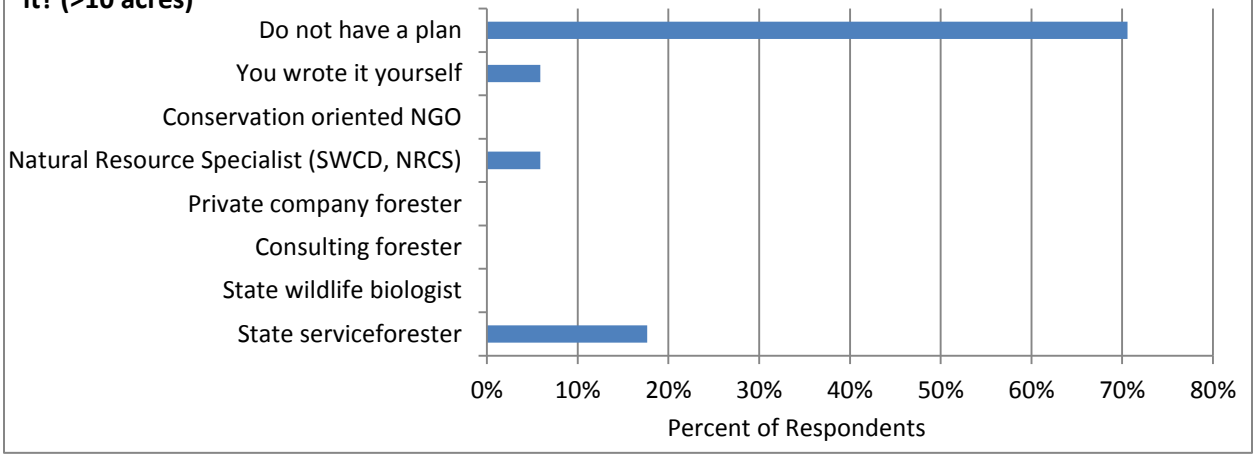


Figure 24a. Woodland Survey Question # 13: If you have worked in your woods, what did you do? (select all that apply) (<10 acres)

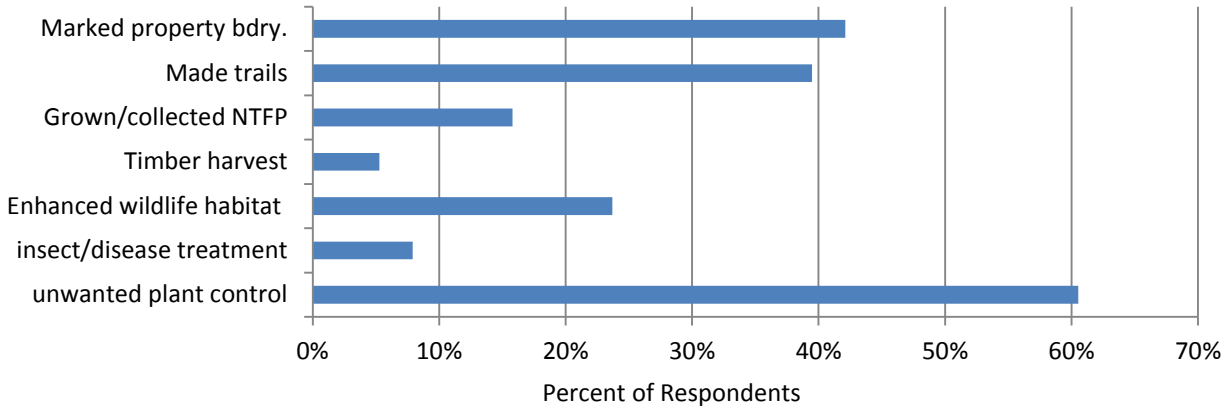


Figure 24b. Woodland Survey Question # 13: If you have worked in your woods, what did you do? (select all that apply) (>10 acres)

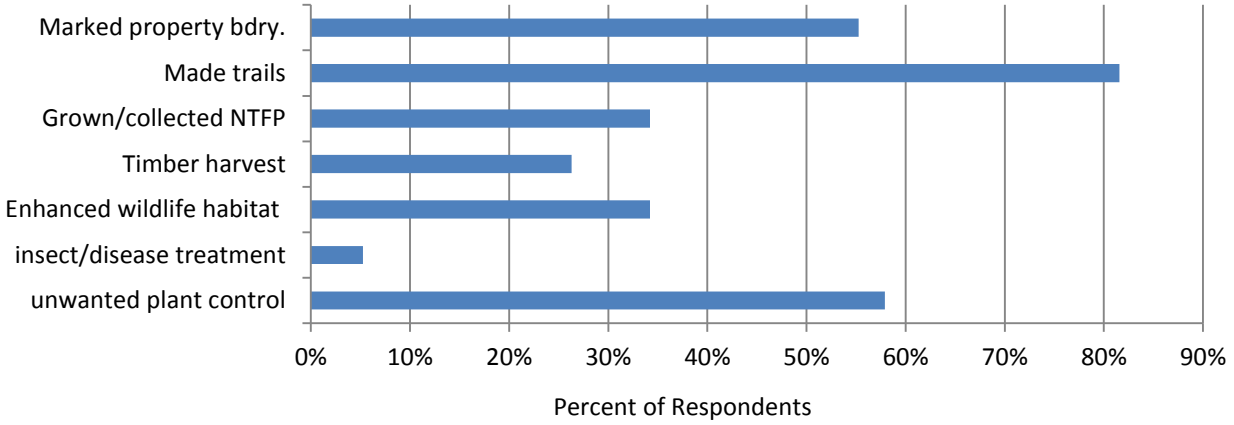


Figure 25a. Woodland Survey Question # 14: How likely are you to do woodland improvement work on your property in the next 6 months? (<10 acres)

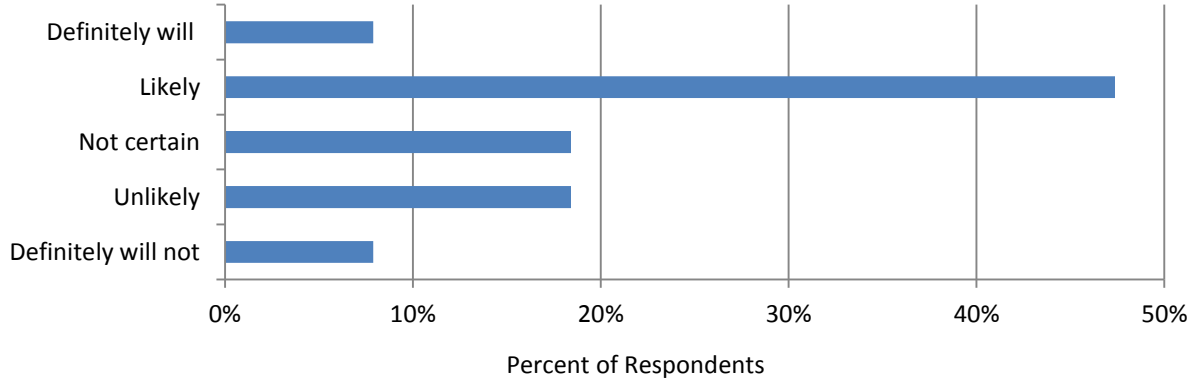


Figure 25b. Woodland Survey Question # 14: How likely are you to do woodland improvement work on your property in the next 6 months? (>10 acres)

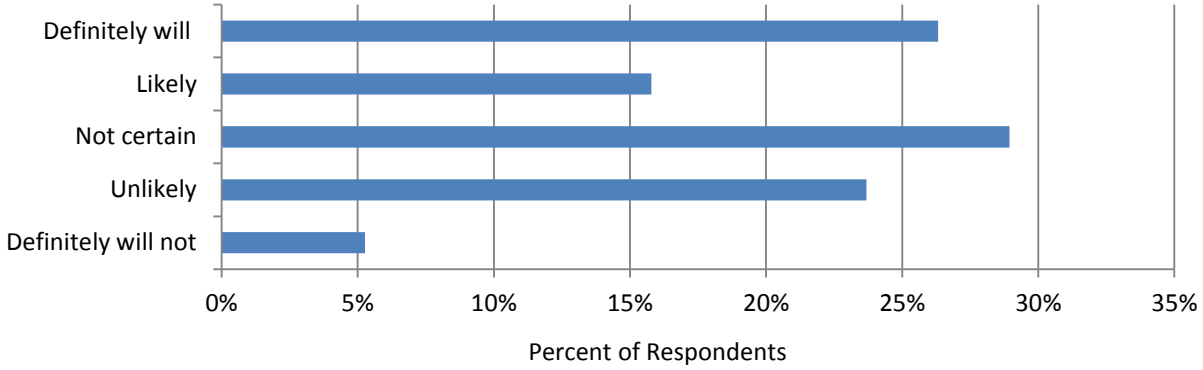


Figure 26a. Woodland Survey Question # 15: What factors keep you from improving your woodland property? (<10 acres)

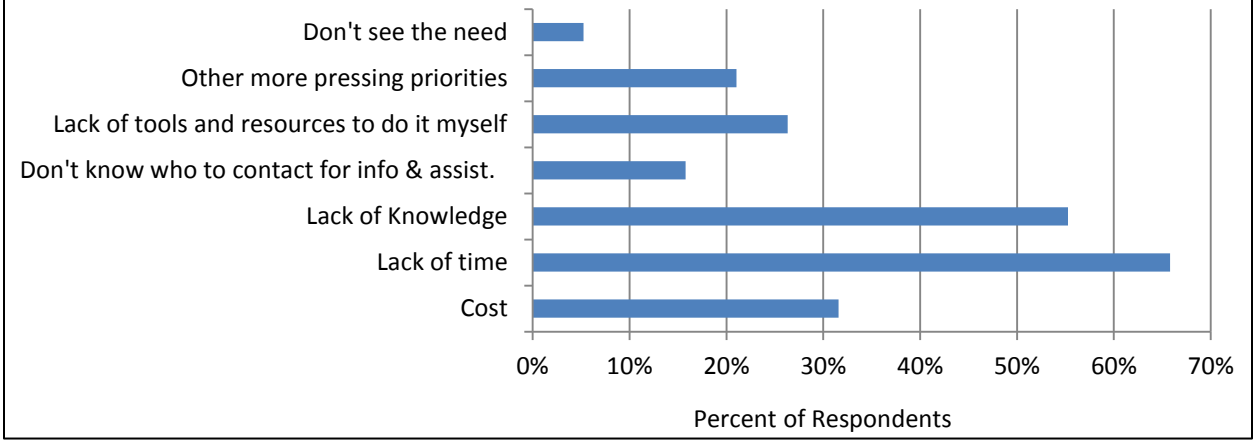
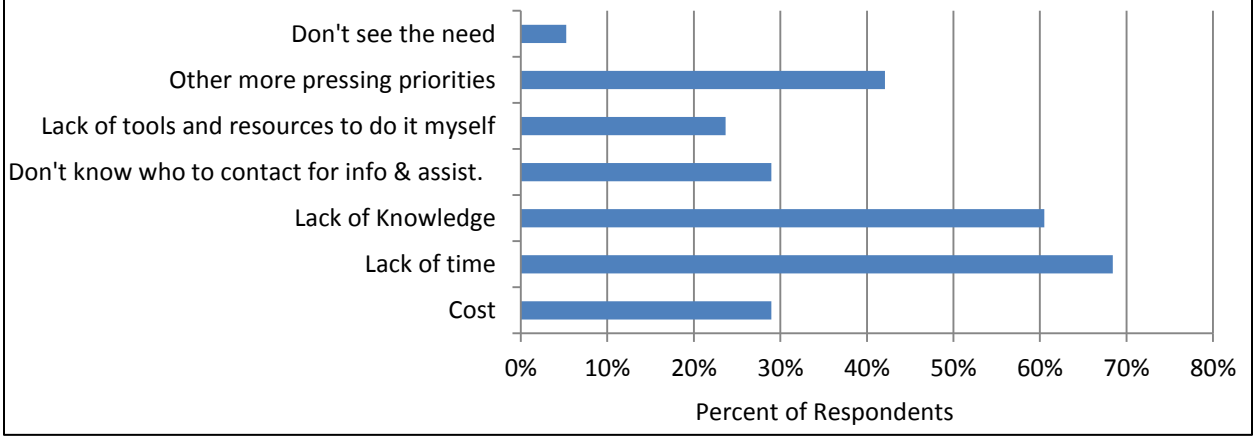


Figure 26b. Woodland Survey Question # 15: What factors keep you from improving your woodland property? (>10 acres)



At the end of the woodland survey there was a section where landowners could leave their contact information if interested in receiving additional information and specify particular interests. Out of the 76 surveys received:

- 56 participants left contact information of some kind with us.
- 31 participants checked that they would like to have someone contact them regarding this plan.
- 43 participants checked that they would like to be informed of upcoming meetings.
- 9 participants checked that they would be interested in serving on a woodland conservation committee.
- 14 participants checked that they would be interested in future woodland stewardship volunteer opportunities.

iii. Hocking County Comprehensive Plan (2007) – Table 8 summarizes the top concerns mentioned during public meetings held in Benton, Falls, Good Hope, Green, & Laurel townships during the spring of 2003 for the development of the Hocking County Comprehensive Plan (2007).

Table 8. Summary of issues & concerns brought up during township meeting held in Benton, Falls, Good Hope, Green, & Laurel Townships. (Hocking County Comprehensive Plan 2007)

Natural Resource Concerns	Legal-Political Concerns	Socio-Economic Concerns
Best Management Practices—Timber Harvesting (needed)	**Development** (need regulation, smart growth)	**Bike Paths** (more needed)
Conservation Development (needed)	**Dumping, Illegal Junk Cars** (enforcement needed)	**Cell Towers & Light Pollution** (need restrictions)
Erosion on Construction Sites	**Landowner Rights** (need to be preserved)	**Conservation Easements** (preservation of farms and forests)
Farmland Preservation (needed)	**Land Use** (needs to be locally controlled)	**Development** (regulation of future development)
Flood Frequency	**Land Use** (too many regulations)	**Factory Farms** (need restrictions)
Floodplain Regulations (enforcement needed)	**Oil & Gas** (enforcement needed)	**Failing Leach Fields**
Groundwater Protection (needed)	**Sewer/Water Infrastructure** (needs restrictions)	**Historic & Cultural Areas** (protection needed)
Groundwater Quality (poor quality in areas)	**Tax Exempt Land** (restrict federal & state land purchases)	**Infrastructure** (need development of sewer & water)
Historic Places & Building (preservation needed)	**Timber Harvests** (need restrictions)	**Jobs & Businesses** (more needed)
Mine Subsidence	**Utility Right-of-Way's** (control of pipelines & transmission lines)	**Landowner Rights** (need to be preserved)
Scenic Beauty Protection (needed)	**Zoning** (not needed)	**Property Taxes** (too high)
Soils too Shallow for Leach Fields	**Zoning** (needed for smart growth)	**Smart Growth** (support development on small tracts)
Waste Disposal Facilities/Landfills (against)		**Steep Slopes** (Limited Land for Development)
		Tax Exempt Lands (reduce tax base)
		Timber Harvests (needed for economy)
		Tourism (threatens the natural beauty of the area)
		Unsightly Homesteads, Junk, & Trash
		Water Availability (need to restrict industrial water use)
		Zoning (needed to limit growth)

iv. National Woodland Owner Survey (NWOS) – State wide data on landowner interests and objectives from the NWOS found that the top 3 concerns in the state are: (1) insect and plant disease, (2) property taxes, and (3) trespassing (www.engaginglandowners.org/new-landowner-research/sffi-landowner-types). The following figures (27 & 28) are state wide results from the NWOS. These results show that overall state landowners list scenery, privacy, hunting/recreation, and nature or biodiversity as the top reasons for owning woodlands. The survey also shows that many state landowners had either no plans or minimal plans for woodland activities on their property during the next 5 years.

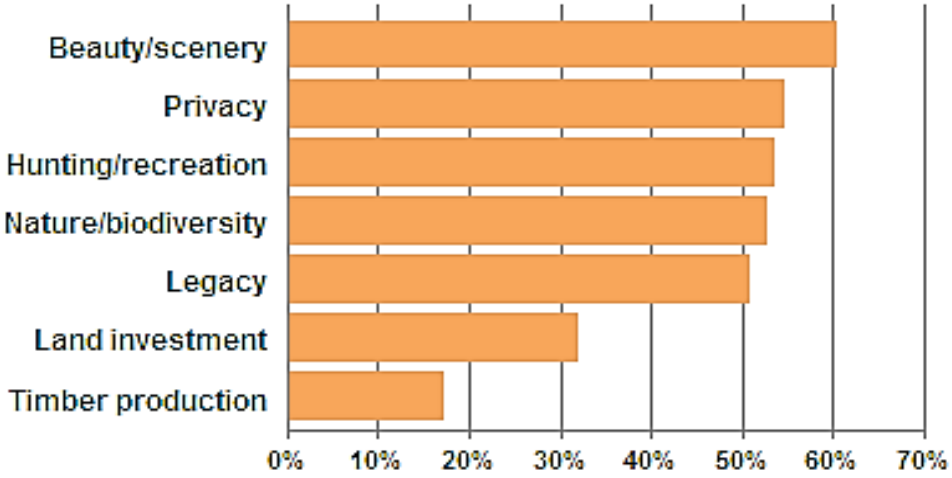


Figure 27. Reasons listed for owning woodlands (NWOS 2002-2006, statewide data)

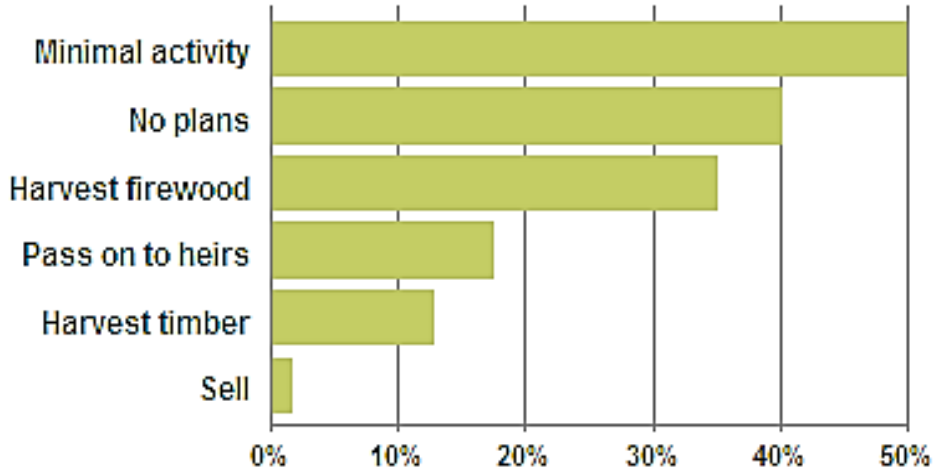


Figure 28. Planned activities in the next 5 years (NWOS 2002-2006, statewide data)

IV. Economic Conditions

a. Employment – A breakdown of occupations, industries, major employers, and agricultural facts for Hocking or Fairfield County is included on the County Profile Factsheets prepared for each county by the Ohio Department of Development Office of Policy, Research and Strategic Planning. The Hocking County factsheet indicates that the top industries are: local governments, leisure/hospitality providers, trade/transportation/utility providers,

manufacturing producers, education/health providers, and state governments, listed in order of largest employee base to smallest. Notable employers in the county include: Amanda Bent Bolt Co., General Electric Co., Gabriel Logan, Hocking Valley Community Hospital, Kilbarger Construction, Kroger Co., Logan-Hocking Local Schools, Smead Manufacturing Co., State of Ohio, and Wal-Mart Stores Inc. Hocking County's factsheet is found online at: development.ohio.gov/files/research/C1038.pdf.

The Fairfield County factsheet indicates the top industries are: trade/transportation/utility providers, education/health providers, local governments, leisure/hospitality providers, manufacturing producers, and professional/business services, listed in order of largest employee base to smallest. Notable employers in the county include: Anchor Hocking Corp., Cyril-Scott Co., Fairfield County, Fairfield Medical Center, Glasfloss Industries, Kroger Co., Lancaster City Schools, McDermott Int'l/Diamond Power, Nifco America, Pickerington Local Schools, Ralcorp/Ralston Foods, State of Ohio, and Westerman Companies. Fairfield County's factsheet is found online at: development.ohio.gov/files/research/C1024.pdf.

Additional information can be found from the 2010 US Census County Quick Facts Website: quickfacts.census.gov/qfd/states/39/39073lk.html (Hocking County) & quickfacts.census.gov/qfd/states/39/39045lk.html (Fairfield County).

b. Unemployment – Estimates made in July of 2012 put Hocking County's unemployment rate at 7.9 percent, and Fairfield County's unemployment at 6.4 percent which is dramatically down from the recent highs in February of 2010, 13.5 percent (Hocking) and 10.1 percent (Fairfield). Both counties have had their lowest estimated unemployment rates in the past 6 years in October of 2006, 5 percent (Hocking) and 4.3 percent (Fairfield), (Ohio Department of Job and Family Services 2012) & (Economagic.com: Economic Time Series Page; www.economagic.com/em-cgi/data.exe/blsla/laucn390730000000003 & www.economagic.com/em-cgi/data.exe/blsla/laucn390450000000003).

c. Employment in Natural Resources – Data obtained from the 2010 US Census County Business Patterns Website was used to produce Table 9, which shows Hocking County Employers working with natural resources. In Forestry, Hocking County ranked 6th of Ohio Counties for total timber production including sawlogs and pulpwood. For just pulpwood production Hocking County ranked 3rd highest. Fairfield County ranked 40th for total timber production with all of it being in sawlogs (USDA Forest Service 2007).

Table 9. Hocking County Employers in Forest Products		
Industry Classification System Code	Reference Year	Number of establishments
Forestry and logging	2010	2
Wood product manufacturing (sawmills, millwork, wood container, pallet, & other wood products)	2010	7
Paper manufacturing	2010	0
Converted paper manufacturing	2010	3

You can find information regarding Fairfield County's forest economy in Ohio State University Extension's factsheet titled "Fairfield County's Forest Economy" which is available on line at ohiowood.osu.edu/images/F_77_12_Fairfield.pdf.

V. Groundwater Resources

In both Hocking County and Fairfield County the most productive groundwater resource is the alluvial deposits in pre-glacial and post glacial valleys which mirror the above ground valleys, primarily the Hocking and Salt Creek Valleys. These deposits are capable of producing 100 – 1000 gallons of water per minute. It is especially important to protect this water source since it supplies many communities with drinking water and because it is found above the bedrock which means it has no rock buffer from rainwater recharge and any potential pollutants that could come with it. Outside of the river valleys the primary source of groundwater is found in the sandstone bedrock formations and to a lesser degree in the inter-bedded sandstone and shale layers. Some of these areas are capable of producing 10 to 25 gallon per minute which is suitable for single homesteads but would not support a commercial industry. However, areas of eastern and southwestern Hocking County have very meager amounts of available groundwater and need to pump water in from outside areas by pipeline.

VI. Soils

a. Description of Soil Series—Plan Area

- *Amanda*—consists of very deep, well drained soils formed on loamy till and a thin layer of loess in some areas. These soils are generally found on the backslopes, footslopes, shoulders, and summits of glacial moraines. Permeability is moderate to moderately slow. Slopes range from 2 to 35 percent
- *Bennington*—consists of deep, somewhat poorly drained, slowly permeable soils formed in calcareous Wisconsinan glacial till in swales, in depressions, and the flats of till plains. Slopes range from 0 to 3 percent.
- *Berks*—consists of moderately deep, well drained soils formed in shale, siltstone, and sandstone residuum on upland hillsides. Permeability is moderate or moderately rapid. Slopes range from 25 to 70 percent.

- *Brownsville*—consists of deep, well drained soils with moderate or moderately rapid permeability formed in colluvium and residuum weathered from fractured siltstone and very fine grained sandstone. Slopes range from 2 to 70 percent.

- *Centerburg*—consists of very deep, moderately well drained soils formed in loamy till on till plains and moraines. These soils are generally found on backslopes, footslopes, shoulders, and summits. Permeability is moderate to moderately slow. Slopes ranges from 2 to 12 percent.

- *Chagrin*—consists of deep, well drained, moderately permeable soils formed in alluvium on flood plains. Slopes range from 0 to 2 percent.

- *Cincinnati*—consists of deep, well drained soils formed in loess and in the underlying Illinoian glacial till. These soils are on ridge tops and hillsides on till plains. They have a fragipan. Permeability is moderate above the fragipan and moderately slow or slow in and below the fragipan. Slopes range from 2 to 12 percent

- *Dekalb*—consists of moderately deep, well drained, rapidly permeable soils formed in sandstone and siltstone residuum on upland hillsides. Slopes range from 40 to 70 percent.

- *Eldean*—consists of very deep, well drained soils that are moderately deep, calcareous sandy and gravelly material. They formed in outwash materials dominantly of limestone origin on outwash terraces, kames, and moraines. In some places, the upper part of the solum formed in silty or loamy alluvium or in loess as much as 18 inches thick. Permeability is moderate to moderately slow in the solum and rapid to very rapid in the substratum. Slopes range from 0 to 12 percent.

- *Euclid*—consists of deep, somewhat poorly drained, moderately slowly permeable soils formed in stratified, silty sediments on low terraces. Slopes range from 0 to 2 percent.

- *Glenford*—consists of deep, moderately well drained soils with a moderately slow permeability, on lacustrine terraces. These soils formed in stratified, silty glaciolacustrine sediments. Slopes range from 0 to 6 percent.

- *Guernsey*—consists of deep, moderately well drained soils with a moderate to slow permeablility on upland ridgetops and hillsides. These soils formed in loess and in the underlying material weathererd from shale and some siltstone. Slopes range from 8 to 70 percent.

- *Homewood*--consists of very deep, moderately well drained soils that have a moderately deep or shallow fragipan. These soils formed in a thin loess up to 22 inches thick in the underlying weathered Illinoian till. These soils are generally found on till plains. Permeability is moderate above the fragipan and slow in the fragipan. Slope ranges from 2 to 40 percent.

- *Latham*—consists of moderately deep, moderately well drained soils formed in residuum from acid shale and interbedded siltstone in some places on uplands. Permeability is slow. Slope ranges from 2 to 70 percent.

- *Ockley*—consists of very deep, well drained soils that are deep or very deep to calcareous, stratified sandy and gravelly outwash. The Ockley soils formed in loess up to 20 inches, or silty material and in the underlying loamy outwash. They are commonly found on stream terraces and outwash plains, and less commonly on kame moraines and eskers. Permeability is moderate in the solum and very rapid in the underlying material. Slope ranges from 0 to 20 percent.

- *Otwell*—consists of deep, well drained and moderately well drained, very slowly permeable soils on terraces. These soils formed dominantly in loess and the underlying lacustrine deposits. In some areas, however, the lower part of the soils formed in outwash deposits. Slope ranges from 2 to 18 percent.

- *Shelocta*—consists of deep, well drained, moderately permeable soils on upland hillsides and ridgetops. These soils formed in colluvium and residuum derived from sandstone, siltstone, and shale. Slope ranges from 8 to 70 percent.

- *Sleeth*—consists of very deep, somewhat poorly drained soils that are deep to calcareous, stratified gravelly and sandy outwash. Sleeth soils formed in loamy outwash. A mantle of loess or other silty material up to 20 inches thick in some areas. They are on outwash terraces, stream terraces, and outwash plains. Permeability is moderate in the loamy outwash and very rapid in the underlying gravelly and sandy outwash. Slope ranges from 0 to 2 percent.

- *Steinsburg*—consists of moderately deep and well drained soils with a moderately rapid permeability. They formed in residuum mostly from weakly cemented acid sandstone, arkosic sandstone, and conglomerate. They are on upland slopes of 6 to 70 percent.

- *Westmoreland*—consists of deep, well drained, moderately permeable soils formed in colluvium and residuum derived from siltstone, sandstone, and shale on upland ridgetops and hillsides. Slope ranges from 15 to 70 percent.

- *Wharton*—consists of deep and very deep, moderately well drained soils formed in residuum from interbedded clay, shale, siltstone, and fine-grained sandstone. They are on uplands. Permeability is slow or moderately slow. Slopes range from 0 to 35 percent.

- *Wheeling*—consists of deep, well drained soils formed in silty alluvium and in the underlying glacial outwash. These soils are on outwash terraces. Permeability is moderate in the solum and rapid in the underlying material. Slope ranges from 0 to 3 percent.

b. Soil Associations

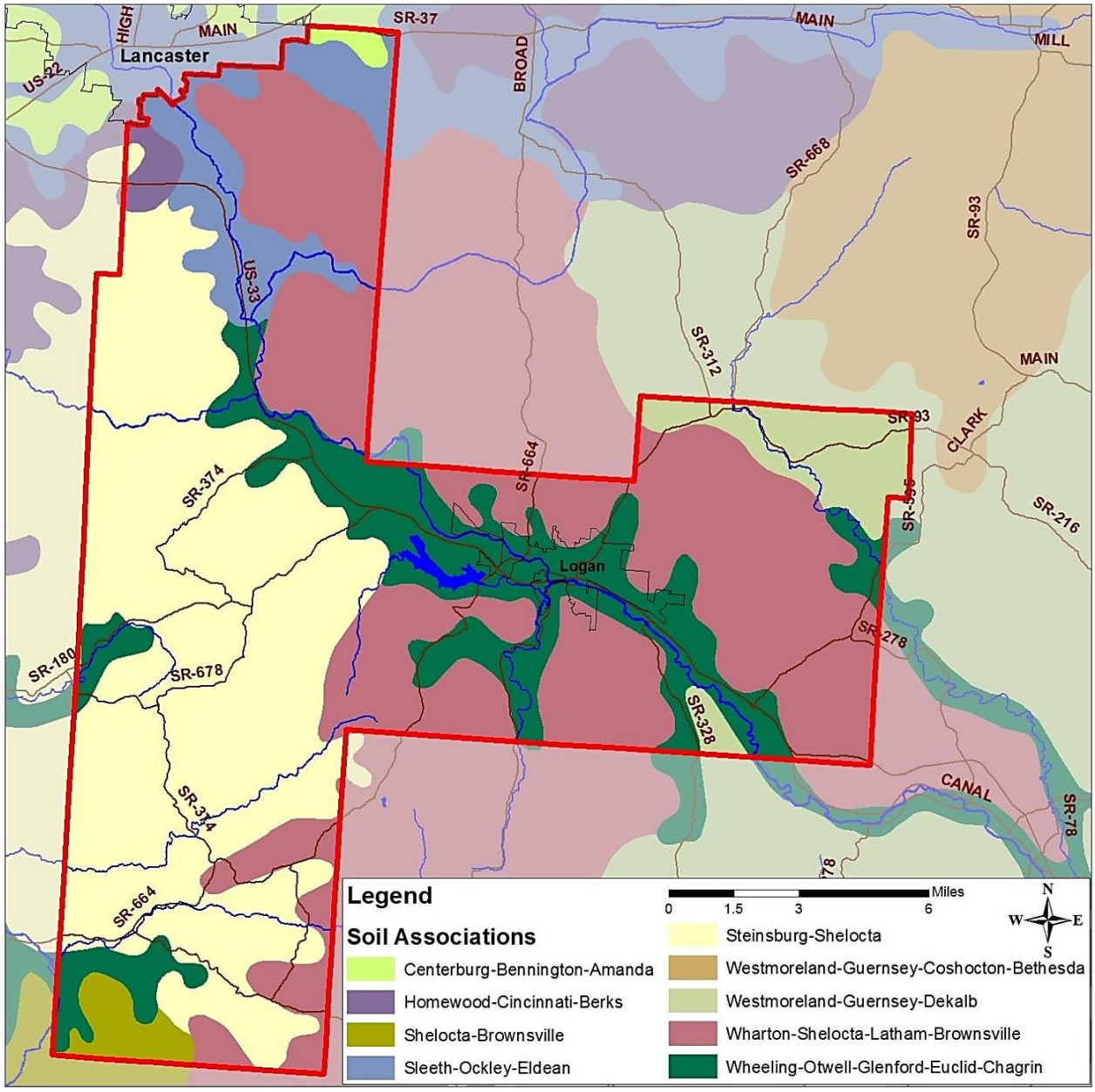


Figure 30. Soil Associations Map—Plan Area (NRCS 2006)

c. For more soil information – contact the Fairfield or Hocking Soil & Water Conservation District and/or view the Fairfield or Hocking County soil surveys found online at: (soilandwater.ohiodnr.gov/portals/soilwater/pdf/soil/surveys/hocking.pdf, or soilandwater.ohiodnr.gov/portals/soilwater/pdf/soil/surveys/fairfield.pdf)

VII. Geology

The exposed bedrock found in the plan area is sedimentary rock mainly consisting of shales, mudstone, siltstone, sandstone, and conglomerates. These rock layers formed 300-360 million years ago in deltaic and marine environments from sediment deposited off the growing Appalachain Mountains. These rock layers are now part of what is considered the Mississipian and Pennsylvanian Systems. Due to tectonic activity in the past these layers dip gently to the

south-southeast with the older Mississippian rock exposed in the western half of the area and the younger Pennsyvannian rock exposed in the eastern half. Many of the popular rock outcrops found in the plan area (Old Man's Cave, Ash Cave, etc.) consist of the Blackhand Sandstone which is part of the Cuyahoga Rock Formation which is part of the Mississippian System. The plan area does not cover any of the widely publicized Marcellus shale layer, however the Utica shale layer is found in the area below the Mississpian strata in the Ordovician aged rock (geosurvey.ohiodnr.gov/portals/geosurvey/PDFs/BedrockGeology/BG-1_8.5x11.pdf).

The plan area lies just south of the historic southern edge of the glacial ice sheets. In the plan area, only the northern half of Berne Township, Fairfield County is thought to have been covered by ice. In Hocking County the glacial ice sheets advanced only up to the extreme western edges of the county. However, glacial melt-waters did help shape the valleys and rock formations in the area while depositing silts, sands, and gravels along the major stream valleys.

The mineral resources of economic importance found in the plan area include coal, clay, gas, gravel, iron ore, oil, and sand. Coal is found mainly in eastern portion of Hocking County. Oil and gas is present in low quantities and since the early 20th century there have been some low-yield oil and gas wells producing in Hocking County. Oil and gas activity has been low in recent years but could increase in the coming years with advances in technology. Iron ore is still present in commercial quantities but currently it is not competitive with other sources and options. During the late 1800's the iron ore industry flourished for a while before it fell apart as high quality substitutes were found elsewhere. (Hocking County Comprehensive Plan, 2007)

VIII. Landowner Resources

- American Tree Farm System – ATFS is a program of American Forest Foundation designed to enhance the quality of America's woodlands by giving woodland owners the tools they need to keep their woodlands healthy and productive. Through this program properties of 10 acres or more can become certified Tree Farms if land owners demonstrate a commitment to sustainable management of their woodlands. (www.treefarmsystem.org)

- Association of Consulting Foresters of America, Inc. – ACF is group of consulting foresters dedicated to advancing the professionalism, ethics, and interest of consulting foresters. Their goal is to set the standards for the consulting forestry profession, to educate and assist landowners in good woodland stewardship, and to inform the public, legislators, and the media on issues sensitive to private landowners and their ability to practice good woodland management. (www.acf-foresters.org)

- Backyard Conservation – Is a Natural Resources Conservation Service program that provides information on how conservation practices that help conserve and improve natural resources in your backyard. These practices help the environment and can make your yard more attractive and enjoyable. Most backyard conservation practices are easy to use. (www.nrcs.usda.gov/wps/portal/nrcs/detail/national/newsroom/features/?&cid=nrcs143_023574)

- Backyard Wildlife – A website by ODNR Division of Wildlife. Providing information on creating wildlife habitat in your backyard. "Your backyard can easily be converted into a mini-refuge for native wildlife. A number of wildlife species have adapted to backyard settings and can be drawn to them by the proper habitat elements. Anyone - even with the smallest parcel of land - can help wildlife by creating habitat areas around their backyard." (wildlife.ohiodnr.gov/wildlife-watching/attracting-wildlife)

- Backyard Woods – An Arbor Day Foundation program designed to assist landowners who want to enhance woodland scenery, provide superb habitat for wildlife, or even utilize backyard woodlands as an extra source of income. (www.arborday.org/backyardwoods/tip-sheets.cfm)

- Call Before You Cut Campaign – an effort to provide in-depth woodland management information to Ohio's 400,000 landowners. (callb4ucut.com)

- Certified Wildlife Habitat – The National Wildlife Federation has a certification program for backyard wildlife habitat. If you meet the requirements your backyard can become certified as wildlife habitat. (www.nwf.org/certifiedwildlifehabitat)

- Conservation Easement – CE is a voluntary but legal agreement between a landowner and a land trust or government agency. It is a way for a landowner to ensure permanent conservation of their property by limiting the type or amount of development on their property while retaining private ownership of the land. The landowner donates/sells the rights to develop or subdivide the land and then the land trust/agency agrees to enforce this agreement. The Landowner maintains the rights to sell their land or pass it on to their heirs but the future owner will be bound by the previous owner's agreement. Each agreement is different and can be tailored to fit a landowner's purposes. For example, a landowner can maintain the right to harvest trees, farm, and even the right to add agricultural structures if it is written into the agreement. Also an easement may apply to all or a portion of the property, and does not need to require public access. If donated, a conservation easement can qualify as a tax-deductible charitable gift and potentially reduce other future taxes. (www.ohiolandtrusts.org), (www.appalachiaohioalliance.org), (www.nature.org)

- Conservation Reserve Program – CRP is a voluntary program administered by the USDA Farm Service Agency. The purpose of the program is to reduce soil erosion, increase wildlife habitat, improve water quality and increase woodlands. CRP provides land rental payments to farmers and landowners who are willing to sign long-term contracts (10-15 years) converting cropland into conservation practices. Practices include filter strips, riparian forest buffers, wetland restorations, and windbreaks. Eligibility varies by soil type and crop history (lands must have a crop history). (www.fsa.usda.gov/FSA/webapp?area=home&subject=copr&topic=crp)

- Environmental Quality Incentives Program – EQIP is a voluntary program administered by the Natural Resource Conservation Service (NRCS). EQIP's Forestry Program is a cost share program

that provides landowners with funds for woodland management practices such as tree planting, grapevine control, crop tree release, forest thinning, and control of woody invasive species. To be eligible a landowner must have a Forest Stewardship Plan, land that is capable of growing trees, and restrict livestock from the woodlands. There is no minimum acreage requirement. (www.nrcs.usda.gov/wps/portal/nrcs/detail/oh/programs/?cid=nrcs144p2_029505)

- Forest Legacy Program – FLP is a partnership between the state of Ohio and the USDA Forest Service to identify and help protect environmentally important forests from conversion to non-forest uses through conservation easements. Forest Legacy conservation easements are legal agreements made with property owners to forever restrict development on their land. Landowners who apply and are selected will be paid the market value of the easement based on an appraisal that is conducted of all Forest Legacy properties. Terms of the agreement are tailored to meet the objectives of the landowner, agency, and the characteristics of the land. The landowner retains ownership of the land and can continue past activities as long as they do not conflict with the terms of the easement. Landowners with land under a working forest agreement are not required to allow public access. However, the landowner will manage the land under a Forest Stewardship Plan and be encouraged to harvest timber and carryout other traditional forest uses. Activities that may disturb the land surface such as strip mining are prohibited, so the landowner must control certain mineral rights in order to participate in the Forest Legacy Program. Oil and gas drilling may be allowed depending on the situation. The conservation easement remains in place if the land is sold. The new owner is still bound by the terms of the easement and may not convert the land to non-forest uses. In addition to gains associated with the sale or donation of property rights, many landowners also benefit from reduced taxes associated with limits placed on land use. To be eligible you must be in a selected Forest Legacy Area. (forestry.ohiodnr.gov/legacyprogram)

- National Wildlife Federation's Backyard Habitat – A program that provides information on how to attract wildlife to your backyard. (www.backyardhabitat.info)

- ODNR Service Foresters – The Ohio Division of Forestry employees 18 service foresters who are uniquely trained to assist private woodland owners who are interested in managing their woodlands. Service foresters can provide landowners with management plans, technical assistance, and information on how to improve woodland health, wildlife habitat, timber production, hunting, or recreation. They also provide assistance on how to plant and establish trees and how to best market and sell woodland products. (forestry.ohiodnr.gov/serviceforesters)

- ODNR Wildlife Private Lands Program – Provides information on managing your land for wildlife; from stream corridors to pastures, prairies, woodlands, and urban landscapes. Also provides sources for planting stock and information on how to build nest boxes. Six private land biologists are employed to assist private landowners. (wildlife.ohiodnr.gov/species-and-habitats/private-lands-management)

- Ohio Forest Tax Law -- OFTL is a voluntary program administered by the Ohio Department of Natural Resources, Division of Forestry, according to the Ohio Revised Code and the Ohio Administrative Code. A landowner must have at least 10 acres of woodlands in order to take advantage of this program. In exchange for the tax reduction conferred by Ohio's forest property tax laws, landowners agree to manage their woodlands for the commercial production of timber and other woodland products and to abide by pertinent rules and regulations. (forestry.ohiodnr.gov/oftl)

- Ohio Forestry Association – OFA supports the management of Ohio's forest resources and improvement of business conditions for the benefits of its members in their endeavors to engage in forestry-related industries and enterprises. OFA maintains a Safety Training and Voluntary Certification Program for logging contractors and their employees. The following requirements are necessary for the Ohio Voluntary Master Logging Companies:

  i. Each trained logger is trained to use Best Management Practices (BMPs) to reduce soil erosion and improve the appearance of timber harvesting activities.
  ii. Each trained logger is trained to employ safe and efficient timber cutting and logging safety practices.
  iii. Each trained logger has current certification in First Aid and CPR.
  iv. The company maintains Workers' Compensation coverage on employees.
  v. The company provides liability coverage on request.
  vi. Each trained logger must participate in advanced training and periodic recertification training.
  vii. Each trained logger must be member of local logger's chapter and the company must be a member of the Ohio Forestry Association, Inc.

  The nearest Master Logger to you can be located at: (www.ohioforest.org/)

- Ohio Society of American Foresters – OSAF's mission is to advance the science, education, technology, and practice of forestry; to enhance the competency of its members; to establish professional excellence; and to use the knowledge, skills, and conservation ethic of the profession to ensure the continued health and use of forest ecosystems and the present and future availability of forest resources to benefit society. OSAF has an online directory of members that provide forestry services to landowners. (ohiosaf.org/findforester)

- Ohio Wood Products – A website where land owners can go to find information on Ohio's timber prices, sawmills, loggers, and firewood dealers. (ohiowood.osu.edu)

- Ohio Woodland Stewards Program – a program promoting stewardship across the woodlands of Ohio through classes, professional workshops and publications. (woodlandstewards.osu.edu)

- Rural Action Sustainable Forestry – Provides resources for woodland owners with a focus on identifying alternative income opportunities, like forest farming of ginseng, goldenseal, and other forest botanicals, as well as how to conduct land restoration projects with native plants,

and mitigating the impacts of non-native invasive species that can adversely affect forest health and diversity. (http://ruralaction.org/programs/forestry/)

- The Woods in Your Backyard – This is a Ohio Woodland Stewards Program workshop for landowners who have a small section of woods out back that they want to learn more about. Learn about which trees and shrubs are 'good' and what they are good for!? Learn how to attract wildlife, improve the health of the trees, and deal with invasive species. (woodlandstewards.osu.edu/classes/woods-your-backyard)

- Trees are good – A website by the International Society of Arboriculture where landowners can go to find information on how to best care for their yard trees and/or how to find a professional tree care service and Certified Arborist. (treesaregood.com)

- Woods in Your Backyard – This is a University of Maryland Extension Program that provides a broad amount of information on small woodlot management. (extension.umd.edu/woodland/woods-your-backyard)

IX. Support of other Natural Resource Plans & Initiatives

- Fairfield County Land Use Plan – A plan that provides vision and framework for the future of Fairfield County by managing growth, fostering stewardship, and encouraging wise investment. Accomplishment of these ideals will permit the county to accommodate continued growth, thereby reaping the benefits of economic prosperity while retaining the charm and inherent attractiveness so important to the citizens of the County. (www.co.fairfield.oh.us/rpc/county_development_strategy_land_use_plan.htm)

- Hocking County Comprehensive Plan – A framework with recommendations for the future of Hocking County including agriculture, forestry, open space, and historic preservation, as well as residential, commercial, industrial and recreational uses. (available at the Hocking County Regional Planner's Office)

- Hocking River Watershed Groups

  i. *Friends of the Hocking River* – FOHR was formed in 1999 by citizens interested in the future of the Hocking River. FOHR members and volunteers represent every county in the watershed. FOHR addresses issues that potentially impact the Hocking River watershed, such as litter prevention/control, mining, dredging, and road construction. FOHR organizes annual river clean-ups and works to improve river access for all citizens. FOHR members regularly access the Hocking River and its tributaries for recreation such as fishing and canoeing. The mission of FOHR is "To preserve the environmental integrity, educate the general public, and promote the wise use of the Hocking River and its watershed." (ohiowatersheds.osu.edu/groups/friends-hocking-river-fohr)

  ii. *Hocking River Commission* – A Watershed Group serving the Hocking River Basin focusing on main stem riparian areas. (ohiowatersheds.osu.edu/groups/hocking-river-commission)

- Hocking State Forest Plan – A plan to guide forest management activities on state forest land. The plan lays out 5 objectives for the state forest: 1) manage forests to ensure the health and sustainability of forest systems, 2) produce high-quality forest products that contribute to local communities, 3) provide recreational opportunities that require a large forest land base, 4) provide unique forestry education sites and promote outreach and long-term research, and 5) maintain a highly trained and well equipped work force. (forestry.ohiodnr.gov/Portals/forestry/PDFs/plans/hocking_5yr.pdf)

- Monday Creek Restoration Project – MCRP is a partnership committed to improving watershed health for the benefit of the community. The partnership was formed in November 1994. The Monday Creek Watershed encompasses 116 square miles in portions of Athens, Hocking and Perry Counties. MCRP is sponsored by Rural Action, a membership-based, non-profit organization working to revitalize Appalachian Ohio. Types of water quality impairments in the Monday Creek Watershed include acid mine drainage, improperly treated wastewater, sedimentation and illegally-dumped trash. Volunteer opportunities include tree plantings and trash clean ups. (mondaycreek.org)

- Wayne National Forest, 2006 Forest Plan – A plan to guide all natural resource management activities for the Wayne National Forest for the next 10 to 15 years. It describes desired resource conditions, resource management practices, levels of resource production and management, and the availability of suitable land for resource management. The purpose of the Forest Plan is to provide management direction to ensure that ecosystems are capable of providing a sustainable flow of beneficial goods and services to the public. (www.fs.usda.gov/detailfull/wayne/landmanagement/planning/?cid=fsm9_006005&width=full)

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