Forest Stewardship Plan

Developed For:

Maryville College

502 East Lamar Alexander Parkway

Maryville, TN 37804

Blount County

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Maryville College Stewardship Plan

This Forest Stewardship plan was prepared for Maryville College, which has requested planning assistance in the management of its property located in Blount County, as shown and described on the attached map. An inspection of the Maryville College property was made on February 25, 2013 and the following objectives for ownership and management were expressed and discussed.

Objectives for ownership of the land:

- Improve and maintain the overall health of the forest
- Improve and maintain aesthetic value of the forest.
- Utilize the forest for demonstrations on proper forest management
- Improve the quality of the wildlife habitat.

Objectives for Management:

1. Improve the forest health by eliminating nonnative invasive species.
2. Utilize various management techniques as a demonstration on proper land management.
3. Wildlife management to encourage a variety of wildlife species to enter and live on the land.
4. Maintain the aesthetic quality for recreational users of the forest.

Property Description:

The Maryville College campus is located on Maryville, TN within Blount County. The campus is approximately 247 acres in size with 128 acres being forested. The large majority of the forestland is currently in a mixed hardwood cover-type. The gently rolling terrain has created areas of upland mixed hardwoods consisting primarily of white oak, red oak, and hickory with associated species and bottom land hardwoods consisting primarily of sycamore, black walnut,

sugar maple and other associated species. Several creeks are located on the property creating riparian zone areas. Throughout the forested area there are small field openings which are used by staff and students for outdoor classrooms or recreation. A system of trails exists in the forest and connects the openings and is used for recreation.

During the initial survey the presence of exotic invasive species was found to be the biggest threat to the forest over-all. The proximity to urban development along the forest edges has played a large role in the presence of these exotic invasive species. English ivy is a prime example found over a majority of the forest. The biggest threat these invasive species pose is lowering biodiversity as well as hindering forest regeneration. Secondary impacts from these invasive species could be diminishing the quality of the wildlife habitat through lack of food, improper vertical structure, or cover.

The timber within the forest is of large size and is primarily mature to over-mature in age-class. Many areas have gaps created within the canopy because of mortality in the over-story. Within these gaps pockets of sugar maple are developing and may work their way into the over-story. If allowed to continue this will create a complex/climax forest-type consisting of shade-tolerant species of trees such as: sugar maple, red maple, and American beech. One area of upland hardwoods consists primarily of red oak and hickory and is in younger age class. This area has a history of previous forest management when the shortleaf pines were harvested. This harvest released an understory of already present oak and hickory. These trees are vigorously growing and offer the best opportunity for forest management via harvesting techniques. Throughout the survey seedling regeneration was documented and consisted mostly of sugar maple and red maple within the over-mature forest. The younger stand of red oak and hickory had fair oak regeneration present as well as red maple.

This forest is very typical of what problems are currently facing the average landowner in East Tennessee. Exotic invasive species from various parts of the world have been brought to East Tennessee through many vectors and are currently a wide-spread problem for our native plant communities. The Maryville College forest offers a great opportunity to demonstrate proper invasive species control and management that can be used as a demonstration for both classroom activities and landowner education as well.

Forest Management Prescriptions:

Separate descriptions of individual forest stands and recommendations for management of the timber and other natural resources during the next ten-year period (2013-2023) are presented below. All exotic invasive species control measures are based on Forest Service General Technical Report SRS-62 "Nonnative Invasive Plants of Southern Forests- A Field Guide for Identification and Control."

Stand 1

12 acres

Description: Stand 1 is in a low lying area along the western end of the Maryville College property. The soils are fairly wet due to the terrain which causes more hydric species to be found in this area. This stand consists of primarily mixed bottomland hardwood species such as black walnut, sycamore, yellow poplar, sugar maple, white oak and red maple. The over-story is mature and of medium to large saw-timber size class. Forest regeneration currently in place consists of small to medium sugar maple seedlings. This shade-tolerant species is able to adapt to the hydric soils while maintaining growth within the lower light levels of the understory. This stand has good vertical structure within the different levels of the canopy. Gaps created by mortality and wind throw are present creating small openings in which accelerated growth is occurring in shrub and understory trees.

Exotic invasive species are widely present within this stand and are impacting forest health. Species found were: tree-of-heaven, English ivy, privet, bush honeysuckle, and vine honeysuckle. These exotics will lower biodiversity due to their aggressive nature and shade-tolerance as well as suppress any tree regeneration.

Prescription: Based on desired objectives of forest health this stand should have control measures utilized to control and reduce the amount of invasive plant species. Hand pulling or manual removal is fairly labor intensive work and yields mixed results. The most effective means of control is a combination of manual removal and wise use of herbicides. Herbicides can prevent re-sprouting from root stock which will save a great deal of time and money in the long run. Integrated Pest Management (IPM) techniques can be used to aid in the removal of these exotic species. Using chemicals at appropriate times during the plants life-cycle as well as capturing the growing space afterwards by beneficial native plants are techniques that will aid increasing the over-all health of the forest.

Invasive vine species should be sprayed with a foliar application of an appropriate herbicide. Any vines up in trees may be cut at ground level and spot treated on the cut surface with herbicide. In the case of English ivy using a weed whacker to damage the plant may aid in uptake of the herbicide. Shrub species can be cut at ground level and spot treated with herbicide on the cut surface. It is important to treat any cut surface immediately after the cut because the plant will begin to close off vessels which will slow the uptake of the chemical into the root-stock.

Areas where exotic species are removed can be planted with native plants that are suited to the site. This native plant stock will capture growing space making it less likely for the exotic invasive species to regain a foothold. Two examples for planting are strawberry bush and rhododendron; both species are native and found on the forest at Maryville College.

Areas of initial attack on the exotic species would be along the roads or trails. These areas provide easy of access as well as a demonstration to forest users about the work being done on the forest. As time goes on and steady work progresses the amount of exotics will decline and native species should start to take over the site from the seed-bank or out plantings.

Caution should be used when utilizing herbicides and all directions on the label should be read and followed. Of special concern are posting signs with information about restrictive entry interval (REI) to insure the safety of workers and recreational users alike.

Any mortality that occurs in the over-story should be left standing until the snag falls due to natural causes. These standing dead trees will provide a value to wildlife and meet a variety of habitat requirements.

Stand 2

26 acres

Description: Stand 2 is located in the western portion of the Maryville College forest and is adjacent to Court St. This stand consists of more upland hardwood species due to a slight raise in elevation which causes the soil to drain better than lower areas. Red oak, white oak, yellow poplar, and red maple are commonly found throughout the stand. It is of mature age-class with size ranging from small to medium saw-timber. Red oaks in particular are starting to show their age within this stand. Most red oaks have a life span of 70-120 years and as they reach maturity these trees will begin to lose large branches in their canopy. As these branches break

out of the canopy it creates an opportunity for rot to set in. Eastern hemlocks were also found during the survey and were under attack from hemlock wooly adelgid. Left untreated, these trees will continue to die-off eventually ending in death.

Throughout the stand regeneration was found to be predominantly red and sugar maple. Gaps that have developed due to over-story mortality are present and have some oak regeneration in them but the maple regeneration is abundant enough to hinder any oak regeneration without assistance.

Without harvesting this stand will continue to move towards a climax forest. Climax forests are typically dominated by shade-tolerant species that can regenerate under an already present over-story. They tend to have a diverse vertical structure and may have un-even age classes due to the gap dynamics and its impact on regeneration.

Invasive species are present within this stand as well. Areas around gaps in the canopy had a higher percentage of invasive species as well as larger sizes due to the additional light getting through the over-story canopy. These invasive species should be controlled and eradicated if at all possible. They will continue to expand their population and suppress forest regeneration as well as lower biodiversity within the stand.

Prescription: Invasive species control should be a priority within this stand. Utilizing IPM techniques such as: manual removal, herbicide application, and reclaiming growing space, should all be used in removal and future management. Any disturbance to the over-story has the possibility to promote the expansion and growth of these already present exotic invasive species. Areas to begin control measures should focus around trails and roads due to accessibility and visibility for demonstration purposes. Isolated spots of invasive species are also prime targets for control. Removing these spots will reduce expansion of populations and help maintain the biodiversity and forest health.

Stand 3

27 acres

Description: This stand varies from the other stands within the forest for a variety of reason. It has a history of active forest management when mature pines were harvested in the past. It also is distinct in its general lack of invasive species within its boundaries. The current over-story consists mainly of red oaks and hickory with associated species. These oak had been

slowly developing under the pine trees and with the pine harvest were released to become the next over-story canopy. This mimics the natural succession that occurs in Tennessee where pines give way to a mixture of oaks and hickory following events such as a southern pine beetle outbreak. All trees were healthy and vigorously growing and have yet to reach maturity. This stand offers the greatest opportunity for active forest management via future harvests which can serve the purpose of maintaining an oak-hickory forest-type and demonstrating the value of harvesting within a managed forested area.

This stand does not exhibit the vertical structure diversity which is found throughout the other stands within the Maryville College forest. This is due to the dominance of the current over-story and age of the stand. As time progresses gaps in the canopy will begin to form which will initiate more structural diversity in the under-story. Trails in this stand benefit from the lack of vertical structure because the stand has a more open park-like feel. Recreational users have a greater chance to observe wildlife at a distance because of this open setting.

The oaks and hickory in this stand are in their prime mast producing years which will benefit many species of wildlife in the area. As other stands continue to mature and age out of their prime mast producing windows this stand will continue to produce for years to come.

Prescription: Maintaining the lack of invasive species in this stand is of the greatest concern. With small and manageable pockets of invasive species such as privet and bush honeysuckle this stand has a good chance of continuing to be invasive species free with proper monitoring and control measures where necessary. This program of control shall also benefit the regeneration of oaks and hickory if a future harvest is to take place.

A harvest at some point in the future would be advisable in stand 3. Due to the current stand age and vigorous growth; planning an initial harvest midway through the next ten-year planning cycle should be appropriate. Generating income is not an objective laid out for the Maryville College forest but it will be an added benefit from wise management of this stand. A shelterwood regeneration harvest would be the most beneficial in promoting advanced regeneration of preferred species while maintaining the aesthetical value of the stand. A shelterwood generally occurs in two stages: first approximately half the basal area is removed in an initial harvest. This allows more light to reach the understory and should promote any seedlings into the advanced regeneration category while suppressing aggressive growth from species such as yellow poplar. After the regeneration has reached a satisfactory developmental state, the remaining over-story should be harvested to release the advanced regeneration. To maintain aesthetical values residual tree may be left at a wide spacing. These large trees will not only maintain a sparse canopy but eventually will provide roosting spots for wildlife as well as eventually become snags (standing dead trees) which also have great wildlife benefit. During

these operations consult the local Area Forester or a consulting forester for aid in developing marking guidelines for the shelterwood cut as well as residual trees to carry over into the next stand of trees.

As the stand develops it shall go through the various stages of succession and shall provide values for wildlife that do not exist to a great extent within the Maryville College forest. It will also provide a demonstration area for proper forest management and can be a place of study as it moves from early successional stages to a mature oak hickory forest.

During any harvesting operation Best Management Practices (BMPs) should always be followed in order to maintain the productivity and value of the soil and water resources within this stand. Any log landings and skid trails should be laced appropriately on the landscape in order to prevent erosion and water quality degradation. Consult the local Area Forester or any consulting forester for guidance on where is appropriate for log landings or skid trails. Following harvesting operations any skid trails and log landings should be seedling with a mixture of wheat and clover or other wildlife beneficial plants. This will prevent erosion and create an additional food source until native species reclaim the growing space.

Trails in this stand should have a buffer which will minimize the disturbance to the trail as well as continue to provide shade to recreational users. These buffer corridors will also act as well wildlife corridors for movement as well as provide vertical structure and cover which wildlife prefers. The size of the buffers can vary depending on where the trail lays on the landscape and other factors such as areas of value or pockets of desired species.

Stand 4

29 acres

Description: This stand is located on the eastern edge of the forest and has both Browns Creek and Duncan branch. These two waterways provide many benefits to both wildlife and recreational users of this area. The forest type is mixed bottomland hardwoods and is a mixture of age and size class. Black walnut, sycamore, yellow poplar, sweet gum, red maple are all commonly found throughout this stand. This stand has a diverse understory due to the amount of water that is present as well as the gaps created through mortality or site limitations such as the over-abundance of water. This diversity of vertical structure and the meandering creeks create a very lush environment for both wildlife and recreational users. Along with most

of the other stands exotic invasive species are present in abundance and present a problem for both biodiversity and forest regeneration.

Cleared areas are located within this stand and are accessible from the trail system that runs throughout the Maryville College forest. These clearings are used for outdoor classrooms or just relaxation by forest users. Currently they are occupied by cool-season grasses such as fescue but could be used as wildflower areas which would be aesthetically pleasing as well as beneficial to wildlife species such as song birds and a variety of insects.

Prescription: Due to the forest condition and the water resources present within this stand care should be taken during any management activities. Soil movement should be kept to a minimum and any pesticides/herbicides should be appropriate for work around water. The greatest threat to forest health currently is the invasive species that were found in abundance. The presence of the two waterways is the greatest opportunity for improvement. These areas tend to be fertile with an abundance of water resources which the invasive species have taken advantage of. Removal of these exotic invasive species will allow the native plants to reclaim these areas. Planting of native species such a rhododendron will take up the growing space previously occupied by these exotic invasive species. Removing the exotic invasive species will also benefit areas downstream because their seeds will not be present in the water to be moved to new areas.

In cleared areas used as outdoor classrooms opportunities to disc up a portion and install a wildflower garden are abundant. Disking the ground up in the spring and sowing it with a wildlife friendly mixture of flowers would enhance the aesthetic value of the area and also benefit songbirds and insects.

Stand 5

13 acres

Description: Stand 5 is mostly a mixed upland hardwood stand which features red oak, white oak, hickory, and yellow poplar. It is a mature stand with most of the volume in the medium to large saw-timber size class. This stand is similar to the other mature stands in the forest but is made up of a more xeric upland mixture of hardwoods. Gaps have begun to develop as mortality occurs within the over-story. These gaps have created pockets of advanced growth in the mid-story and under-story. Due to the well-drained nature of the soils more oak regeneration was found in and around these gaps but yellow-poplar and red maple are all also competing for resources in these areas. As with most other stands exotic invasive species: privet, bush honeysuckle, multi-floral rose, and vine honeysuckle were found in the stand. Under the forest canopy the majority of the regeneration currently in place tended to be red maple.

Prescription: Invasive species control is needed within this stand. Both manual removal as well as wise use of appropriate herbicides should be used. Areas to focus would be along trails and around gaps areas. The gap areas will promote the invasive species due to the additional light resources available which will increase competition to any tree species that are attempting to claim the gap in the forest canopy. Removing the invasive species will also allow other important species such as blackberry to claim a portion of the growing space before the over-story canopy reclaims the growing space. Early successional species that are stimulated by the addition light resources hitting the ground create a small window of additional soft mast for wildlife to take advantage of.

Stand 6:

21 acres

Description: Stand 6 is in the southern portion of the forest and is adjacent to Wilkenson Pike. It also has an area of development inside of the stand boundaries. These two features make this another visible portion of the forest to neighbors and visitors alike. A portion of Duncan's Branch runs through the eastern side of the stand which creates a bottomland forested setting while on a small ridge surrounding the development the forest has a more upland species cohort. Both forest-types are mature and of mixed saw-timber size class. As with other areas

in the forest of this relative age-class invasive species are present. They are found more predominantly around forest edges and in canopy gaps. Regeneration present in the understory was a mix of species but red maple and sugar maples was observed in the greatest abundance. These shade-tolerant species are most likely what will begin to dominate the stand as mortality occurs in the over-story.

Prescription: Invasive species control is prescribed for this stand. Both manual removal as well as proper herbicide application should be used in this effort. As exotic species are removed activities such as out-planting of native species can be done to occupy the growing species and create an additional seed-source for preferred native species.

Additional Recommendations: The following additional recommendations which apply to the overall management of the property are also offered:

Utilize signs to educate the public about the Maryville College forest and the Tennessee resource it represents.

Open areas can be used for planting of valuable wildlife trees such as crab apple, plum, persimmon, pecan, hazelnut, mulberry, or pawpaw.

Trees in open areas around campus should be watched for signs of damage or disease. When signs of decline or die-back are present get a professional Arborist's opinion on ways to mitigate the situation or plan for its removal.

Eastern Hemlocks are found on the main campus and throughout the Maryville College Forest. Treatment of these should be prioritized and most valuable trees should be treated first. The easiest method of application is a soil drench in the root zone of the tree. These applications are best done between mid-March through mid-June and late August through early December. Merit is the active ingredient and can be purchased by landowners as Bayer Advanced Tree and Shrub Control Concentrate. Stem injections and foliar applications are also effective means of treatment but require more specialized equipment for application. Additional information can be found in the University of Tennessee Bulletin SP503-G.

Both black walnut and ash are found within the Maryville College forest and are currently under attack by invasive pests, Thousand Canker Disease and Emerald Ash borer. Monitor the resources for mortality and watch for snags developing along trails and roads. As the trees die they may become safety hazards for recreational users.

Utilize GPS / GIS technology to map out invasive species occurrence which will aid in creating an effective strategy of eradication.

Limit disturbance around areas with a high concentration of exotic invasive species. These invasive plants tend to be aggressive and will take advantage of bare soil and additional light resources. Kudzu is especially aggressive and will easily dominate other species trying to compete with it.

During any kind of timber harvest activities, refer to the "Guide to Forestry Best Management Practices (BMPs) that is enclosed. BMPs are activities that protect water quality before, during, and after a harvest. These practices lessen then environmental impact of logging operations and road building.

Stewardship Plan Update: This forest stewardship plan should be updated in 2023.

FOREST STEWARDSHIP PLAN PREPARED BY:

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Brook Smith **Date**
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TN Department of Agriculture, Forestry Division

Enclosures:

"Guide To Forestry Best Management Practices in Tennessee"

Hemlock Woolly Adelgid Publication by the Tennessee Division of Forestry
(Excerpts from University of Tennessee Bulletin SP503-G)

What is Emerald Ash Borer? USDA publication NA-PR-05-04
(additional information can be found at www.emeraldashborerinfo.com)

Thousand Canker Disease: A Threat to Tennessee's Black Walnut Trees
(additional information can be found at www.protectTNforests.org)

Seedling Order Form 2013-2014

"Recreation Trails Manual"- Forest Stewardship Publication

"Nonnative Invasive Plants of Southern Forests- A Filed Guide for Identification and Control"
Forest Service General Technical Report SRS-62
Electronic copies can be found at http://www.invasive.org/eastern/srs/