MIDDLE PENINSULA CHESAPEAKE BAY PUBLIC ACCESS AUTHORITY POLICY STATEMENT ON LANDS UNDER AUTHORITY OWNERSHIP WITHOUT A FORMAL MANAGEMENT FRAMEWORK

August 3, 2010

Introduction

The Middle Peninsula Chesapeake Bay Public Access Authority was enabled by the Virginia General Assembly in 2003 and has been granted various powers and duties according to § *15.2-6600* et al.

As a general practice of the Middle Peninsula Chesapeake Bay Public Access Authority (PAA), lands owned and managed by the PAA for use by the general public shall have a community based management plan developed to reflect the needs and wants of the community. The planning process shall be inclusive and at a minimum address use conflict management and resource conservation and protection.

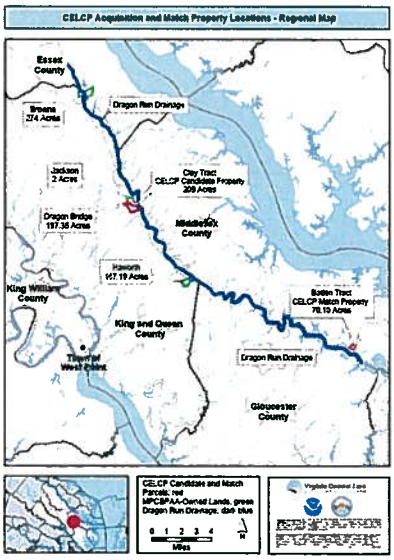
The Governing Board of the PAA is ultimately responsible for setting policy for land management and reserves the right to amend policy at any time. The PAA currently has management plans in place for the Browne Tract and the Thurston Hayworth Recreation area.

PAA Holdings Without Management Plans

The PAA holds title to land for a variety of reasons and under various terms and conditions. In the absence of a prescribed land management plan for a PAA holding, any holding will be managed according to conditions dictated by the grantor as part of the public record or special terms associated with a grant award specific to the acquisition. In addition, the PAA vests daily land management responsibilities to the land manager of the PAA. It is general policy that PAA land holding(s) without a management plan will be managed as limited access, special use sites. Limited access or special use can be, but not limited to: scientific research, church group usage, Boy Scout usage, assistive hunts for those with disabilities, habitat improvement /maintenance relationship. The PAA land manager is responsible for the daily management, maintenance and coordination for all limited access, special use activities.

For example:

The Dragon Bridge, Jackson and Clay tracts (see map) were acquired by the Middle Peninsula Chesapeake Bay Public Access Authority under a 2005 National Oceanic and Atmospheric Administration (*NOAA*) federal grant award under the Coastal Estuarine Land Conservation Program (CELCP).



Collectively, these three parcels are managed as a 400 acre holding referred to as the "Clay Tract". Due to cost

associated with the development of a management framework, the Clay Tract currently does not have a framework in place (PAA staff is currently partnering with USDA, DGIF and DOF to develop a strategy for long-term conservation stewardship)

The PAA land manager defers to the *2003 Coastal and Estuarine Land Conservation Program Final Guidelines* to provide a management framework for the Clay Tract. The PAA land manager relies upon:

2.6 Ownership, Use and Long-term Stewardship

b. In general, lands acquired with CELCP funds will allow access to the general public. However, access may be limited or controlled in an equitable manner for resource protection, public safety, or for other reasonable cause. User fees should not be charged to access lands acquired through this program. However, if user fees are charged, they should comply with any applicable state standards for user fees. In such cases, all income or other revenues derived from the fees shall be used for the maintenance or management of the property.

c. The property shall be managed in a manner that is consistent with the purposes for which it was entered into the program and shall not convert to other uses. As a condition of the grant award, a strategy for long-term stewardship must be developed for each project that identifies the entity(ies) responsible for ongoing stewardship, including financial or staff support, and monitoring of conservation easements or ongoing activities to ensure that they are consistent with long-term conservation. Activities that may be considered to be consistent with conservation purposes include: resource protection; restoration and enhancement, such as vegetative erosion control or restoration of natural water flow to the area; recreational activities, such as: hiking, hunting, and fishing; access for swimming, canoeing, kayaking; and research and educational activities. Construction of facilities on a minor scale, such as restrooms or boardwalks, to facilitate these activities and/or for the purpose of minimizing harm to coastal resources due to public access and recreation may be allowed depending on the proposed use of the property and the site environment. Activities that are considered to be inconsistent include: active agricultural or aquaculture production; shoreline armoring or other hard erosion control structures; construction or expansion of roads, buildings or facilities except as noted above, or such facilities for active recreation as sports facilities, water parks, playgrounds, or similar uses.

d. Non-governmental organizations, corporations, or individuals may participate in the acquisition and long-term stewardship of lands through this program, except as provided under sections 2.2 and 2.4 of these guidelines.

e. Leasing or renting of the property or interest in property acquired through the CELCP to a third party is prohibited unless specifically authorized by NOAA. The recipient

agrees that any authorized arrangement for leasing or renting property involved in the project must be: consistent with the authorized general and special purpose of the award; for adequate consideration; and consistent with applicable Department of Commerce requirements concerning, but not limited to, nondiscrimination and environmental compliance. All income or other revenues derived from an approved lease or rent arrangement shall be used to maintain or manage the property.

MASTER PLAN/TIMELINE

HAWORTH, BROWNE & CLAY TRACTS

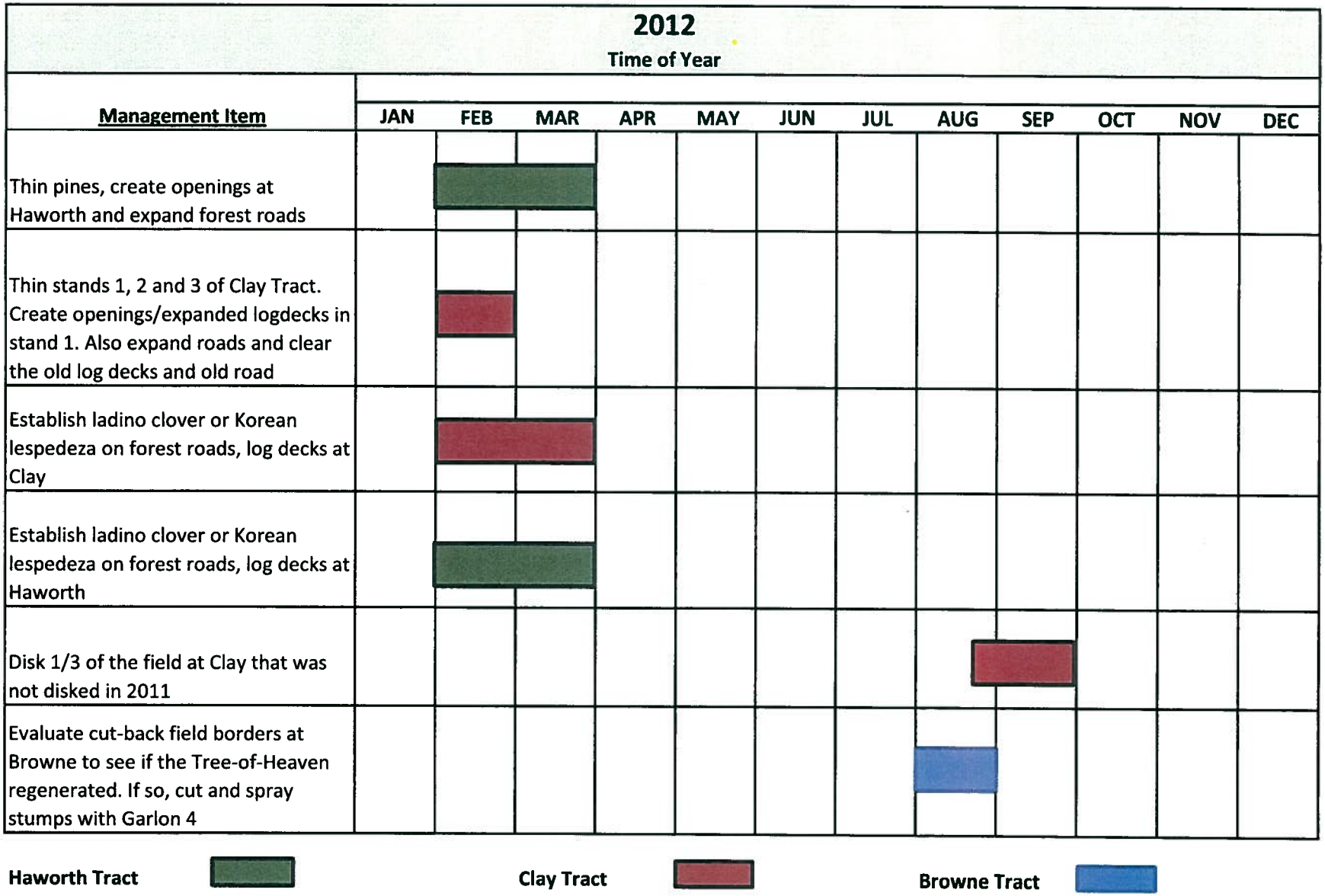
2011

Time of Year

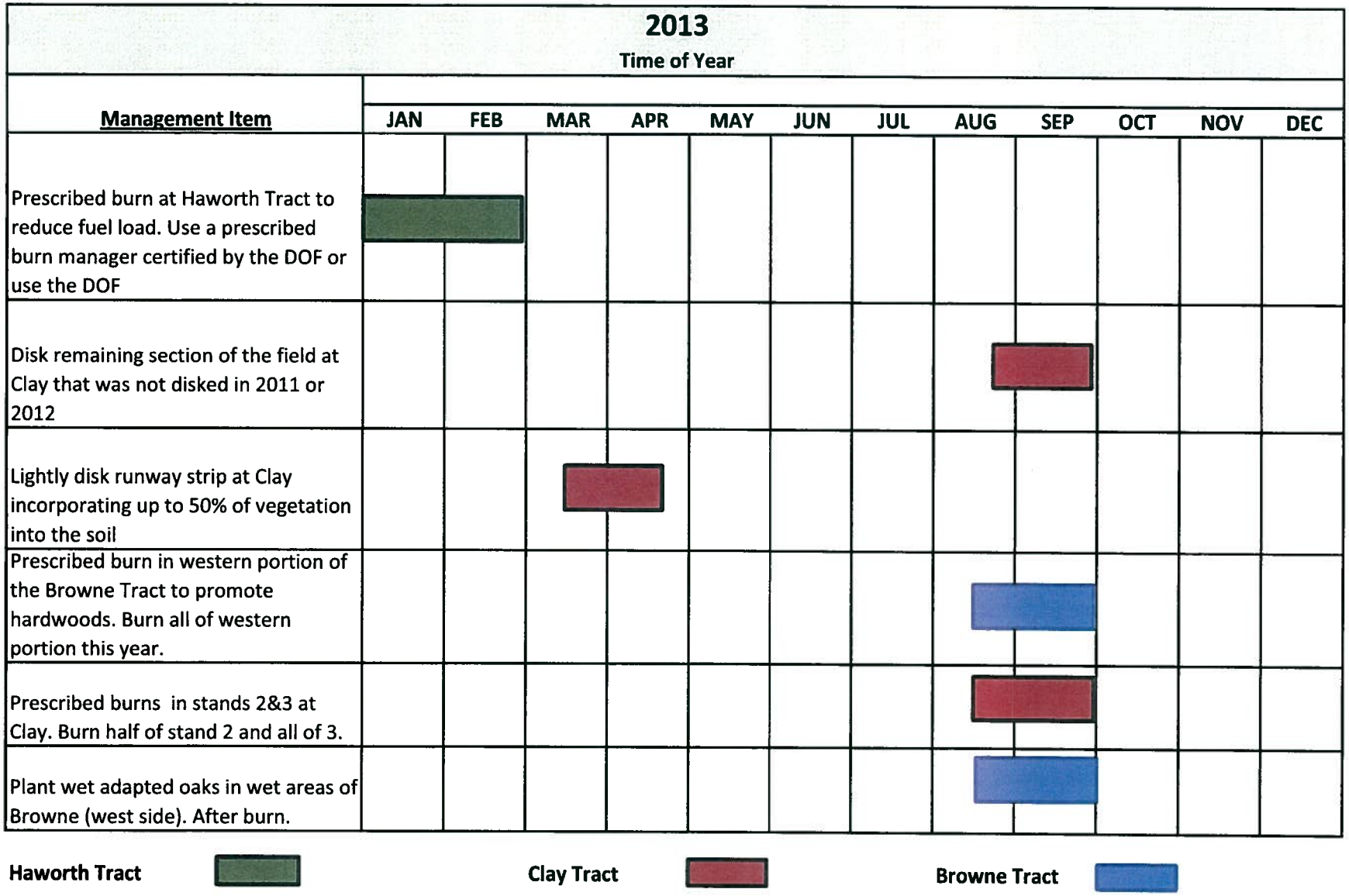
Management Item	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Clear-cut western portion of Browne												
Use high speed forest mulcher for trails, roads, cutbacks, etc on both sides												
Lightly disk runway strip at Clay incorporating up to 50% of vegetation into the soil. Lightly disk in odd years.												
Hand cut the edges of the runway strip at Clay where a disk will not work to expand it and to create an irregular edge. Create brush piles.												
Disk 1/3 of the field at Clay												
Evaluate Bowne clear-cut to see if oaks and other hardwoods survived and whether or not hardwood regeneration is feasable												
Evaluate cut-back field borders at Browne to see if the Tree-of-Heaven regenerated. If so, cut and spray stumps with Garlon 4												

Haworth Tract **Clay Tract** **Browne Tract**

h21


2012
Time of Year
Management Item
JAN
FEB
MAR
APR
MAY
JUN
JUL
AUG
SEP
OCT
NOV
DEC
Thin pines, create openings at Haworth and expand forest roads
Thin stands 1, 2 and 3 of Clay Tract. Create openings/expanded logdecks in stand 1. Also expand roads and clear the old log decks and old road
Establish ladino clover or Korean lespedeza on forest roads, log decks at Clay
Establish ladino clover or Korean lespedeza on forest roads, log decks at Haworth
Disk 1/3 of the field at Clay that was not disked in 2011
Evaluate cut-back field borders at Browne to see if the Tree-of-Heaven regenerated. If so, cut and spray stumps with Garlon 4
Haworth Tract
Clay Tract
Browne Tract

S21


2013
Time of Year
Management Item
JAN
FEB
MAR
APR
MAY
JUN
JUL
AUG
SEP
OCT
NOV
DEC
Prescribed burn at Haworth Tract to reduce fuel load. Use a prescribed burn manager certified by the DOF or use the DOF
Disk remaining section of the field at Clay that was not disked in 2011 or 2012
Lightly disk runway strip at Clay incorporating up to 50% of vegetation into the soil
Prescribed burn in western portion of the Browne Tract to promote hardwoods. Burn all of western portion this year.
Prescribed burns in stands 2&3 at Clay. Burn half of stand 2 and all of 3.
Plant wet adapted oaks in wet areas of Browne (west side). After burn.
Haworth Tract
Clay Tract
Browne Tract

921

2014 Time of Year												
Management Item	**JAN**	**FEB**	**MAR**	**APR**	**MAY**	**JUN**	**JUL**	**AUG**	**SEP**	**OCT**	**NOV**	**DEC**
Prescribed burn in western portion of the Browne Tract to promote hardwoods. Burn 1/3. Start rotation.												
Start prescribed burn rotation at Haworth. Burn 1/3 of the property and in the sequence outlined in the plan												
Prescribed burns in half of stand 2 at Clay. Whatever half was not burned in 2013.												
Re-start the disking rotation in field at Clay												

Haworth Tract **Clay Tract** **Browne Tract**

2015 Time of Year												
Management Item	**JAN**	**FEB**	**MAR**	**APR**	**MAY**	**JUN**	**JUL**	**AUG**	**SEP**	**OCT**	**NOV**	**DEC**
Evaluate stand 8 at Clay. Thin to 45-60 sq.ft/acre												
Evaluate stand 9 at Clay. Thin to 45-60 sq.ft/acre												
Evaluate stand 6 at Clay. Thin to 45-60 sq.ft/acre												
Prescribed burn at Browne, burning 1/3 this year a different 1/3 next year, etc												
Prescribed burns in stands 2&3 at Clay. Burn half of stand 2 and all of 3.												
Prescribed burn rotation at Haworth. Burn 1/3 of the property and in the sequence outlined in the plan												

Haworth Tract **Clay Tract** **Browne Tract**

2016

Time of Year

Management Item	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Thin stand 4 at Clay to 45-60 sq. ft/acre												
Prescribed burn rotation at Haworth. Burn 1/3 of the property and in the sequence outlined in the plan												

2027

Time of Year

Management Item	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Remove pines from Stand 1 at Clay in addition to non-desirables. Create open oak woodland												

2029

Time of Year

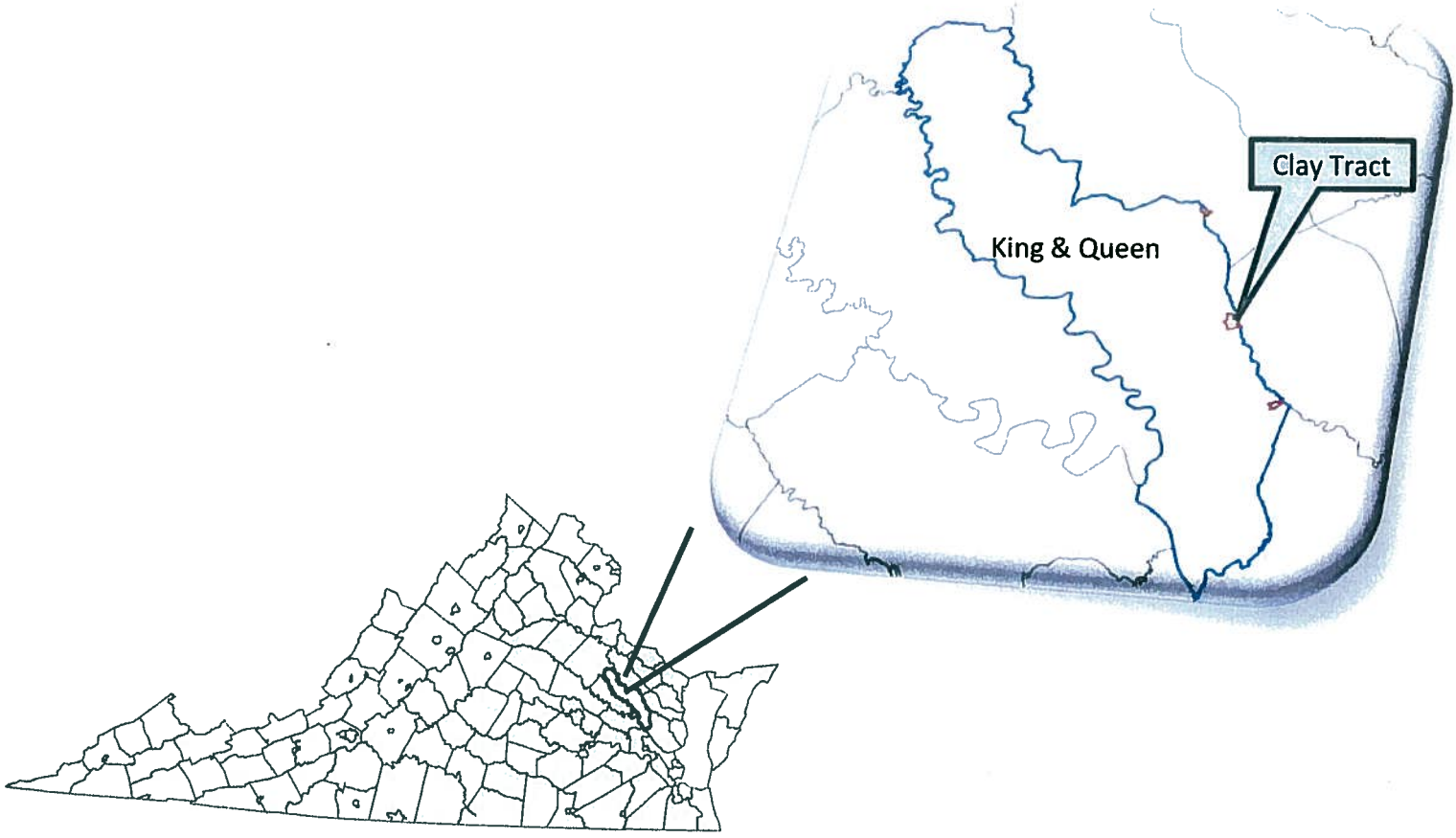
Management Item	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Start a prescribed burn rotation in Stand 1 of Clay to promote an open oak woodland												

Haworth Tract **Clay Tract** **Browne Tract**

Middle Peninsula Chesapeake Bay Public Access Authority

WILDLIFE HABITAT MANAGEMENT PLAN

CLAY TRACT



INTRODUCTION

This document was prepared through a cooperative agreement between the Virginia Department of Game and Inland Fisheries, the US Department of Agriculture – Natural Resources Conservation Service, and the Conservation Management Institute. The recommendations provided in this document are best management practices that could be applied to the Clay Tract. The goal of this document is to provide the most effective approach for managing wildlife and conservation values while promoting recreational opportunities. Active management will be required at this tract to ensure it meets the Middle Peninsula Planning District Commission's (MPPDC) goals and objectives tor the Clay Tract. The habitat practices outlined in this plan could be funded through timber sales as well as annual hunting/access fees.

MANAGEMENT PLANS

Stand 1 – 110 acres

Dominant species found in stand 1 include; loblolly pine (*Pinus taeda*), southern red oak (*Quercus falcate*), overcup oak (*Quercus lyrata*), sweetgum (*Liquidambar styraciflua*), red maple (*Acer rubrum*), and tulip poplar (*Liriodendron tulipifera*) (figure 1). Overall the stand is dominated by approximately 25 year old loblolly pine. Tree core data from the loblolly pine, collected on 10 May 2010 by the Virginia Department of Forestry (DOF), indicates the pines are still putting on a fair amount of growth each year. However, the tops of the loblolly pines are starting to touch, indicating a second thinning is required. A second thinning will allow the loblolly pines to reach saw-timber size more rapidly, where they have the most commercial value. This thinning should occur in February of 2012.

There are several other advantages of conducting a second thinning. A second thinning could create more openings for habitat plots and hunting areas. The openings, roughly ½ - 1 acre in size each, will add habitat diversity to the stand, which promotes wildlife diversity. A mature oak forest should be the ultimate habitat goal for stand 1. Once the loblolly pines have reached their maximum growth potential, they can be harvested along with mature tulip poplars. During this final harvest however, the oaks within this stand need to be left intact (Appendix A, photos 1-2). The second thinning will also allow the oaks to proliferate and attain more growth. Many birds and mammals rely heavily on mast producing trees such as oaks for reproduction and survival. In addition to mast, the overall structure of hardwood forests differ from other habitat types and play an important role in winter and nesting cover for many species of birds and mammals. Lower King and Queen County, and the middle peninsula forest lands in general, are dominated by loblolly pine. Managing for an oak dominated forest at the Clay Tract will add much needed diversity to this region.

The old log decks and road in this stand are dominated by loblolly pines that are too dense for wildlife habitat or to be commercially valuable (Appendix A, photo 3-4). These areas should be cleared by the forestry crew conducting the thinning, or by a group of volunteers. Several young pines also grow along the road edge and in some cases have blown over the trail. These young pines along the edge of the road should be removed and managed for herbaceous vegetation to add additional wildlife habitat diversity.

If the second thinning is not performed, the stand should be re-evaluated in 5-10 years to see if the loblolly pines are still putting on growth, or if they are ready for harvest. In addition, if the pine thinning does not take place, a volunteer work crew should remove undesirable trees such as maple, sweetgum, young tulip poplar, etc. The highest priority area would be within 150' of the agricultural field to the west. This will open the understory to promote herbaceous vegetation and provide significantly improved breeding habitat for quail, turkey and songbirds. The crew could also create openings and expand the trails that exist within the stand. Productive trees will have to be marked prior to mobilizing

a volunteer work crew. When the pines are ready for harvest, the mast producing trees should not be cut.

We recommend performing this second thinning in February of 2012. The stand should be evaluated again in 2027 to see if remaining pines are ready to be cut. When this final cut is conducted, all oaks, hickories and blackgum trees need to be left. All other non-mast producing trees should be removed at this time as well. A prescribed burn rotation should be implemented starting 1-2 years after this final cut to promote open an oak woodland. Log decks and forest roads should be cleared and re-seeded.

Stand 2 – 44 acres

Stand 2 is comprised of various oaks, American beech (*Fagus grandifolia*), tulip poplar, some mature loblolly pines, and various hardwood species (Figure 1). This stand has the potential to provide exceptional wildlife habitat for deer, turkey, quail and migratory songbirds through a crop-tree release cut. In a crop-tree release, a forester, wildlife professional, or the landowner selects trees that are important mast producers. Competing trees and/or non-mast producing trees that are in close proximity to the selected trees are removed. Only trees that have branches touching the branches of the mast producers need to be removed. This "releases" the mast producing tree from competition and enables it to grow and produce more mast. We recommend removing some oaks in addition to all of the loblolly pine and mature tulip poplars found within this stand. This will encourage more vigorous forest shrubs such as blueberry (*Vaccinium spp.*), which is a highly desirable species for deer, woodcock and several other species of wildlife.

Several areas of young, dense regenerating stands of tulip poplars currently exist in the understory (Appendix A, pictures 5-6). These young poplar stands should be removed by either the forestry company conducting the thinning, a volunteer crew, or by using herbicides followed with a prescribed burn. Clumps of shrubs should be established approximately every 150' in these locations. The clumps should be about 30'x 50' wide. The shrub patches will provide food and cover for several species of wildlife. Shrub species that should be established, or managed for, include highbush blueberry (*Vaccinium corymbsum*), indigobush (*Amorpha fruticosa),* and American plum *(Prunus Americana*). If shrubs are planted, they will have to be protected from deer for the first few years.

Along the northeast corner of this tract there is an old log deck that is covered with a dense stand of young pines (Appendix A, photo 7). These pines should be cleared and the area should be managed as an opening, preferably with partridge pea, lespedeza (kobe or Korean), or ladino clover.

A few snags per acre should be created within this stand by girdling non-desirable trees such as sweetgum or pine.

Prescribed Burning

After the thinning is complete, initiating a prescribed burning rotation can maintain excellent wildlife habitat. Burning should be conducted by a certified burn manager 1 - 2 years after thinning and occur on a 3-year rotation. The prescribed burns should be applied in September. Prescribed burning will provide many benefits to wildlife such as:

- Keeping vegetation at a height where it is most useful for wildlife.
- Improve the nutritional value and digestibility of the vegetation.
- Help maintain herbaceous vegetation (i.e. grasses, forbs, and legumes).
- Provide for a diversity of food and cover types for wildlife.
- Provide nesting habitat for quail, turkeys and songbirds.

Firebreaks

Firebreaks should be incorporated into any planned burning activity. A firebreak is a strip or gap of bare land or vegetation that is established or created to act as a barrier to slow or stop the progress of wildfire and/or controlled prescribed burns. Firebreaks may be temporary or permanent and consist of fire-resistant vegetation, nonflammable materials, bare ground or natural geographic features such as rivers, rock outcrops, etc. Firebreaks should be located on the contour where practical, and stabilized in an appropriate manner to minimize the risk of soil erosion. Firebreak construction must comply with applicable federal, state, and local laws and regulations, including the state's Best Management Practices (BMP's) which can be viewed at the Virginia Department of Forestry's web site. Firebreaks must be 50 feet wide within the forest to allow sufficient sun light for grass and legume plants to grow successfully.

Four types of firebreaks are adaptable to the various needs and conditions existing in Virginia. They are:

1. Forest roads
2. Plowed, disked, or bladed firebreaks
3. Burned firebreaks
4. Vegetated firebreaks

These firebreaks can also serve as trails for hiking, birdwatching, and/or hunting. Seeding firebreaks to lespedeza (kobe or Korean) or ladino clover will provide additional wildlife foods while still serving as trails for recreational users. If an annual is planted, light disking should occur every year or two. Annual plants require a disturbance to reseed and to prevent being out-competed by perennials.

Stand 3 – 14 acres

Stand 3 is a mixture of loblolly, southern red oak, tulip poplar, American beech and hickory (Figure 1). Tree core data shows that the loblolly pines in this stand are approximately 35 years old and are no longer putting on growth. The loblolly pine should be removed to take advantage of their commercial value. In addition, several mature tulip poplars exist within the stand and they can also be harvested. The goal for this stand is to manage for a mature oak-hickory forest. An oak-hickory stand is beneficial to several species of wildlife and can be achieved by removing the pines and poplars. In addition, removing those species will allow more sunlight to reach the forest floor, promoting herbaceous vegetation in the understory. Habitat management in this stand will compliment the management activities at stand 2 as well as in the field (Figure 1). Prescribed burns should be applied in this stand 1-year before or after stand 2 to create habitat diversity at the tract.

Stand 4 – 25 acres

Stand 4 is a stand of loblolly pine that is approximately 7 years old (Figure 1). The trees are adequately spaced and do not appear to be in competition with themselves or with other tree species. The recommendations for this stand are to cutback the edges along the "airport runway" strip. This will make the strip wider and more productive for nesting songbirds and quail. This area can provide nesting habitat for quail if the strip and the cutback areas are managed for herbaceous vegetation. To enhance this area, partridge pea can be seeded in the central part of the strip, approximately 10' wide. Best management practices for this strip will be to lightly disk the site in odd years starting in spring 2011. Light disking will expose pockets of bare soil and will not turn over all of the soil. If conducted in late February/early March it will promote annual vegetation which contains high seed yields. Managing this

area for warm season grasses, partridge pea, or lespedeza (kobe or Korean) will provide nesting and brood rearing habitat for quail. Cutting back the pines along the adjacent crop field will also create optimal nesting and brood rearing conditions for quail. The young pines will provide adequate escape cover and shelter fulfilling a quail's habitat requirements.

There are several spots along the strip that consist of sweetgums and the invasive Japanese honeysuckle (*Lonicera japonica*) that are ideal for cutting back (Appendix A, Pictures 8-9). The most effective method will be to use a volunteer crew to remove the trees, and to spray the honeysuckle with a glyphosate (e.g. Roundup) application. Also, if the trees are removed at ground level where the honeysuckle is growing; then a disk can quickly open this area up after it is treated with an herbicide.

This stand should be re-evaluated in 2017 for a thinning. If thinning is needed, thin to 45-60ft^2/acre. Once thinned, a prescribed burning rotation should be established.

Field – 5 acres

The field is currently a mixture of herbaceous vegetation that is mowed on a regular basis (Figure 1). The best management practices for this field include breaking it into 3 smaller sections and disking each section on a rotational basis. One small section should be disked each year; however the other 2 sections should not be mowed, disked or disturbed in that same year. Strips of clover, lespedeza and/or partridge pea, roughly 10' wide can be established in between the 3 sections. Managing the field in this fashion will allow quail, turkey and songbirds to nest, as well as provide feeding and bedding areas for deer. These practices will compliment the management practices in adjacent tracts. Disking should occur in August/September to allow enough time for the herbaceous plants to start re-growth before going dormant. This will make the vegetation more palatable and attractive for deer during the hunting season.

Mowing

The field and "runway strip" should not be mowed unless the mowing is followed by a prescribed burn. Mowing allows thatch to build up on the ground over time and will deter the growth of forbs and desirable vegetation. A better method of managing these areas for grassy/herbaceous cover is to perform light disking. The disking should target any encroaching woody vegetation and should only disturb pockets of soil, or incorporate 50% of the vegetation into the soil. Do not mow or disk between April 15th and August 15th as these dates reflect the typical bird breeding season in Virginia.

THREATENED/ENDANGERED SPECIES and SPECIES of CONCERN

A review of the Virginia Department of Game and Inland Fisheries (VDGIF) species list and threatened waters list shows the state threatened bald eagle as nesting within 2 miles of the Clay Tract. Tier IV unlisted species were documented within 2 miles of the Browne Tract. The unlisted species found within 2 miles include:

Ironcolor shiner (*Notropis chalybaeus*)
American eel (*Anguilla rostrata*)
American brook lamprey (*Lampetra appendix)*
Banded sunfish *(Enneacanthus obesus)*

A review of the Department of Conservation and Recreation's (DCR) natural heritage list shows that the small whorled pogonia (*Isotria medeoloides*) occurs within 2 miles. The small whorled pogonia is listed

as federally threatened and state endangered. Avoid timber harvests and prescribed burns from April through early August in case this species is present within the Clay Tract.

Prescribed burns should only be conducted in stand 2 when winds are blowing due west, south, or east and outside of the general bald eagle nesting times of December 15 – July 15 of any year. We also recommend not conducting any practices within 100' of a stream or river. If any of the listed species are found within the Clay Tract, we recommend consulting with a VDGIF biologist before carrying out any further habitat improvements.

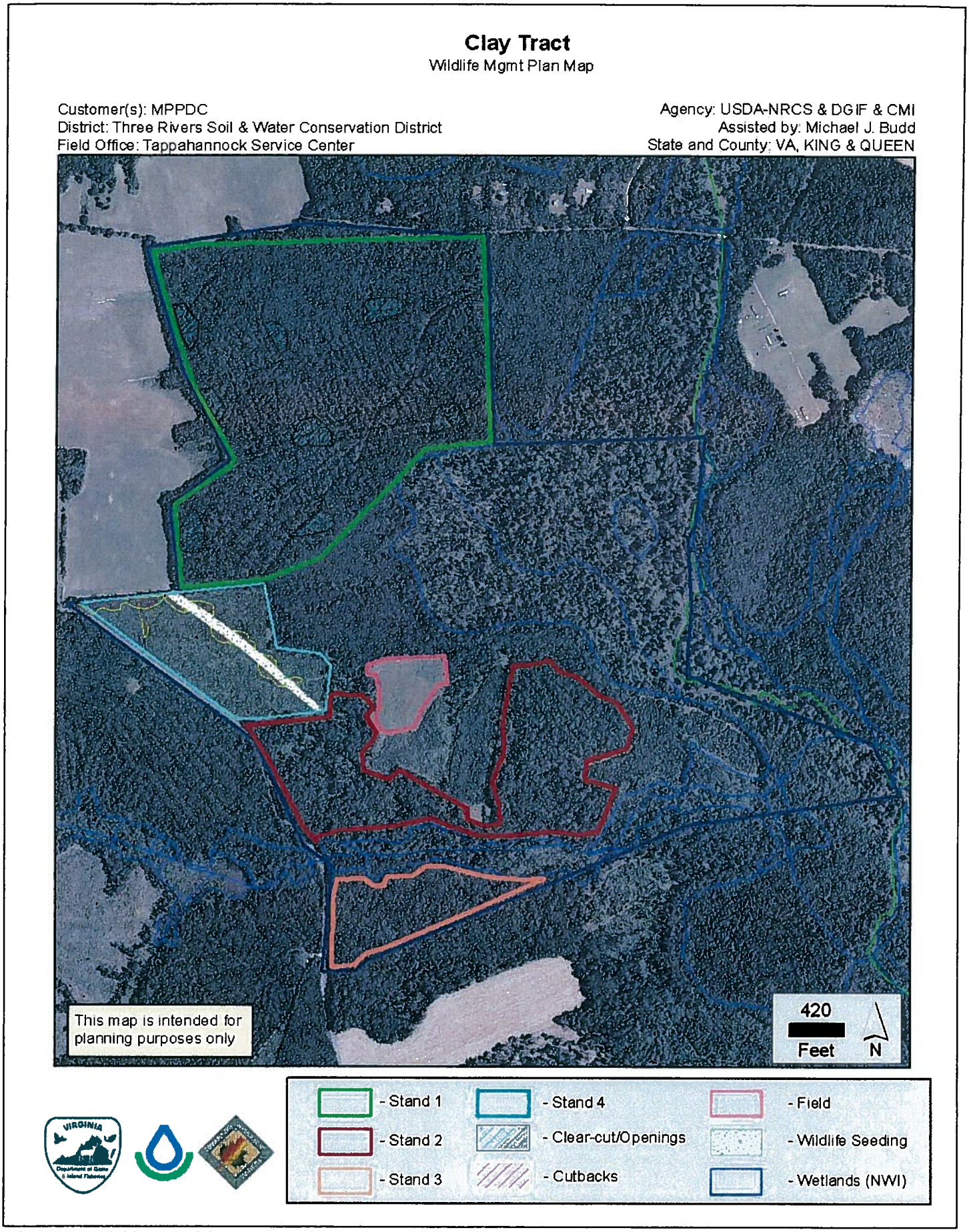


Figure 1. Aerial image of the Clay Tract outlining proposed management areas and practices.

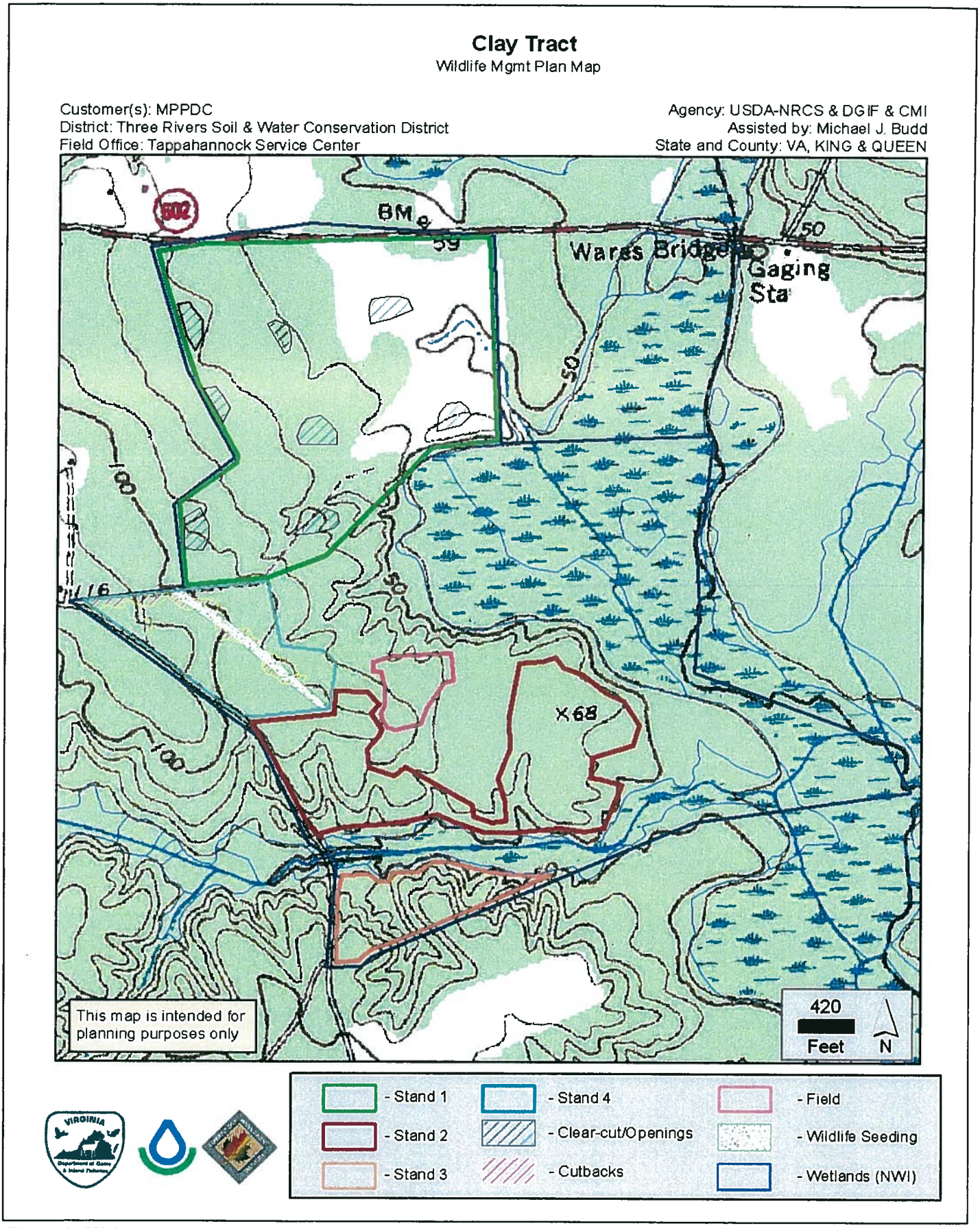


Figure 2. USGS Topographicmap of the Clay Tract outlining proposed management areas and practices.

APPENDIX A

SITE PHOTOS

Picture 1. Representative photo of stand 1 showing oaks (red arrow) mixed with

Picture 2. Representative photo of stand 1 showing oaks (red arrow) mixed with

Picture 3. Dense young pines on old log deck in stand 1 that should be cleared.

Picture 4. Dense young pines on old log road in stand 1 that should be cleared.

Picture 5. Young tulip poplars should be cut to improve habitat conditions.

Picture 6. Young tulip poplars should be cut to improve habitat conditions.

Picture 7. Dense young pines on old log deck should be cleared and managed as an herbaceous opening.

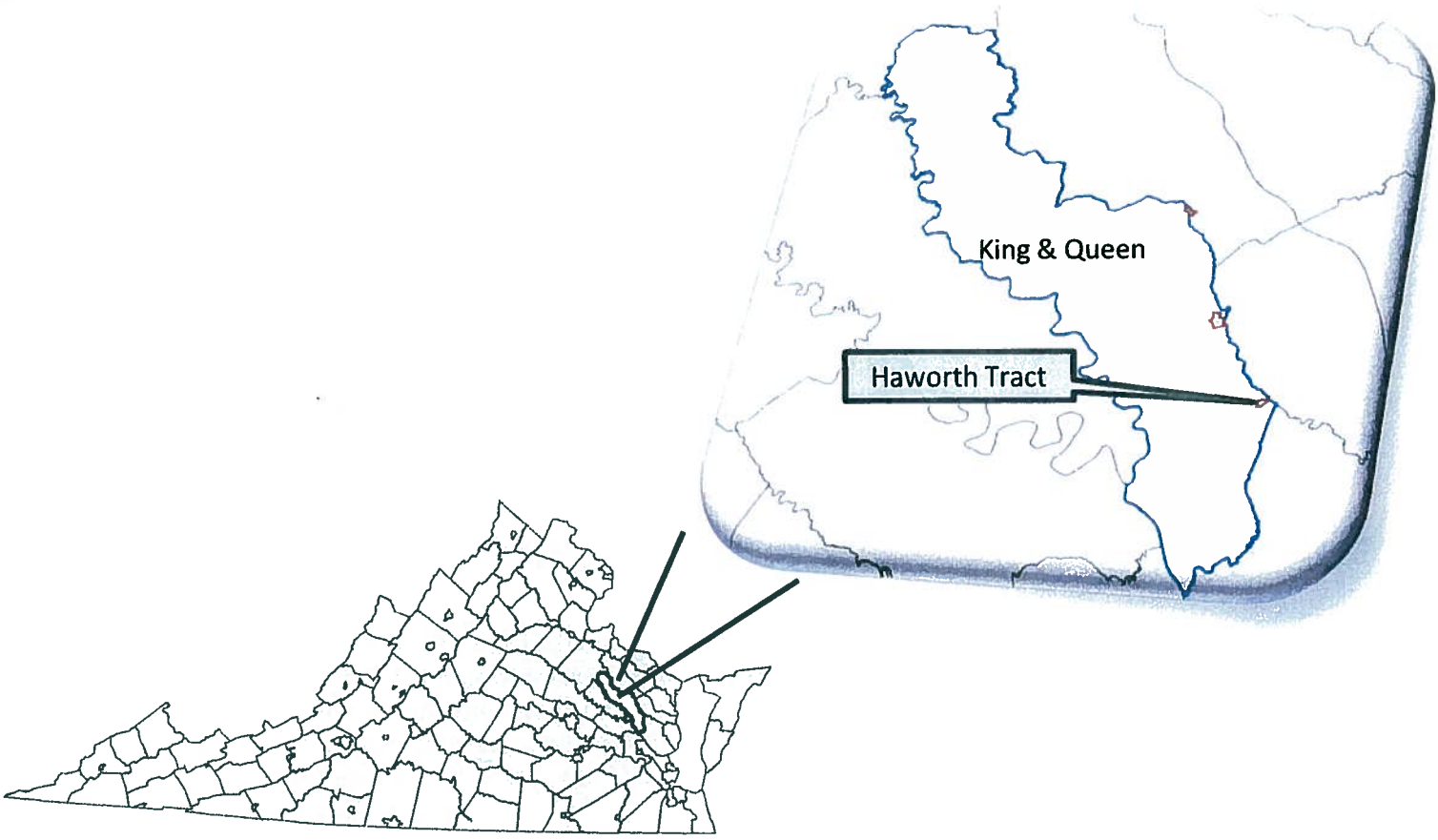
Picture 8. Areas along the "runway strip" in stand 4 that could be cut back to provide enhanced nesting opportunities for quail.

Picture 9. Representative photo of Japanese honeysuckle along the "runway strip" that should be sprayed with an herbicide.

Middle Peninsula Chesapeake Bay Public Access Authority

WILDLIFE HABITAT MANAGEMENT PLAN

HAWORTH TRACT



Introduction

This document was prepared through a cooperative agreement between the Virginia Department of Game and Inland Fisheries, the US Department of Agriculture – Natural Resources Conservation Service, and the Conservation Management Institute. The recommendations provided in this document are best management practices that could be applied to the Haworth Tract. The goal of this document is to provide the most effective approach for managing wildlife and conservation values while promoting recreational opportunities. To achieve the Middle Peninsula Planning District's (MPPDC) goals and objectives, these habitat management plans should be implemented.

Management Plans

Thinning

The area outlined as "Commercial Thinning" in the map view on page 4 is a dense stand of pines that should be thinned to a basal area of 45-60ft^2/acre in February or March 2012. Currently, the pine stands at the Haworth tract provide minimal wildlife habitat due to the overcrowding of pines, lack of plant diversity and a lack of an understory (Appendix A). Thinning will maximize the benefits of this stand for wildlife, as well as for timber value. Through proper management the Haworth Tract has the ability to provide productive habitat for quail, turkey and deer in addition to several other wildlife species. Proper management can also enhance recreational opportunities through hiking, hunting and bird-watching. In addition, it can also provide a source of income for the landowner(s) through timber sales. These funds can aid in future wildlife management plans for the Haworth Tract.

As a general rule, to achieve benefits for wildlife under a forest canopy, sunlight should strike at least 50% of the ground at noon. To accomplish this, pine stands must be thinned to 45-60ft^2/acre. Thinning to this level (45-60ft^2/acre) will provide optimal wildlife habitat, but still allow the loblolly pine to mature into a productive stand with a high commercial value. In addition, thinning heavily along field edges, road corridors and around stand openings will further enhance the property for wildlife. This "edge" habitat often yields the greatest dividend for wildlife, acre for acre. Some oak species do exist within these pine stands and we recommend leaving these oaks for their significant wildlife value.

Clear-cuts/Expanded Log Decks

The areas outlined "clear-cut/openings" in the map view on page 4 can be log decks that are expanded and/or sections where all of the trees are removed. These clear-cuts will add a mosaic of habitats to the property and maximize the benefits of the property for wildlife. In general, clear cuts should be irregular in shape and practically sized (10-30 acres). Many species including deer, turkey and quail like the edges of habitat.

A clear cut can be one of the most beneficial timber management practices for wildlife. The value of a clear-cut to wildlife is that it provides cover and forage in a fashion that is usable year around. Cover is not readily available in a mature stand of trees except in areas where trees have fallen or in dens. Within a year after a clear-cut, early succession species begin to dominate the site and a variety of food and cover is available during most of the year. This type of early succession habitat is generally available in a clear cut for eight to ten years.

These areas should be maintained by disking every 2-3 years. The clear-cuts can be seeded to partridge pea, lespedeza (Kobe or Korean) or to ladino clover. If partridge pea or a lespedeza is seeded, the site

should be lightly disked every spring or every other spring. The log decks will have to be cleared by the forestry crew using a bulldozer to remove the woody debris.

Prescribed Burning

After the thinning is complete, initiating a prescribed burning rotation can maintain excellent wildlife habitat. The sections that should be burned are outlined in the map view on page 6. The pine understory currently consists of a deep layer of pine needles that is preventing herbaceous vegetation from establishing. A prescribed burn of the entire tract in January or February of 2013, or 1 year after the thinning, will remove this layer of pine needles and reduce fuel loads. A rotational burn sequence should start in 2014, where only 1/3 of the property is burned each year. These burns can take place anywhere between March 1st and May 1st. Burning should be conducted by a certified burn manager 1 - 2 years after thinning and occur on a 3-year rotation. The suggested sections and rotation is outlined in the map view. Prescribed burning will provide many benefits to wildlife such as:

- Keeping vegetation at a height where it is most useful for wildlife.
- Improve the nutritional value and digestibility of the vegetation.
- Help maintain herbaceous vegetation (i.e. grasses, forbs, and legumes).
- Provide for a diversity of food and cover types for wildlife.
- Provide nesting habitat for quail, turkeys and songbirds.

The outlined sections should be sectioned off into even smaller units to provide better control of the fire. The outline is not a prescribed burning plan, only an overview of a rotational pattern that could be used. A prescribed burn manager will draw a more definitive plan when it comes time for the actual burn.

Firebreaks

Firebreaks should be incorporated into any planned burning activity. A firebreak is a strip or gap of bare land or vegetation that is established or created to act as a barrier to slow or stop the progress of wildfire and/or controlled prescribed burns. Firebreaks may be temporary or permanent and consist of fire-resistant vegetation, nonflammable materials, bare ground or natural geographic features such as rivers, rock outcrops, etc. Firebreaks should be located on the contour where practical, and stabilized in an appropriate manner to minimize the risk of soil erosion. Firebreak construction must comply with applicable federal, state, and local laws and regulations, including the state's Best Management Practices (BMP's) which can be viewed at the Virginia Department of Forestry's web site. Firebreaks must be 50 feet wide within the forest to allow sufficient sun light for grass and legume plants to grow successfully.

Four types of firebreaks are adaptable to the various needs and conditions existing in Virginia. They are:

1. Forest roads
2. Plowed, disked, or bladed firebreaks
3. Burned firebreaks
4. Vegetated firebreaks

These firebreaks can also serve as trails for hiking, birdwatching, and/or hunting. Seeding firebreaks to an annual lespedeza (kobe or Korean) or ladino clover will provide additional wildlife foods while still serving as trails for recreational users. If an annual is planted, light disking should occur every year or two. Annual plants require a disturbance to reseed and to prevent being out-competed by perennials.

Forest Roads

Forest roads may be used in any forest type and on nearly all terrain conditions. Existing or newly constructed forest roads or trails can be effective firebreaks if properly maintained. Forest roads are important not only for use as a prescribed fire tool but also for wildfire suppression access, timber harvesting, wildlife management, recreation, education and other forest management activities. Well planned roads provide low-cost access and require minimal maintenance. The travel surface of roads should be at least 10 feet wide. These roads already exist at the Haworth Tract, but we recommend widening these roads by removing the first few rows of adjacent trees. If seeded to ladino clover, partridge pea, or lespedeza; it will enhance the wildlife values of the property.

Where economically feasible, the road bed should be mulched with straw (do not use hay due to the high probability of introducing unwanted fescue to the roadbed) to help retain soil moisture and minimize seed loss from foraging wildlife. This allows the road to be used as a linear wildlife opening as well. If the road is to be maintained as a wildlife opening, the road should be planned and constructed to allow for adequate amounts of sunlight and rainfall which are necessary for proper establishment and continued vigor of the planting choice. Daylighting, or the removal of road side vegetation, may be necessary to allow ample sunlight to reach the road bed for several hours each day, aid in surface drying and create a soft transition zone between the forest and the road.

THREATENED/ENDANGERED SPECIES and SPECIES of CONCERN

A review of the Virginia Department of Game and Inland Fisheries (VDGIF) species list, and threatened waters list, shows the state threatened bald eagle (*Haliaeetus leucocehpalus*) as nesting within 2 miles of the tract. Tier IV unlisted species were documented within 2 miles, and also within the Dragon Run. The unlisted species found within 2 miles of the Haworth Tract include:

Ironcolor shiner (*Notropis chalybaeus*)
American eel (*Anguilla rostrata*)

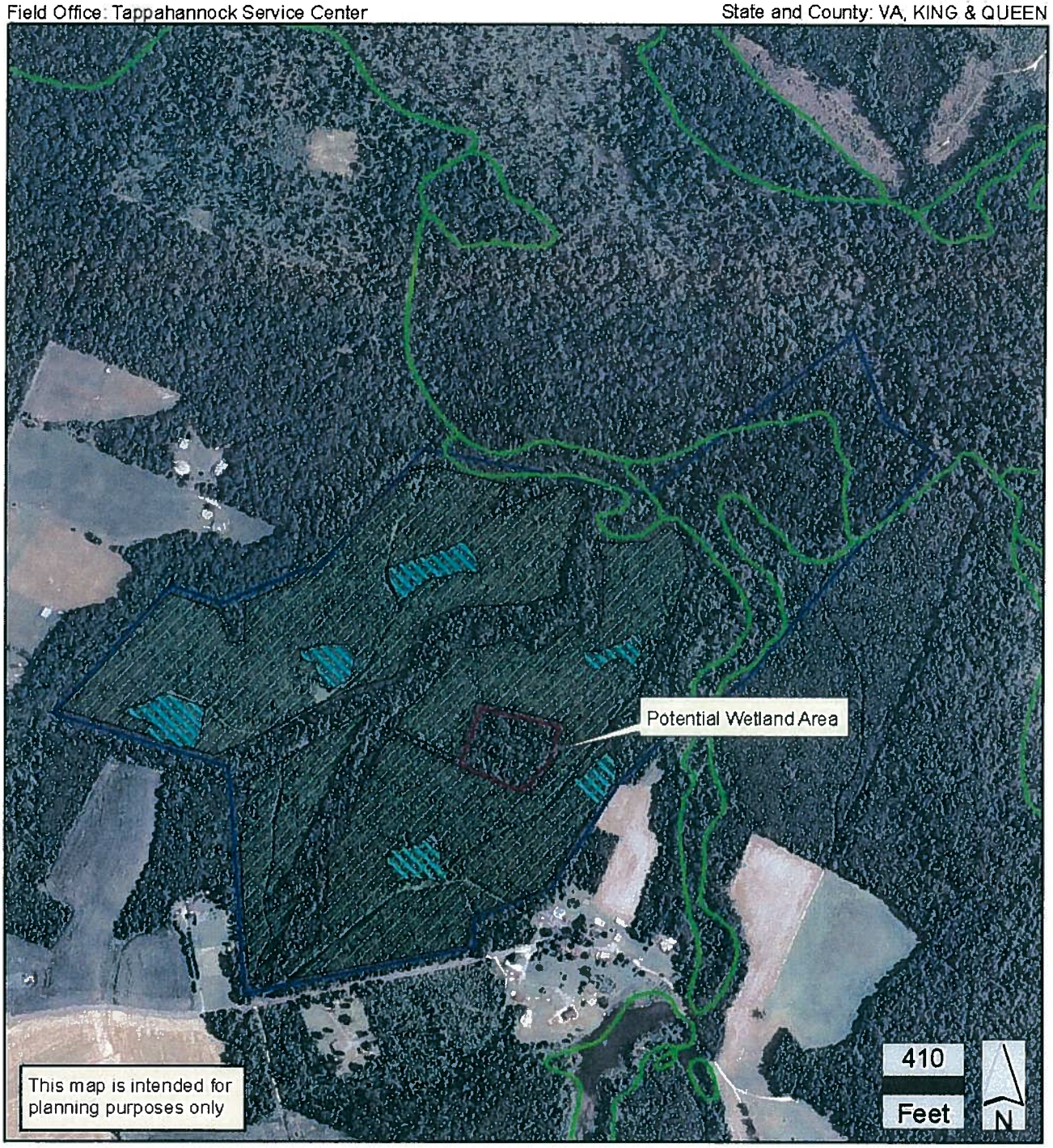
Tier IV species are still a species of concern; however other species have suffered greater population declines and have smaller populations. A review of the Department of Conservation and Recreation's (DCR) natural heritage list shows the federally threatened and state endangered, small whorled pogonia (*Isotria medeoloides*), as occurring within 2 miles.

Haworth Tract

Wildlife Mgmt Plan Map

Customer(s): MPPDC
District: Three Rivers Soil & Water Conservation District
Field Office: Tappahannock Service Center

Agency: USDA-NRCS & DGIF & CMI
Assisted by: Michael J. Budd
State and County: VA, KING & QUEEN



- Commercially thin to a basal area of 45-60 ft^2/acre
- Clear-cut/Openings
- National Wetlands Inventory

Haworth Tract

Wildlife Mgmt Plan Map

Customer(s): MPPDC
District: Three Rivers Soil & Water Conservation District
Field Office: Tappahannock Service Center

Agency: USDA-NRCS & DGIF & CMI
Assisted by: Michael J. Budd
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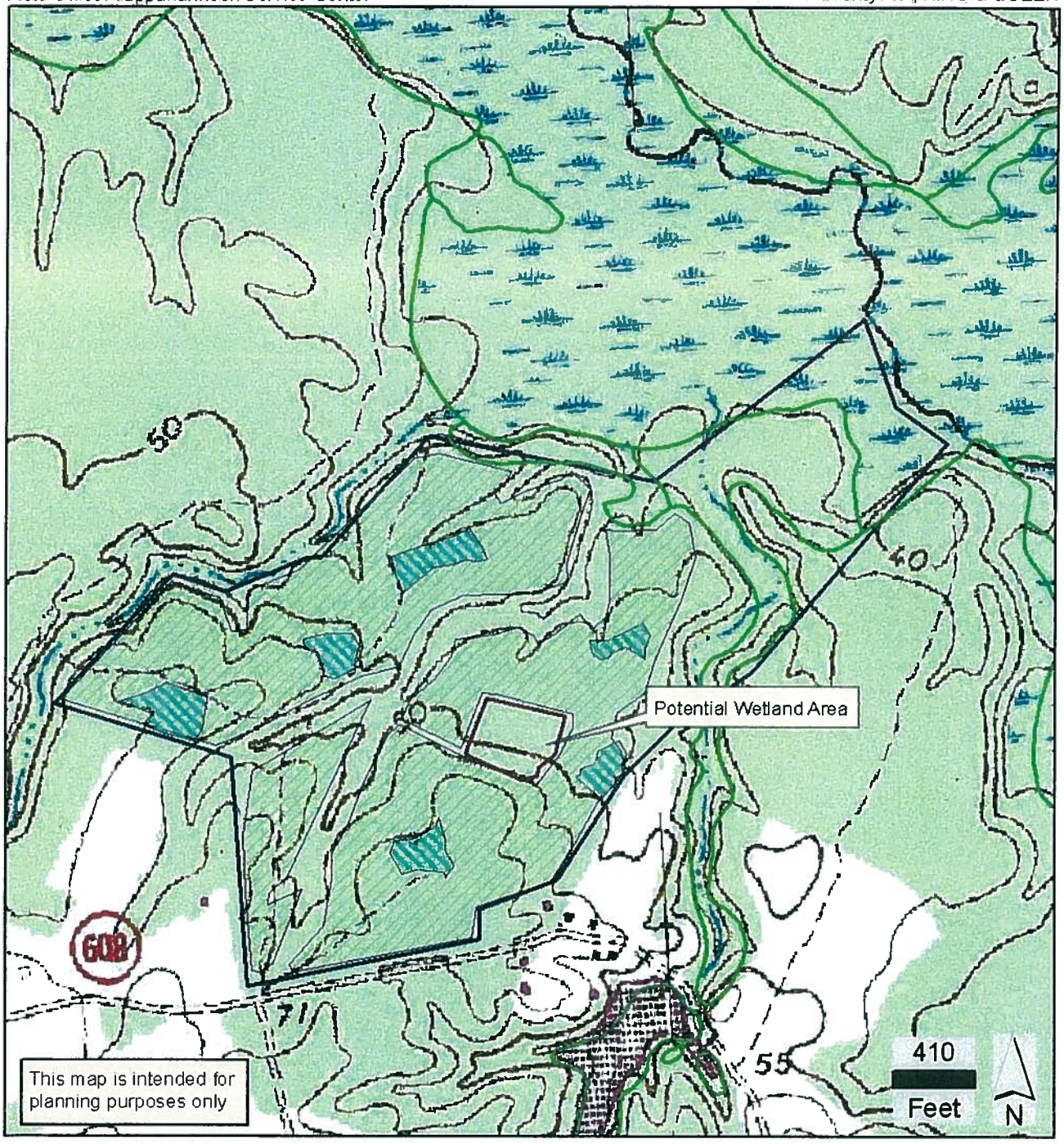

- Commercially thin to a basal area of 45-60 ft²/acre
- Clear-cut/Openings
- National Wetlands Inventory

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Haworth Tract

Wildlife Mgmt Plan Map

Customer(s): MPPDC
District: Three Rivers Soil & Water Conservation District
Field Office: Tappahannock Service Center

Agency: USDA-NRCS & DGIF & CMI
Assisted by: Michael J. Budd
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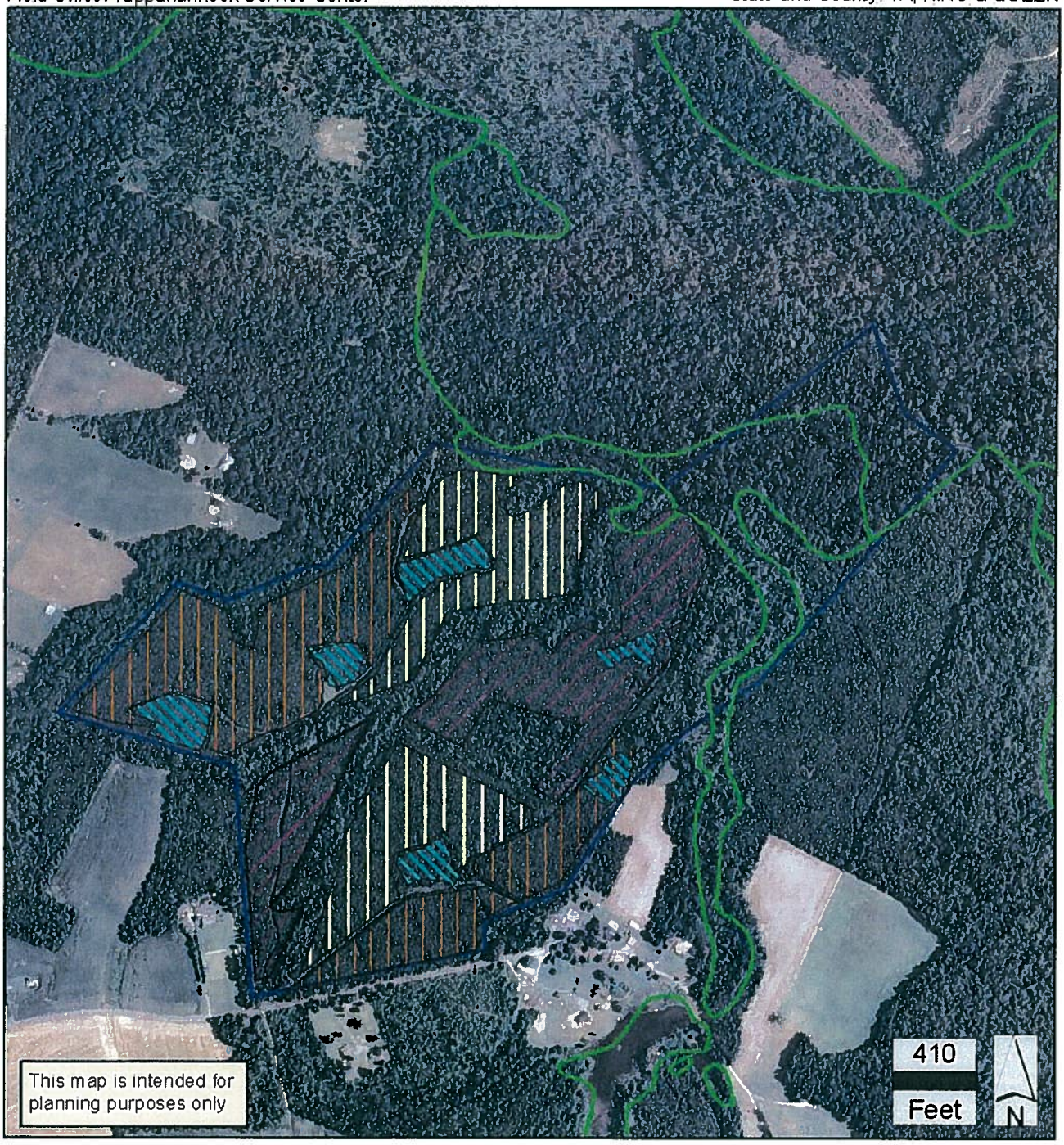

- Prescribed burn at year 3 post thin
- Prescribed burn at year 4 post thin
- Prescribed burn at year 5 post thin
- Clear-cut/Openings
- National Wetlands Inventory

Haworth Tract

Wildlife Mgmt Plan Map

Customer(s): MPPDC
District: Three Rivers Soil & Water Conservation District
Field Office: Tappahannock Service Center

Agency: USDA-NRCS & DGIF & CMI
Assisted by: Michael J. Budd
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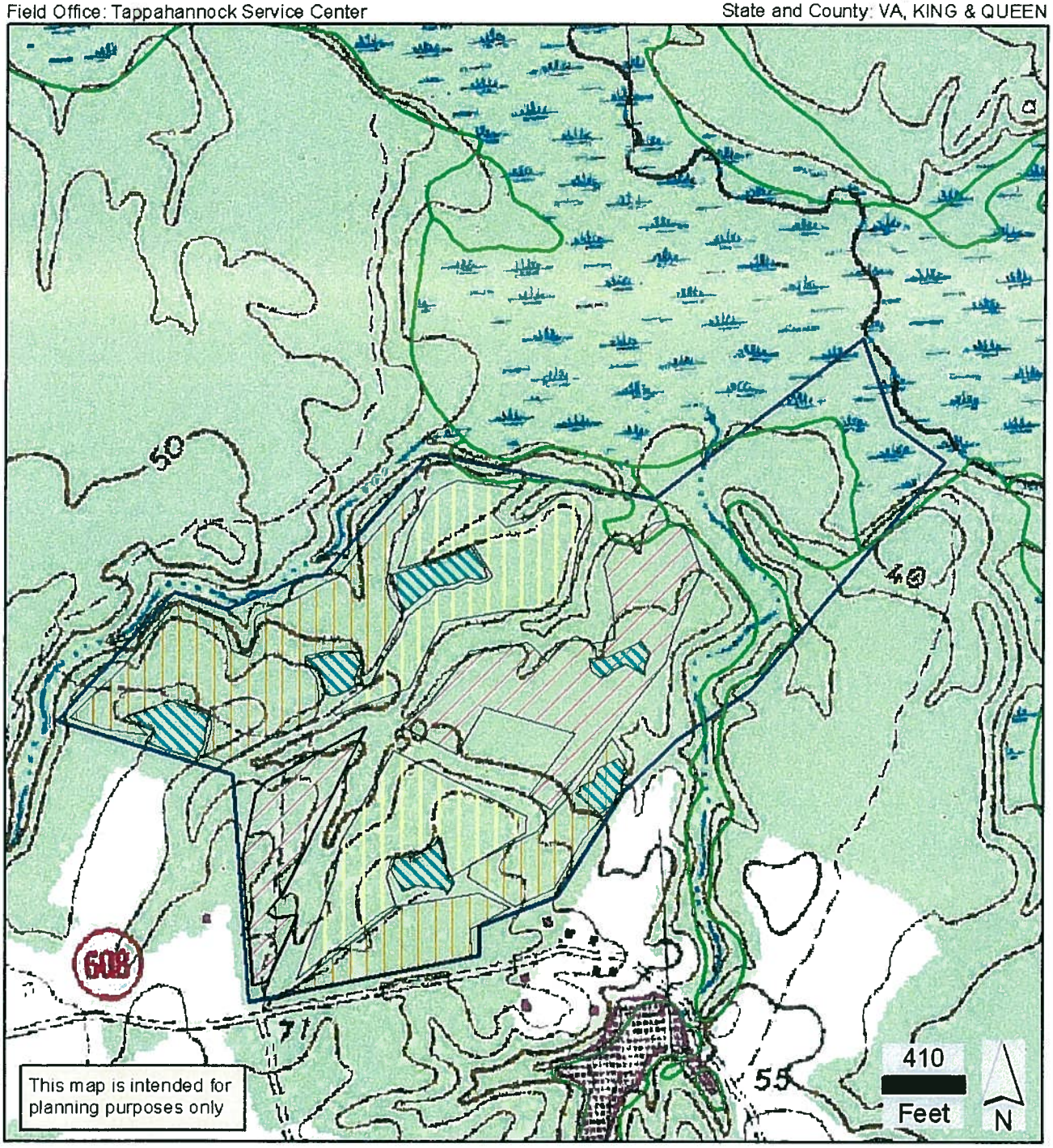


- Prescribed burn at year 3 post thin
- Prescribed burn at year 4 post thin
- Prescribed burn at year 5 post thin
- Clear-cut/Openings
- National Wetlands Inventory

APPENDIX A

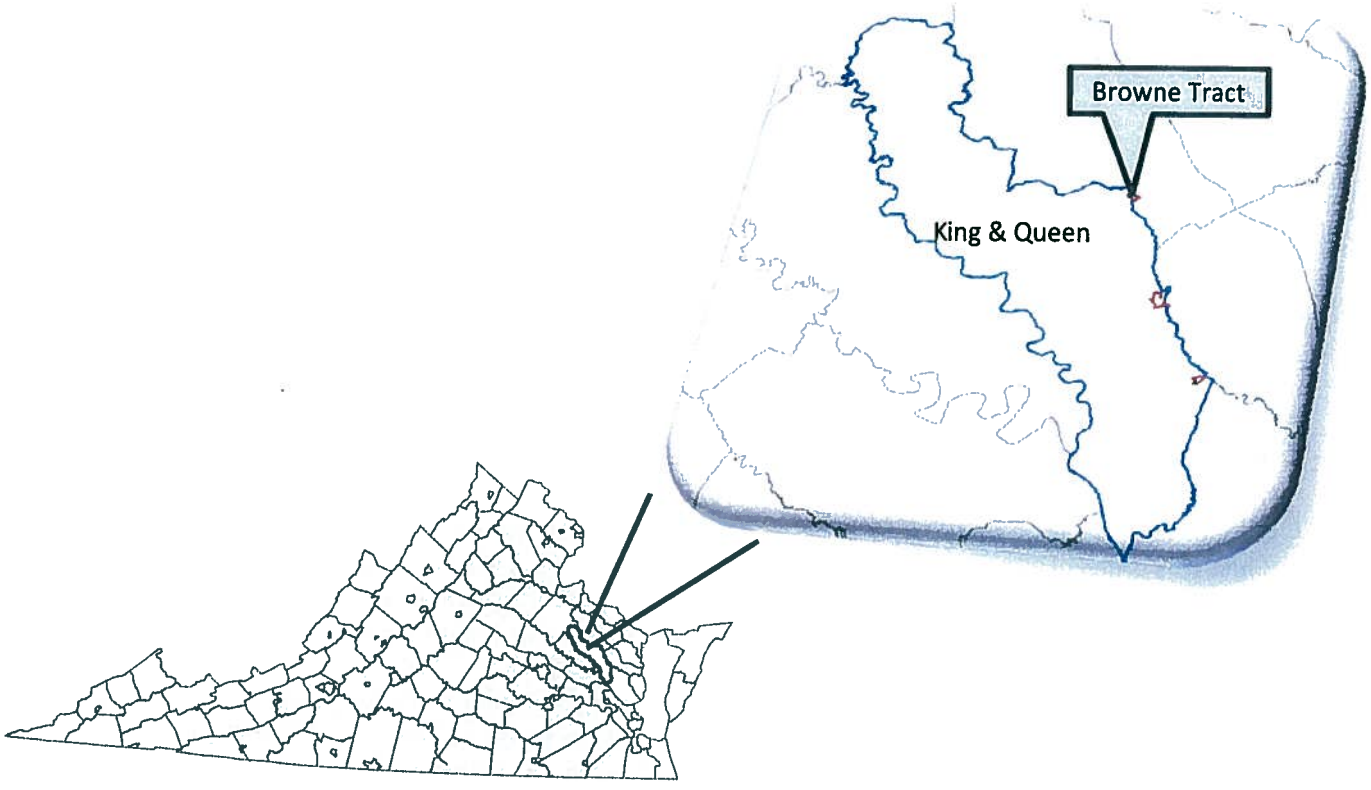
SITE PHOTOS

Pictures 1-3: These photos are representative of the Haworth Tract. The tree densities and/or pine needle build-up prevents an herbaceous understory. Loblolly pines may not be growing at desired rates as a result of their density.

Middle Peninsula Chesapeake Bay Public Access Authority

WILDLIFE HABITAT MANAGEMENT PLAN

BROWNE TRACT



INTRODUCTION

This document was prepared through a cooperative agreement between the Virginia Department of Game and Inland Fisheries, the US Department of Agriculture – Natural Resources Conservation Service, and the Conservation Management Institute. The recommendations provided in this document are best management practices that could be applied to the Browne Tract. The goal of this document is to provide the landowner/manager with the most effective approach for managing wildlife and conservation values while promoting recreational opportunities. Active habitat management will be necessary at the Browne Tract to achieve or stay consistent with the Middle Peninsula Planning District Commissions (MPPDC) goals and objectives.

MANAGEMENT PLANS – Browne Tract West

Pre-established plans for the western portion of the Browne Tract include a clear-cut. A clear-cut can be one of the most beneficial timber management practices for wildlife, especially deer, turkey and quail. The value of a clear-cut to wildlife is that it provides cover and forage in a fashion that is usable year around. Cover is not readily available in a mature stand of trees except in areas where trees have fallen or in dens. Within a year after a clear-cut, early succession species begin to dominate the site and a variety of food and cover is available during most of the year. This type of early succession habitat is generally available in a clear cut for eight to ten years.

The size and shape of a clear-cut depends on a variety of factors including topography, economics, and wildlife. In general clear cuts should be irregular in shape, bordered on one or two sides by mature timber, and practically sized (10-30 acres). Many species including deer, turkey and quail like the edges of habitat. Creating an irregular border and surrounding the clear-cut with different habitat types (i.e. mature timber, previous year's cuts, and agriculture) increases the amount of edge.

Oak Management – Post Harvest

We recommend managing this area for oaks after the loblolly pines are clear-cut. Oak dominated forests are one of the most important habitat types because they directly influence population and ecological processes. Many birds and mammals rely heavily on mast producing trees for reproduction and survival. In addition to mast, the overall structure of hardwood forests differ from other habitat types and play an important role in winter and nesting cover for many species of birds and mammals. Several oak trees exist in the pine understory and should not be harvested during the clear-cut. While the oaks may not be as commercially valuable as loblolly due to limited growing conditions (Appendix A), they will provide better wildlife habitat and improved recreational opportunities. Lower King and Queen County, and the middle peninsula forest lands in general, are dominated by loblolly pine. Managing for an oak dominated forest at the Browne Tract will add much needed diversity to this region. Some portions of the area will likely remain very wet after the trees are cut. These areas can be planted with bald cypress or with wet adapted oak species (e.g. pin oak, overcup oak, willow oak).

After the clear-cut, a prescribed burn in September should be implemented. If this site is not burned, then mechanical thinning will be required. Mechanical thinning is not as beneficial to wildlife as a prescribed burn, but will be required for the management of non-desirables and competing species if a prescribed burn is not used.

Prescribed Burning

Quick growing species like loblolly pine, maple, sweet-gum, and poplar can quickly dominate if close attention is not given to the site. Prescribed burning is the most effective method for increasing oak prevalence in a regenerating clear cut. Quicker growing species generally have thinner bark and put most of their energy into above ground growth. Oaks on the other hand are thicker barked and tend to put energy into root development during the first few years of life. For this reason, prescribed burns will shift species composition to favor oak species.

Initiating a prescribed burning rotation can maintain excellent wildlife habitat. Burning should be conducted by a certified burn manager 1 - 2 years after the harvest and occur on a 3-year rotation in 10-20 acre sections (Figure 1). Prescribed burning will provide many benefits to wildlife such as:

- Keeping vegetation at a height where it is most useful for wildlife.
- Improve the nutritional value and digestibility of the vegetation.
- Help maintain herbaceous vegetation (i.e. grasses, forbs, and legumes).
- Provide for a diversity of food and cover types for wildlife.
- Provide nesting habitat for quail, turkeys and songbirds.

For the first burn, burn the entire section to promote herbaceous plants in late August or September 2013. Starting the following year (2014), start a prescribed burn rotation in late August or September by burning only 1/3 of the western section a year. Burning in late August or September will effectively remove competing species such as pine, tulip poplar, sweetgum and maple.

Firebreaks

Firebreaks should be incorporated into any planned burning activity (Figure 1). A firebreak is a strip or gap of bare land or vegetation that is established or created to act as a barrier to slow or stop the progress of wildfire and/or controlled prescribed burns. Firebreaks may be temporary or permanent and consist of fire-resistant vegetation, nonflammable materials, bare ground or natural geographic features such as rivers, rock outcrops, etc. Firebreaks should be located on the contour where practical, and stabilized in an appropriate manner to minimize the risk of soil erosion. Firebreak construction must comply with applicable federal, state, and local laws and regulations, including the state's Best Management Practices (BMP's) which can be viewed at the Virginia Department of Forestry's web site (www.dof.virginia.gov). Firebreaks must be 50 feet wide within the forest to allow sufficient sun light for grass and legume plants to grow successfully.

Firebreaks can also serve as trails for hiking, bird-watching, and/or hunting. Seeding the firebreaks with Korean or kobe lespedeza, or ladino clover is recommended. This will provide additional wildlife habitat while still serving as a trail for recreational users and managers. If an annual is planted, light disking should occur every year or two. Annual plants require a disturbance such as light disking to reseed and to prevent being out-competed by perennials. Disking should occur in late winter (Feb) to promote reseeding for annual legumes and to create bare ground for a firebreak.

MANAGEMENT PLANS – Browne Tract East

The portion of the Browne Tract east of the Dragon Run currently consists of several species of trees, including sweet gum, loblolly pine and maples. To better manage this area for wildlife, several management practices should be implemented. To create and ensure a soft edge around the crop fields,

the edges should be set back, however the oak trees should *not* be removed (Figure 1). A high-speed forestry mulcher is preferred, although a bulldozer or a group of volunteers with hand tools can also be used. A high-speed forestry mulcher will disturb only the first few inches of the soil and allow for better germination of herbaceous vegetation. In addition, the mulcher can accomplish this work in a short amount of time. The mulcher could also be used on the western portion of the tract to clear and smooth firebreaks, log-decks and trails. While creating the field borders and openings, it will be important to chemically treat areas of Tree-of-Heaven (*Ailanthus altissima*) (Appendix B & D). This species is highly invasive and will take over any disturbed areas if not treated. Where the tree-of-heaven is not present, these areas can be left to reseed naturally or a warm season grass mixture can be used. The mixture should be seeded at 5lbs/acre or less. This practice will be important to quail and other early succession species. Appendix C lists seed distributors that carry these mixtures:

Seeding mixture (lbs PLS per acre)
Wildlife – tall grass mixture
1.5 lb. big bluestem
1.0 lb. Indian grass
1.5 lb. switchgrass
1.0 lb. native forbs

The warm season grass areas need to be managed every 2-3 years to deter the growth of woody species and to prevent the stand from becoming too thick. Effective methods for managing these areas include light disking or mowing, if mowing is followed by a prescribed burn. Mowing is the least favorable option and should only be done if it can be followed by a prescribed burn. Mowing causes thatch to build up over time preventing favorable weed species from germinating. It also limits the amount of cover available for quail broods.

This area also has the ability to provide habitat for the American woodcock (*Scolopax minor*) in addition to deer, turkey and quail. The area can be improved by removing older non-desirable trees such as sweet gum, maple and young pines in the sections between the Dragon Run and the access trail. Removing these trees will allow for shrubs or saplings to take over, providing a high stem density that woodcock prefer. The cutback edges and firebreaks will also enhance woodcock habitat.

For the areas to the east and northeast of the access trail, openings should be created to provide additional food and nesting cover for wildlife. The trail that runs east to west should be expanded to roughly 50' in width to provide a travel corridor for wildlife as well as nesting cover. We recommend planting these openings with ladino clover, or kobe lespedeza and partridge pea. The openings should be lightly disked every year or two.

Sweetgums are currently taller than the pines and may out-compete the pines if not managed (Appendix D). These trees should be removed to promote loblolly pine. This can be accomplished via a mechanical removal by volunteers, or by hiring a forestry crew to do a pre-commercial thin. A pre-commercial thin will promote herbaceous vegetation in the understory, providing additional wildlife habitat. In addition, it will also accelerate the growth of the pines.

If a contract with the Department of Forestry is possible, we recommend having them manage the pines in this portion of the Browne tract. Any timbering operations can be lumped into their activities to make this portion more attractive to a commercial forester. Without the ability to harvest on both DOF and MPPDC land at the same time, the MPPDC portion may not provide enough value to attract a commercial forester.

THREATENED/ENDANGERED SPECIES and SPECIES of CONCERN – Browne Tract

A review of the Virginia Department of Game and Inland Fisheries (VDGIF) species list and threatened waters lists shows the bald eagle (*Haliaeetus leucocephalus*) as nesting within 2 miles of the Browne Tract. The federally threatened/state threatened small whorled pogonia (*Isotria medeoloides*) is also found within 2 miles of the Browne Tract. Unlisted tier IV species documented within 2 miles of the Browne Tract include:

Ironcolor shiner (*Notropis chalybaeus*)
American eel (*Anguilla rostrata*)
American brook lamprey (*Lampetra appendix)*

Tier IV species are still a species of concern; however other species have suffered greater population declines and have smaller populations. A review of the Department of Conservation and Recreation's (DCR) natural heritage list did not reveal any listings for threatened or endangered habitats within 2 miles.

Browne Tract

Wildlife Mgmt Plan Map

Customer(s): MPPDC
District: Three Rivers Soil & Water Conservation District
Field Office: Tappahannock Service Center

Agency: USDA-NRCS & DGIF & CMI
Assisted by: Michael J. Budd
State and County: VA, KING & QUEEN

- Year 1 Prescribed Burn
- Year 2 Prescribed Burn
- Year 3 Prescribed Burn
- Firebreaks/Trails
- Openings
- National Wetlands Inventory

Browne Tract

Wildlife Mgmt Plan Map

Customer(s): MPPDC
District: Three Rivers Soil & Water Conservation District
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Agency: USDA-NRCS & DGIF & CMI
Assisted by: Michael J. Budd
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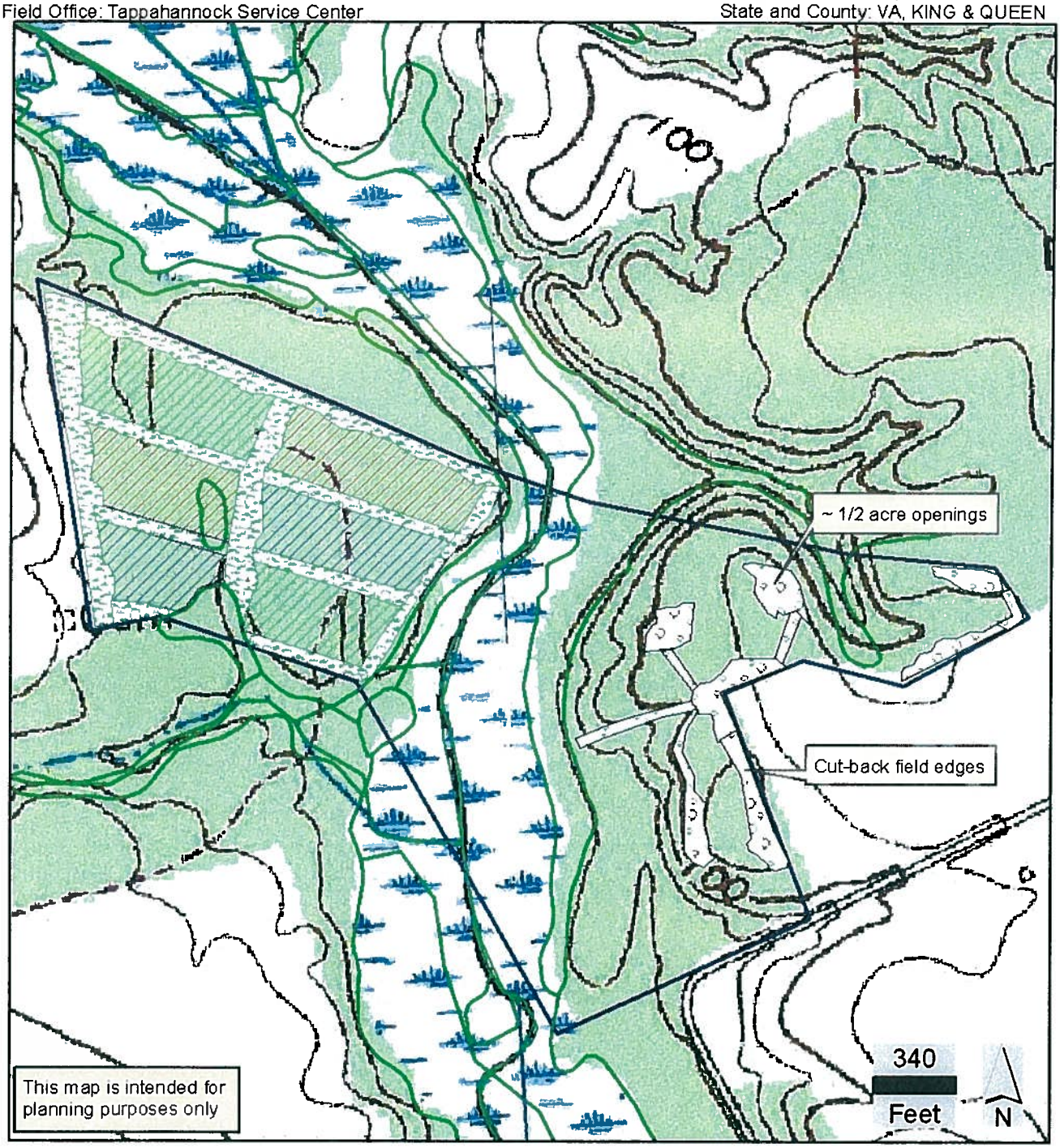


- Year 1 Prescribed Burn
- Year 2 Prescribed Burn
- Year 3 Prescribed Burn
- Firebreaks/Trails
- Openings
- National Wetlands Inventory

APPENDIX A

SOILS REPORT: FORESTLAND PRODUCTIVITY

Forestland Productivity

This table can help forestland owners or managers plan the use of soils for wood crops. It shows the potential productivity of the soils for wood crops.

Potential productivity of merchantable or *common trees* on a soil is expressed as a site index and as a volume number. The *site index* is the average height, in feet, that dominant and codominant trees of a given species attain in a specified number of years. The site index applies to fully stocked, even-aged, unmanaged stands. Commonly grown trees are those that forestland managers generally favor in intermediate or improvement cuttings. They are selected on the basis of growth rate, quality, value, and marketability. More detailed information regarding site index is available in the "National Forestry Manual," which is available in local offices of the Natural Resources Conservation Service or on the Internet.

The *volume of wood fiber*, a number, is the yield likely to be produced by the most important tree species. This number, expressed as cubic feet per acre per year and calculated at the age of culmination of the mean annual increment (CMAI), indicates the amount of fiber produced in a fully stocked, even-aged, unmanaged stand.

Trees to manage are those that are preferred for planting, seeding, or natural regeneration and those that remain in the stand after thinning or partial harvest.

Reference:
United States Department of Agriculture, Natural Resources Conservation Service, National forestry manual.

Report—Forestland Productivity

Forestland Productivity– King and Queen County, Virginia				
Map unit symbol and soil name	**Potential productivity**			**Trees to manage**
	Common trees	**Site Index**	**Volume of wood fiber**	
			Cu ft/ac	
4B—Emporia sandy loam, 2 to 6 percent slopes				
Emporia	Loblolly pine	75	100	Loblolly pine, Sweetgum
	Southern red oak	70	57	

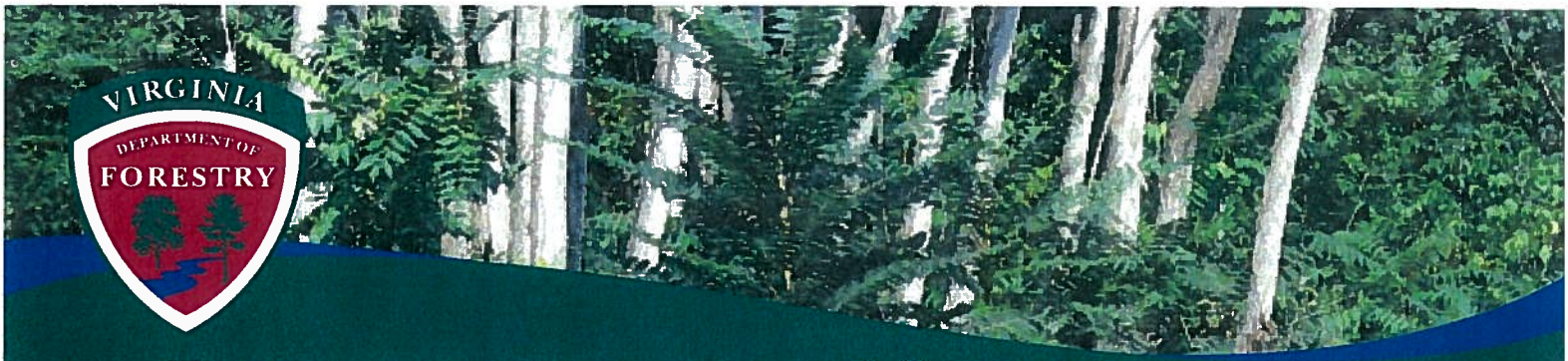
Forestland Productivity-- King and Queen County, Virginia				
Map unit symbol and soil name	Potential productivity			Trees to manage
	Common trees	Site Index	Volume of wood fiber	
			Cu ft/ac	
7A—Kinston and Bibb soils, 0 to 2 percent slopes, occasionally flooded				
Kinston	Cherrybark oak	95	57	American sycamore, Cherrybark oak, Eastern cottonwood, Green ash, Loblolly pine, Sweetgum, Yellow-poplar
	Eastern cottonwood	100	129	
	Loblolly pine	100	129	
	Sweetgum	95	114	
	White oak	90	57	
Bibb	Loblolly pine	100	157	Eastern cottonwood, Loblolly pine, Sweetgum, Yellow-poplar
	Sweetgum	90	100	
	Water oak	90	86	
15B—Slagle sandy loam, 2 to 6 percent slopes				
Slagle	Loblolly pine	86	129	Loblolly pine, Sweetgum, Yellow-poplar
	Southern red oak	76	57	
	Sweetgum	86	100	
	Water oak	76	72	
	Yellow-poplar	90	86	
18B—Tarboro sand, 0 to 6 percent slopes, rarely flooded				
Tarboro	Loblolly pine	72	100	Loblolly pine, Longleaf pine

Data Source Information

Soil Survey Area: King and Queen County, Virginia
Survey Area Data: Version 13, Feb 23, 2010

APPENDIX B

TREE-OF-HEAVEN MANAGEMENT GUIDE



Control and Utilization of Tree-of-Heaven

A Guide for Virginia Landowners

Virginia Department of Forestry
www.dof.virginia.gov

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INTRODUCTION

Ailanthus altissima (also known as tree-of-heaven, paradise tree, Chinese sumac, stink tree or just Ailanthus) is a native of China and was first introduced to the United States from England to Philadelphia, PA, in 1784. It was often nursery grown in the eastern U.S. and widely planted in cities and towns during the early 1800s. In the 1850s, Ailanthus was brought to California by Chinese immigrants. Its widespread use as an urban and shelterbelt tree is due to its ease of establishment, rapid growth, and lack of significant insect and disease problems. Tree-of-heaven also has a high tolerance of poor soils, low soil moisture and air pollution, making it an ideal tree for heavily urbanized areas. Unfortunately, it produces an unpleasant odor and regenerates prolifically from root sprouting and heavy seed production. Despite these negative qualities, widespread planting continued well into the 20th century. Over this time period, it has become naturalized in 42 states.

threaten to displace many native plant species.

As in many states, Virginia is increasingly dealing with the impact of non-native invasive plants. In many areas, they have become so naturalized that eradication is no longer an option. However, through a multi-faceted approach, the impact of some invasive plants can be minimized. One approach that has been little explored to date is developing uses and markets for woody invasive species. A number of species, such as *Ailanthus altissima*, *Paulownia tomentosa* (Paulownia or Princess tree) and *Albizia julibrissin* (Mimosa or silk tree), have now attained the volume and size in places to have potential use. By developing uses for these species and making use of pre-existing markets, it becomes more economical to control their spread. Since most of the forest land in Virginia is owned by non-industrial private landowners, anything that can provide additional income or reduce the cost of land management will increase the incentive to control invasive species.

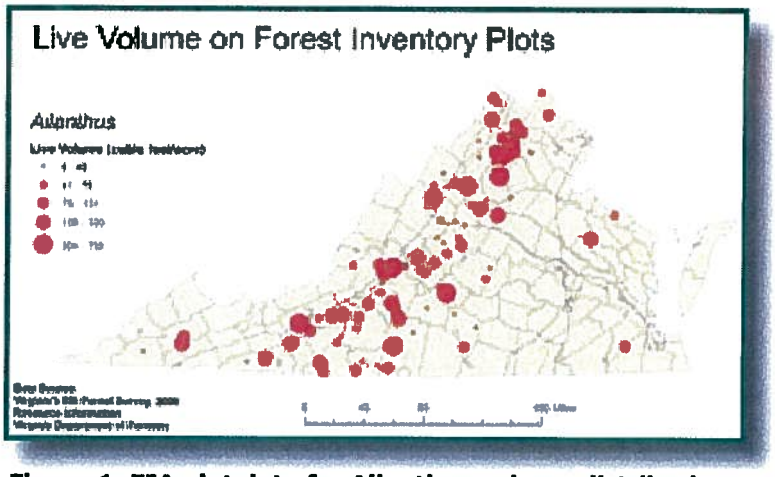

Figure 1. FIA plot data for Ailanthus volume distribution in Virginia.

Based on current FIA inventory data, 49 counties in Virginia have measurable quantities of Ailanthus and state-wide volumes are more than 67 million cubic feet, concentrated primarily along the Blue Ridge Mountains and I-81 corridor (Figure 1). As a point of reference, this represents approximately 0.20 percent of the 33 billion cubic feet of live volume in Virginia. This volume amount exceeds that of many native tree species and Ailanthus is 42nd in abundance out of a list of 128 tree species for the Commonwealth. It is found mostly in disturbed habitat, particularly along highway and roadway corridors and medians. In many locations, it has also established itself within more heavily forested areas where it can

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At this point, a disclaimer is necessary: by suggesting we make use of Ailanthus using pre-existing markets, such as furniture, pulp and paper, charcoal and possibly biomass, we are in no way implying that this invasive weed should be cultured for profit. Ailanthus plantations would not be a profitable enterprise for landowners and would only contribute to further spread and proliferation of this species.

Landowners frequently ask forestry personnel about the feasibility of controlling tree-of-heaven and what research is being done to combat this problem. Market development as a means of mitigating impacts of invasive tree species is a novel approach that may hold promise for addressing multiple problems. Likewise, efforts to control Ailanthus must not only involve cutting and harvesting, but also proper and timely application of herbicides to prevent vigorous re-sprouting. This publication will address both of these tactics.

Biology and Life Cycle

Ailanthus seeds germinate beginning in May and throughout the summer. Seeds and seedlings are very tolerant of poor soils, but they germinate and grow best in full sunlight and are fairly intolerant to shade and wet soils. Seedlings quickly put down a large taproot and can grow up to three feet or more during their first year. While trees can reach a size of 60 to 70 feet in height and two feet to three feet in diameter, they are typically short-lived, with an average life span of 30 to 50 years. Unfortunately, they can dominate an area due to vigorous re-sprouting, root-suckering, and secretion of a chemical from its root system to the surrounding soil that is toxic to other plants.

Tree-of-heaven sprouts from the roots, root crown and bole. Re-sprouting occurs when the main stem is cut, burned or otherwise damaged. Top dieback from frost or drought can produce the same effect. These sprouts typically grow much faster than a seedling growing from seed because an extensive root system is already established. Growth rates of re-sprouts can be as fast as 10 feet per year. Root suckering can occur at any time and can be some distance from the parent tree. Root suckers also grow quite fast, up to six feet per year and may appear as far as 50 feet to 90 feet from the parent tree. Often they grow in response to mechanical disturbance of the root system or an ineffective herbicide treatment. Root suckers can develop into whole new trees, but re-sprouts often do not live long due to weak attachment to the stump. Such aggressive vegetative growth, however, makes it very difficult to control (Figure 2).

Most Ailanthus trees produce either male or female flowers. Pollination occurs from a variety of nectar and pollen-feeding insects, such as honey-bees and beetles, that are attracted to the strong odor of the male flowers. Many small, light seeds are produced in large clusters. Normally the most prolific seed production occurs between ages 12 and 20. However, fruiting has been observed in saplings as young as 1-year-old or in 2-year-old root sprouts. Several hundred inflorescences may be produced in one year. Since an individual flower can produce hundreds of seeds, a tree can yield more than 300,000 seeds per year, with most being viable. One tree in Pennsylvania was documented to produce more than a million seeds in one year.

The winged fruits are easily dispersed by wind, water and machinery. Seeds retain dormancy for less than one year, so there is no long-term build up of seed banks. Seed can germinate in highly compacted or salty soil. They contain two-large cotyledons (embryonic leaves) with stored oils and, therefore, are well equipped for rapid growth. Oak leaf litter has been shown to delay germination and increase mortality of Ailanthus seed.

Once established, tree-of-heaven is perhaps among the fastest growing tree species in North America, often growing three feet to six feet in the first year. Saplings can average an additional three feet to four feet of height growth per year for at least four years. Pole-sized trees continue to grow rapidly, but overall growth

slows after age 20 to 25. Once established, Ailanthus density expands mainly by root sprouting. An acre of land can become dominated by root sprouts from the same individual tree. Sprout growth slows considerably if they become shaded. Cattle, deer and rodent browsing, as well as defoliation by ermine moth caterpillars, may strip seedlings and saplings of their foliage.

Figure 2: Ailanthus trees often grow in clumps that sprout from the same root system and are clones of each other, or each tree may have germinated independently from seed.

CONTROL OR ELIMINATION

History has taught us that the permanent eradication of a weed species from a geographic region is not a realistic goal. But for specific situations and limited areas where the silvicultural objectives will require the removal of invading tree-of-heaven, there are options available. Long-term elimination of Ailanthus requires diligence; its seed production, germination rate and sprouting potential make repeated follow-up monitoring essential. New sprouts or seedlings should be treated as soon as possible after detection so they will not rebuild root and seed reserves. Establishing a thick cover of non-invasive native vegetation can help discourage re-establishment but will not prevent it.

The most effective, economical and environmentally sound long-term control strategy is to develop an integrated pest management (IPM) approach that involves the coordinated use of several compatible control strategies. Due to the many characteristics that make it so persistent and invasive, Ailanthus is a prime candidate for an IPM approach to maintain long-term control.

Tree-of-heaven has been the subject of a good deal of research, experience and publication. What follows is a compendium of generally-accepted information condensed from many sources. The reader is referred to the suggested reading listed at the end of this document for further details and additional perspectives on Ailanthus control.

In general, methods of weed management can be categorized as:

1. Physical (manual or mechanical removal);
2. Thermal (spot or broadcast burning);
3. Managerial (plant competition or grazing);
4. Biological (selective insects or pathogens), or
5. Chemical (herbicides).

PHYSICAL

- **Manual.** These methods may have promise for landowners with low budgets or on sites with other rare or sensitive plants that need to be carefully tended and preserved.
  - **Pulling.** Ailanthus can be effectively removed by pulling up young seedlings as soon as they are large enough to grasp securely. Be sure this is done before they start to produce seeds or develop a tap root (which would make this physically difficult or impossible). It may be easier to attempt this after a rain when the soil is loose.
  - **Cutting.** Manually operated tools, like brush cutters, saws, axes, machetes, loppers and clippers, can be used to cut Ailanthus. This is an initial control practice, and long-term success will likely require either an herbicidal control or repeated cutting of re-sprouts. It can be a useful tactic if the density of Ailanthus or the terrain would otherwise make access to the plants for ongoing treatments difficult or dangerous. If possible, the initial cutting should be in early summer to impact the tree when its root reserves are lowest. Cutting large seed producing trees can reduce seedling proliferation.
  - **Digging.** This is a slow and labor-intensive approach, but with care it can be effective. Since every piece of root that breaks off and remains in the soil may produce a new plant, it is important to be thorough and methodical. As a result of the time required, this technique may be suitable only for small infestations and around trees and shrubs where other methods are not practical.
  - **Girdling.** This involves manually cutting through bark and cambial tissues around the entire trunk of the undesirable tree in the spring when it is actively growing. It is relatively inexpensive. Re-sprouting will likely be an issue (unless herbicides are applied to the girdled area), and there may be concern about leaving standing dead trees on some sites, but this could be a useful technique for at least eliminating large seed-producing trees.
- **Mechanical.** These methods use mechanized power equipment to remove selected or all above-ground vegetation. They are non-selective in that all vegetation on a treated site may be affected, but can be effective on gentle topography with a minimum of obstacles, such as rocks, stumps or logs. Most mechanical equipment is not safe to operate on slopes over 30 percent, and the approach is not recommended where soils are compactable or erosive.
  - **Chopping/Cutting/Mowing.** Saplings can be trimmed back by equipment-mounted mowers or choppers. They can be removed faster and more economically in these ways than by manual means and with less soil disturbance than with scarification. However, these methods are nonselective. They reduce the potential for biological control through plant competition and open up new niches for invading vegetation. Wildlife forage is eliminated. Saplings usually require several cuttings before the underground parts exhaust their reserve food supply. After cutting or chopping with mechanical equipment, Ailanthus re-sprouts from root crowns in greater density if not treated with herbicides.
  - **Scarification.** In recent years, several machines designed to grind and mulch above-ground vegetation and scarify the surface layer of the soil have become available. They are expensive but excellent for cleaning a site and leaving it easily accessible and operable for future management activities, and leave the prior plant community as incorporated organic matter or surface mulch. To an even higher degree than mowing, scarification prepares the site for re-colonization and eliminates wildlife forage and shelter. On at-risk slopes or soils, it can also increase the chance of erosion.

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Thermal

- **Spot Treatment.** Fire has limited use for tree-of-heaven control. It can be effective for initial spot treatment using a weed burner to heat-girdle individual stems. This method is cheaper than herbicide options and can be used during periods of rain or snow, but Ailanthus re-sprouts prolifically after heat-girdling so additional follow-up treatments would still be required.
- **Broadcast Burning.** This approach has not been widely attempted or studied for controlling Ailanthus. However, it seems reasonable to expect that by removing the canopy and releasing a flush of nutrients such a fire could result in heavy sprouting and rapid growth of tree-of-heaven – not a useful result.

Managerial

- **Plant Competition.** This method alone is not a reliable control method for tree-of-heaven. Establishing and maintaining a healthy overstory can minimize the chance of re-invasion or at least slow the spread of new Ailanthus. But its rapid growth rate, prolific seeding, sprouting potential and shade tolerance will often allow it to out-compete native species that occur or are planted on a site.
- **Grazing.** The continued removal of the tops of seedlings and re-sprouts by grazing animals prevents seed formation and also gradually weakens the root systems. Grazing must be continued until the seed bank is eliminated or Ailanthus could re-colonize quickly after livestock is removed and begin to dominate pastures once again.

Biological

Biological control methods for Ailanthus have not been studied extensively. Some evidence suggests that the fungal pathogens *Verticillium dahliae* and *Fusarium oxysporum*, isolated from dead and dying Ailanthus trees, could hold promise. Furthermore, research at Virginia Tech is exploring the potential of an introduced weevil from China that feeds on Ailanthus to be released if it proves effective and can be done safely with little or no impact to non-target plant species. It is also hoped that this weevil, through feeding on Ailanthus infected with the Verticillium fungus, may move the Verticillium around and effectively inoculate new trees with it – resulting in a lethal combination. However, all of this research is preliminary and practical results, if achieved, would not be available for some time.

Chemical

Herbicides are probably the most effective tool for controlling Ailanthus, and they are usually the quickest way to kill the root system and prevent re-sprouting of cut trees. There are several registered general-use herbicides available that can be applied either as foliar sprays, cut stump treatments, by injection into the plant, or as basal sprays. It is important to carefully read and follow all of the label instructions and warnings for any herbicide, and to use care when applying them near other plants that have ecological or economic value.

- **Foliar Spray.** Herbicide solutions can be applied to fully-expanded leaves of individual trees using backpack sprayers (directed applications) or to all foliage in an area using tractor- or truck-mounted sprayers or even helicopters (broadcast applications). Foliar sprays are recommended where Ailanthus-size and distribution allow effective spray coverage of all foliage without unacceptable contact to nearby desirable vegetation. Where Ailanthus is in association with other exotic weed species, as is often the case, foliar spray offers the

advantage of treating the entire area at one time. Timing is critical and can limit this application, while logistics can be complicated by the large volumes of diluted spray mix to be transported and applied or by the need to arrange loading areas or heliports.

- Herbicide active ingredients that are effective when applied to the foliage of Ailanthus include glyphosate (e.g., Roundup®, Rodeo®, Accord®, RazorPro®), triclopyr ester (Garlon 4), and triclopyr amine (Garlon 3A). In directed backpack sprays, concentrations of 2 percent glyphosate applied June 15 to September 15, 1.5 percent triclopyr ester, or 2 percent triclopyr amine product, such as Garlon® 3A, applied June 1 to September 1 worked well (the triclopyr products may be slightly more effective). For broadcast applications, the concentration for these products could be reduced by 0.5 percent to 1.0 percent. Other herbicides, which have proven to be effective for foliar application of Ailanthus, are dicamba (e.g., Banvel®, Vanquish®), imazapyr (e.g., Arsenal®, Chopper®), and metsulfuron methyl (e.g., Escort®), but those products tend to have residual soil activity that could control non-target plants or require a waiting period before restoration planting efforts.

- **Cut Stump Treatment.** The cut stump method is used when trees will be cut as part of the process. Felling trees can be slow, labor intensive, and hazardous, so make sure qualified skilled individuals are conducting that phase. If the tree must be cut, however, it is better to treat the stump than not. This method is likely to be most successful during the growing season, with diminishing success through the early fall. Application of herbicide to the cut stumps must be conducted immediately after cutting, within five minutes to 15 minutes of the cut with water soluble formulations, or longer with oil mixtures, to ensure uptake of the chemical before the plant seals off the cut area. The mixture may be painted on with a paint brush or sprayed on using a spray bottle or backpack sprayer. A mixture of 20 percent to 25 percent Garlon® 4 in an oil-based carrier is effective (Figure 3). In this case, the whole stump surface and sides to the ground line would be sprayed.

Figure 3: Typical treated and untreated tree-of-heaven stumps one year after cutting: A) Stump from stem treated with Garlon 4 basal spray one week prior to cutting; B) Prolific stump sprouting when stump is cut without an herbicide application.

Another option is to use Garlon® 3A at 100 percent, treating only the outer third of the stump surface. Re-check the following year and control any new stump sprouts or root suckers. Other herbicides, which have proven to be effective in stump treatment of Ailanthus, are dicamba (e.g., Banvel®, Vanquish®), imazapyr (e.g., Arsenal® A.C., Chopper®), and 2,4-D + picloram (e.g., Pathway®). Dicamba is particularly effective in October.

- **Stem Injection (hack-and-squirt).** This technique is very effective when applied during the summer. Root suckering will be an increasing problem in the fall, winter and spring. It requires first making downward-angled cuts into the sapwood around the tree trunk at a comfortable height, using a hand ax. With spray bottle or wand in the other hand, squirt the selected product into the cuts within a minute or two, so that the bottom of the cut is covered but liquid doesn't run out of it. Follow label directions for your chosen product for exact rates and spacing of cuts. This method can be used with trees of any size, though it is most effective with stems over two inches in diameter. This method is relatively easy for one person to do, with hatchet in one hand and spray bottle in the other, but should not be done alone in case of an accident. Monitor the treatment area and be prepared to follow-up the next year. Glyphosate products have sometimes been recommended for control of Ailanthus using this method, but several field trials have shown consistently poor long-term control. Other herbicides, which have been effective for hack-and-squirt control of Ailanthus during the growing season, are the same as those listed above for cut stump application.

- **Basal Spray.** A basal bark application is one of the easiest and most effective methods of controlling tree-of-heaven. It does not require any cutting, and works best during late winter, early spring and summer. The base of the tree stem must be free of snow, ice or water on the bark from recent rainfall, though precipitation following application is inconsequential. Late winter through early spring (February 15 to April 15 in Virginia) is generally the most productive time, since vegetation near the base of the trees is usually absent or leafless. Application through the summer works very well in Virginia as long as vegetation is not a hindrance and spray coverage is thorough. Fall to mid-winter applications (October to January) have reportedly given poor results. A solution of a 20 percent to 25 percent concentration of oil-soluble triclopyr product (e.g., Garlon® 4) in an oil-based carrier is highly effective. Another option is to use a pre-mixed, ready-to-use triclopyr product designed for basal bark (and cut stump) application (e.g., Pathfinder® II). Using a handheld or backpack-type sprayer, apply the mixture in a continuous 12-inch wide band around the tree base. The basal bark method is generally used for trees that are less than six inches in diameter, though larger stems (up to 16 inches) may also be treated effectively by thoroughly treating bark (Figure 4). Another herbicide, which has been shown to be effective for basal bark control of Ailanthus, is imazapyr (e.g., Chopper®, Stalker®). This is sometimes used in a combination with triclopyr at a concentration of 15 percent Garlon® 4 and 5 percent Stalker® in 80 percent oil diluent. Thorough wetting is necessary for good control.

- **Secondary Insects Following Herbicide Use.** While the effects of herbicide treatment (yellowing and wilting foliage) can be observed within weeks or even days during spring and summer, control at other times of the year can still kill trees, albeit more slowly (Figure 5). Herbicide-treated trees that are not killed outright are often weakened to such an extent that they become attacked by tiny wood-boring insects called ambrosia beetles. They are easily identified by the fine sawdust that emerges

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from their burrowing holes as they bore deeper into the tree. This dust often forms a narrow tube that is the width of the hole, and is called a frass tube (Figure 6). If the infested wood is cut open in cross section it will expose beetle galleries stained with a black fungus. These beetles do not normally attack healthy trees, so their presence indicates a tree that is highly stressed or dying. In many cases, if the herbicide does not kill the tree completely, other secondary insects or diseases eventually will.

Figure 4. A) Basal spray application of Garlon 4 in June and B) crown fading of same tree one month later.

Figure 5. Example of stunted thin foliage of treated Ailanthus the spring following a September basal spray of triclopyr in oil (Garlon 4).

Figure 6. Emergent frass tubes result from boring of ambrosia beetles, which can attack Ailanthus following treatment with herbicides.

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Utilization of Ailanthus

Incorporating Ailanthus control with other forest management activities is important to improve markets and reduce eradication costs. In most cases, Ailanthus must be marketed with other species to get it harvested. By coordinating spraying or other control methods with harvesting and other forest management operations, the wood can be utilized and invasive species impact to the forest can be reduced. Basal spraying the Ailanthus a few weeks before harvest will minimize risk of stump and root sprouts while still leaving the wood usable. Even if the trees are not harvested, it is important to control them to reduce the impact from sprouts and seeds regenerating in the forest. Invasive species control should be part of all forest management plans.

Working with Virginia Tech and several local woodworkers, research and evaluation on potential uses of Ailanthus was conducted. Ailanthus trees from several sites were harvested and processed into various products to determine mechanical and physical properties and what might be feasible for commercial use. Based on stated uses in its native habitat of China, products evaluated were pulpwood, firewood, charcoal, lumber, pallet stock and secondary wood products. Some of the results are compared with local native species to help with evaluation.

Ailanthus characteristics can be quite variable depending on its location and growth patterns. Research has shown differences in mechanical and physical properties in different parts of the country. It is a ring-porous tree and produces lumber that looks very similar to ash. Faster growing trees that are more open-grown tend to have more stresses in the wood, which lead to higher rates of warping, twisting, cupping and less stability and strength compared to slower, straighter-growing trees. Ailanthus has very soft, corky pith that can lead to utilization problems for most products. It is recommended that all sawed products not include any pith wood to minimize potential impacts to strength and stability. Ailanthus tends to have a high moisture content when green that impacts its strength and susceptibility to mold and stain. It is known to have a strong odor when leaves and branches are crushed or broken. Although there appeared to be a mild odor from green materials, especially if they contained bark, there is no apparent odor in finished products.

Pulpwood

Ailanthus has a history of being used for pulp and is accepted at pulp mills in Virginia that use hardwoods. Volumes are small compared to other species used.

Firewood

Based on research, Ailanthus should make acceptable firewood. When dry, it is comparable to other preferred hardwoods, such as ash, oak, maple, beech and hickory, for heat value. Because of the high moisture content of green Ailanthus, it is important that it is dried well before using. Users of Ailanthus firewood reported no odor concerns.

Table 1. Heat values by species.

Species	Higher Heating Value (BTU/lb.)
Ailanthus altissima	8,171 - 8,452
White Ash	8,246 - 8,920
Sugar Maple	8,190
Red Oak	8,037 - 8,690
Hickory	8,039 - 8,670
White Oak	8,169 - 8,810
Beech	8,151 - 8,760
Hemlock	8,885

Natural Lump Charcoal

As part of a project to develop value-added products from small diameter and waste wood, several batches of Ailanthus slabs and branches were used to make charcoal (Figure 7). The quality of the charcoal was good, especially that made with slabs. Several food items at different events were cooked using the charcoal with extremely positive results. To maximize charcoal quality and quantity, some air drying of the wood is necessary due to high moisture content of green material.

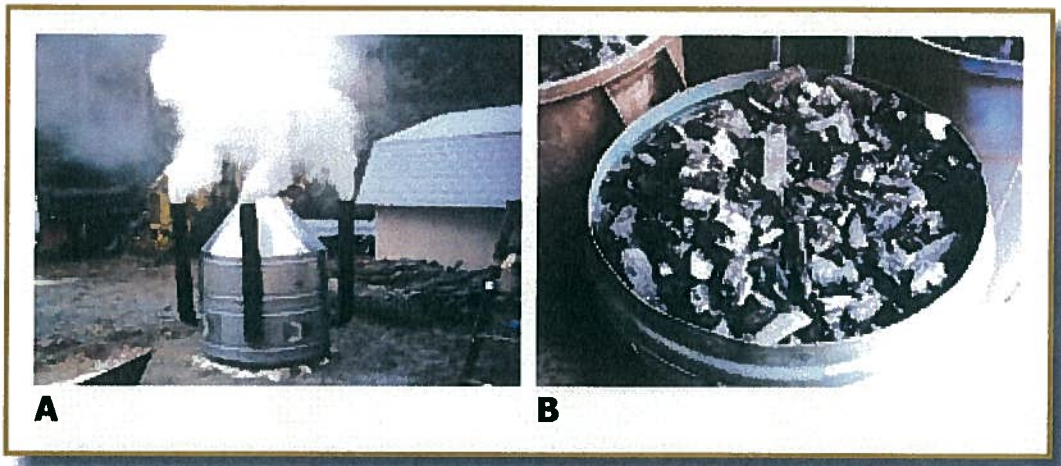

Figure 7: Department of Forestry charcoal kiln and Ailanthus charcoal.

Figure 8: Cutting Ailanthus boards (Charlie Becker, left, and Tim Tigner, retired, of the Virginia Department of Forestry).

Lumber

As with any species, the quality of the logs will have an impact on the quality and use of the lumber. Because of the fast and often crooked growth, high moisture content and corky pith, Ailanthus can cause difficulties as lumber, if not processed carefully. However, with proper care and selection, the wood can be used for a variety of products.

To minimize the problems associated with growing stress and pith, logs for sawing should be fairly straight with the pith centered in the log and at least 10 inches in diameter. To minimize end checks, the ends of logs should be coated with a sealer. When using band saws, blades need to be sharp to keep the saw tracking straight. The ring-porous nature of the wood can sometimes cause blades to follow the grain. During sawing, stresses are sometimes released that will cause the log and lumber to move. These problems can be reduced by rotating the log to balance the tensions and avoiding the pith (Figure 8). Because of the high moisture content, lumber should be stickered to begin drying as soon as possible. In the summer months, mold and stain can develop within a couple of days if the surface remains wet. If air drying, place stacks in an area with good air circulation. Ailanthus can be dried quickly with little concern for surface checks and splitting with one-inch-thick lumber. Placing weights on top of the stacks will improve flatness of lumber. During hot, humid weather, moving wood directly to a dry kiln is advisable.

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Pallet Parts

Some preliminary work has been done to look at the feasibility of using Ailanthus for pallet parts. As with the lumber, some of the properties will make it a challenge to use. One of the first constraints is that most pallet lumber comes from the low-grade center of trees. The corky pith in Ailanthus can reduce the strength and stability of the core wood and its usefulness as pallet stock. While the specific gravity of the tested Ailanthus (0.57-0.62) is closer to typical medium-density hardwoods, the strength and stiffness is closer to low-density hardwoods. The moisture content of the wood also affects the strength and there is more potential for mold development. Additional work needs to be done to determine what factors determine the strength and stiffness of wood for pallet parts.

Kiln Drying

For most uses, wood needs to be kiln dried. Several loads of Ailanthus were dried at VA Tech to determine drying characteristics. Most lumber was 1-1¼-inch thick and variable width. Due to small volumes, all lumber regardless of grade was dried. Green Ailanthus is capable of being dried rapidly with average moisture losses experienced being as high as 10 percent per day when moisture contents are more than 30 percent. Moisture losses of 19 percent to 20 percent were experienced in the first two days of drying of 4/4 material without causing checking to the material. Although further testing is needed, a 10 percent moisture loss per day seems acceptable for this species without leading to degrade. Ailanthus is not prone to surface checking like many other ring porous species but it does have issues with warp (cup, twist, bow and crook) since it contains large amounts of tension wood. In a couple of cases, honeycomb defects were found, but they were always confined to a single growth ring. Conditioning (stress relief) of lumber is important. In most cases, Ailanthus can be dried from green to 7 percent moisture in less than two weeks. Thicker material (two-inch thick) had more warping problems than thinner wood and also some end splitting. For this material, a 6.6 percent loss per day is acceptable. Until additional research is done, it is recommended that all boards, especially thick lumber, should be end coated to minimize splits. Lumber should be cut and graded to minimize pith and other degrade in material to be kiln dried. Weights should be placed on all stacks during drying to minimize warping.

Wood Properties

Although Ailanthus has the reputation of being a weak, light wood, tests of dried wood in Virginia showed many of its properties to be similar to woods, such as ash, oak, maple and birch, including specific gravity and hardness (Table 2). These properties indicate that Ailanthus may make a good flooring material, although dimensional stability may be of concern.

The Virginia Department of Forestry conducted a number of Ailanthus harvests and provided several woodworkers with boards to get feedback on wood-working properties and potential market demand. Projects included a bench, blanket chest, small tables, chairs and shelves. In general, most enjoyed the challenge of using the wood and would use it again. However, there was quite a mix of results on wood stability. This was probably due to the wide variety of wood quality that was used. In most cases, there was a lot of waste due to cupping and warping. While the stress tests indicated that the material was stress free, when this material was used to build a piece of furniture, significant longitudinal stress was evident, particularly those boards that contain or were located near the center of the tree. This was not unexpected due to the large amounts of abnormal wood (juvenile and or tension wood) present in the samples.

Table 2. Wood properties by species.

Strength Property	Ailanthus (Virginia)	Sugar Maple	Black Oak	Southern Red Oak	White Ash	Beech	Yellow Birch
Hardness (max. load, lbs.)	1,282	1,450	1,210	1,060	1,320	1,300	1,260
Specific Gravity	0.62	0.63	0.61	0.59	0.60	0.64	0.62
Shear (psi)	2,147	2,330	1,910	1,390	1,910	2,010	1,880
Bending (psi)	14,125	15,800	13,900	10,900	15,000	14,900	16,600
Tension (psi)	880	-	-	510	940	1,010	920

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Below are comments from various craftsmen:

"It had excellent machining properties in the joiner and planer. It tooled real well with the jigs used to make dovetail joints."

"It behaved very much like white ash. If I had not been told it was Ailanthus, I would have guessed it to be white ash."

"The grade of the lumber is very important. Many of these boards looked pretty good, but there was still a lot of waste."

"In storage, it warped and cupped extremely badly. It did not check or split nearly as bad. I stored it in the upstairs shop, which is pretty hot during the summer. I stored much of the other hardwood I use their too, so it was a good comparison."

"It sanded very well."

"It finished very well. Tung oil was used on the blanket chest to accent the grain pattern. It appeared to take stain well on a test piece."

"It would be important to saw it at least 5/4. This is needed to be able to get the cup and warp out. Even with this thickness, I had to rip the boards and then glue them back together. I do this with most wide boards of other species to reduce problems with cupping."

"I felt the wood had potential in furniture manufacture where a good hardwood was needed for framing that would then be covered with fabric."

"I really look forward to using more of this wood. I hope to see it on the market soon, especially if it can be bought at a good price."

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Suggested Publications:

Creighton, J. L. 2008. Tree-of-Heaven (Ailanthus) Control Methods. Forest Research Review October 2008. Charlottesville, VA. Virginia Dept. of Forestry: 11-12.

Eck, William E.; McGill, David W. 2007. Testing the efficacy of triclopyr and imazapyr using two application methods for controlling tree-of-heaven along a West Virginia highway. Gen. Tech. Rep. SRS–101. U.S. Department of Agriculture, Forest Service, Southern Research Station: 163-168.

Evans, C. W.; D. J. Moorehead; C. T. Bargeron, and G. K. Douce. 2006. Invasive Plant Responses to Silvicultural Practices in the South. The University of Georgia Bugwood Network, Tifton, GA, BW-2006-03. 52 p.

Miller, J. H. 2003. Non-native invasive plants of southern forests: a field guide for identification and control. Revised. Gen Tech. Rep. SRS-62. Asheville, NC: U.S. Department of Agriculture, Forest Service, Southern Research Station. 93 p.

Suggested Web Resources:

Non-native Invasive Plants of Southern Forests - USDA Forest Service

http://www.invasive.org/eastern/srs/TofH.html - Jan. 6, 2008

Plant Invaders of Mid-Atlantic Natural Areas - National Park Service and U.S. Fish and Wildlife Service

http://www.invasive.org/eastern/midatlantic/aial.html - Jan. 6, 2008

Southeast Exotic Pest Plant Council Invasive Plant Manual - SE-EPPC

http://www.invasive.org/eastern/eppc/ailanthus.html - Jan. 6, 2008

Weeds Gone Wild: Alien Plant Invaders of Natural Areas - Plant Conservation Alliance

http://www.nps.gov/plants/alien/fact/aial1.htm - Jan. 6, 2008

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APPENDIX C

SEED DISTRIBUTORS

LIST OF DEALERS OF SEEDS OR SEEDLINGS
2008

DEALER	STREET	CITY	STATE	ZIP	TELEPHONE	WEBSITE
1. Sharp Brothers Seed Co.	396 SW Davis-Ladue	Clinton	MO	64735	660-885-7551	sharpseed.com
2. Bamert Seed Co.	1897 CR 1018	Muleshoe	TX	79347	800-262-9892	bamertseed.com
3. Adams-Briscoe Seed Co.	P. O. Box 19	Jackson	GA	30233	877-775-7826	abseed.com
4. Kester's Wild Game Foods	P. O. Box 516	Omro	WI	54963	800-558-8815	kestersnursery.com
5. Miller Grass Seed Co.	P. O. Box 81823	Lincoln	NE	68501	402-438-1232	
8. Carroll Gardens	444 E. Main Street	Westminster	MD	21157-5540	800-638-6334	carrollgardens.com
9. Dothan Seed and Supply	1300 Montgomery Hwy	Dothan	AL	36303	334-794-6774	dothannurseries.com
10. Southern States Coop.	8718 West Broad Street	Richmond	VA	23294	804-747-9315	southernstates.com
11. Wilson Feed and Seed	2105 Hull Street	Richmond	VA	23224	804-233-3011	
12. Pennington Seed Co.	P.O. Box 290	Madison	GA	30650	800-285-7333	penningtonseed.com
13. Stark Brothers Nurseries	P. O. Box 1800	Louisianna	MO	63353	800-325-4180	starkbros.com
14. Wildlife Nurseries	P. O. Box 2724	Oshkosh	WI	54903	920-231-3780	
15. Albert Lea Seed House	P. O. Box 127	Albert Lea	MN	56007	800-352-5247	alseed.com
16. Roberson Seed Co.	P. O. Box 19651	Amarillo	TX	79114	806-359-4468	
17. Wetsel Seed Co.	P. O. Box 791	Harrisonburg	VA	22801	800-572-4018	wetsel.com
18. Carino Nurseries	P. O. Box 538	Indiana	PA	15701	800-223-7075	carinonurseries.com
20. Lincoln Oaks Nurseries	3310 Univ. Drive	Bismarck	ND	58504	701-223-8575	lincolnoakes.com
22. Musser Forests, Inc.	1880 Rt 199 Hwy. N.	Indiana	PA	15701	800-643-8319	musserforests.com
23. Forest Nursery Co., Inc.	2362 Beersheba Hwy.	McMinnville	TN	37110	931-473-2133	tnnursery.com
25. Lawyer Nursery, Inc.	6625 Montana Highway 200 West	Plains	MT	59859	800-551-9875	lawyernursery.com
26. J.F. New Native Plant Nursery	708 Roosevelt Rd.	Walkerton	IN	46574	574-586-3400	jfnew.com
27. Van Pines Nursery	14731 Baldwin St.	West Olive	MI	49460-9708	800-888-7337	vanspinesnursery.com
28. Miller Nurseries	5060 West Lake Road	Canandaigua	NY	14424	800-836-9630	millernurseries.com
29. Douglas W. King Co.	P. O. Box 200320	San Antonio	TX	78220	888-357-3337	dkseeds.com
31. Virginia Department of Forestry	P. O. Box160	Crimora	VA	24431	540-363-7000	dof.virginia.gov
34. National Wild Turkey Federation	P. O. Box 530	Edgefield	SC	29824	803-637-3106	nwtf.org/conservation/habitat_products.html
35. Croshaw Nursery	P. O. Box 339	Columbus	NJ	8022	609-298-0477	croshawnursery.com
39. Evergreen Nurseries	5027 County TT	Sturgeon Bay	WI	54235	800-448-5691	evergreennurseryco.com
40. Pinelands Nursery	8877 Richmond Rd	Toano	VA	23168	800-667-2729	pinelandsnursery.com
42. Warren County Nursery	6492 Beersheba Hwy.	McMinnville	TN	37110	931-668-8941	tnnursery.com/wcn
43. Spandle Nurseries	Route 2, Box 125	Claxton	GA	30417	800-553-5771	spandles.com
46. Johnston Seed Co.	P. O. Box 1392	Enid	OK	73702	800-375-4613	johnstonseed.com
47. Stock Seed Farms	28008 Mill Road	Murdock	NE	68407	402-867-3771	stockseed.com

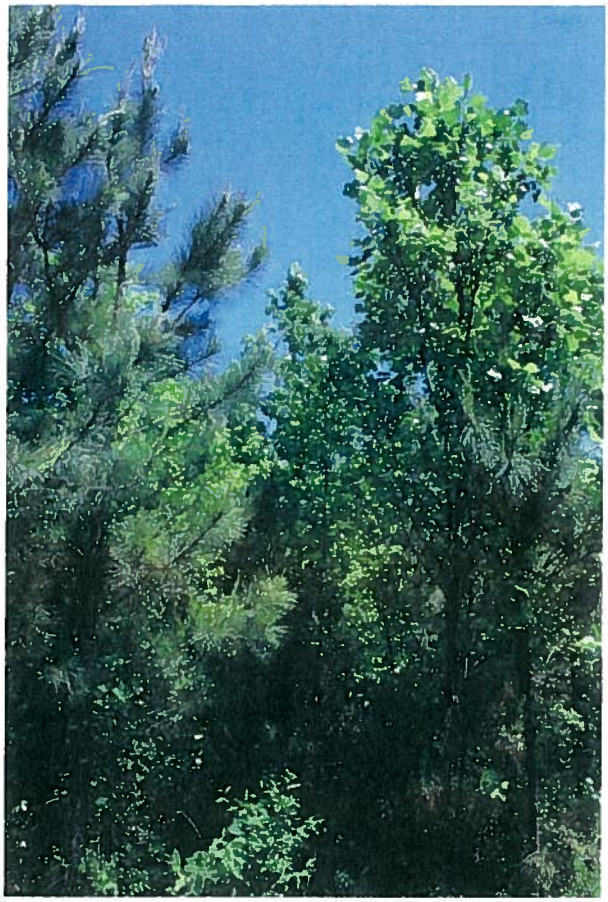
49. Woodlanders, Inc.	1128 Colleton Avenue	Aiken	SC	29801	803-648-7522	woodlanders.net
50. Hamilton Seeds	16786 Brown Road	Elk Creek	MO	65464	417-967-2190	hamiltonseed.com
52. Environmental Plant Resources, Inc.	P. O. Box 209	Parrish	FL	34219	800-771-4114	
53. Ernst Conservation Seeds	9006 Mercer Pike	Meadville	PA	16335	800-873-3321	ernstseed.com
56. Allendan Seed	1966 175th Lane	Winterset	IA	50273	515-462-1241	
58. Pine Grove Nursery	R.D. #3, Box 146	Clearfield	PA	16830	800-647-1727	pinegrovenursery.com
59. Ashland Feed Store	120 Thompson St.	Ashland	VA	23005	804-798-8431	ashlandfeedstore.com
61. Morse Nursery	12300 Betz Road	Battle Creek	Michigan	49015	269-979-4252	morsenursery.com

DEALER	Fruit Trees	Nut Trees	Conifer	Shrubs	NWSGs	CSGs	Crop Seeds	Food Plots	Wetlands	flowers
1. Sharp Brothers Seed Co.				x	x	x	x		x	x
2. Bamert Seed Co.					x	x	x	x		x
3. Adams-Briscoe Seed Co.	x						x			
4. Kester's Wild Game Foods								x	x	
5. Miller Grass Seed Co.					x	x				
8. Carroll Gardens			x	x						x
9. Dothan Seed and Supply		x		x	x					x
10. Southern States Coop.					x	x	x			x
11. Wilson Feed and Seed	x	x		x			x			x
12. Pennington Seed Co.					x	x		x	x	
13. Stark Brothers Nurseries	x	x		x			x			x
14. Wildlife Nurseries								x	x	
15. Albert Lea Seed House					x	x	x	x		
16. Roberson Seed Co.					x		x			x
17. Wetsel Seed Co.					x		x			x
18. Carino Nurseries		x	x							
20. Lincoln Oaks Nurseries	x	x								
22. Musser Forests, Inc.	x	x	x	x						
23. Forest Nursery Co., Inc.					x					x
25. Lawyer Nursery, Inc.	x	x	x	x						
26. J.F. New Native Plant Nursery					x				x	x
27. Van Pines Nursery		x	x	x						
28. Miller Nurseries	x	x		x						
29. Douglas W. King Co.					x	x	x	x		
31. Virginia Department of Forestry	x	x		x		x		x		
34. National Wild Turkey Federation	x	x					x	x		
35. Croshaw Nursery			x							
39. Evergreen Nurseries			x	x						
40. Pinelands Nursery				x	plugs				x	
42. Warren County Nursery	x	x	x	x				x	x	
43. Spandle Nurseries	x	x	x	x	x	x	x	x	x	
46. Johnston Seed Co.					x	x	x	x		
47. Stock Seed Farms					x	x	x	x		x

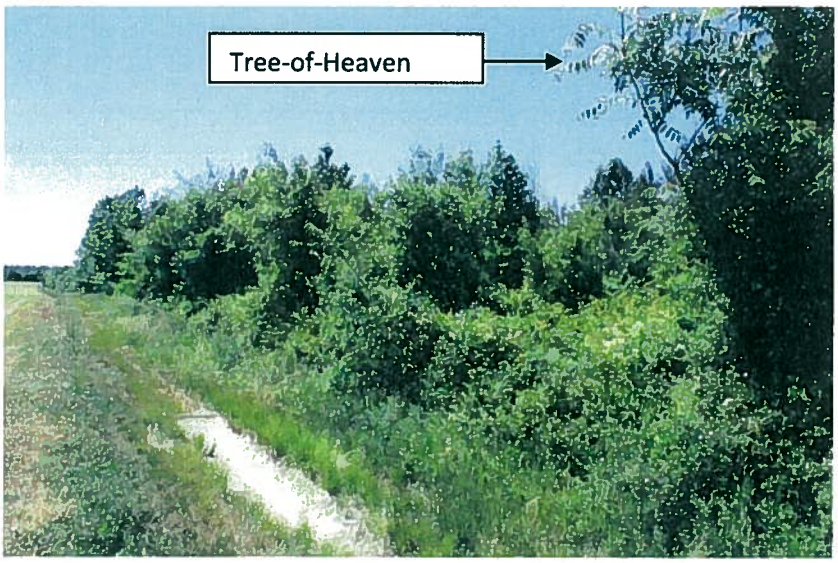
49. Woodlanders, Inc.	x	x		x						
50. Hamilton Seeds				x	x/plugs	x		native	x/plants	native
52. Environmental Plant Resources, Inc.		x native FL	x	x	x/plugs				plants	
53. Ernst Conservation Seeds		x		x	x	x	x	x	seed	seed
56. Allendan Seed					x	x		x		x
58. Pine Grove Nursery				x						
59. Ashland Feed Store					x	x	x	x		x
61. Morse Nursery	x	x	x	x						

APPENDIX D

SITE PHOTOS



Picture 1 – Photo taken near the parking lot of the Browne Tract documenting the competition from sweetgum and tulip poplar on loblolly.



Picture 2 - Representative photo of the field border at the Browne Tract. Tree-of-Heaven is present.

MIDDLE PENINSULA CHESAPEAKE BAY PUBLIC ACCESS AUTHORITY

December 21, 2009

To: Mike Ashley- King & Queen Sportsmen Hunt Club

From: Lewie Lawrence, PAA staff

Re: Administrative Access Authorization

At the December 18th, 2009 meeting of the Middle Peninsula Chesapeake Bay Public Access Authority (PAA), Mrs. Doris Morris representing the King and Queen County Board of Supervisors conveyed that the Sportsmen Hunt Club (Club) has an interest in assisting the PAA with managing the Clay Tract as well as contributing to a larger public initiative to improve the wildlife habitat within the Dragon Run Watershed.

As you are aware, the Clay Tract was acquired under the Coastal and Estuarine Land Conservation *(CELCP)* Program administered by the NOAA Office of Ocean and Coastal Resource Management. This program has specific requirements for ownership, use, and long term stewardship. The PAA is pleased that the King & Queen County Sportsmen Hunt Club desires to assist with the stewardship of the Clay Tract.

Stewardship is a long term goal of the PAA and is intended to produce tangible habitat improvement in summer, spring, fall and winter seasons while fostering public education and productive relationships between the PAA and other governmental entities, sportsmen's clubs, nongovernmental organizations, private individuals and other partners across the Middle Peninsula.

The PAA understands that the Sportsman Hunt Club desires to develop a cooperative approach to target habitat improvements for deer, turkey, quail and a variety of other animals within the Dragon Run Watershed. The club agrees to undertake a habitat improvement project. Specifically, the Club will disk and provided an agreed upon habitat improvement cover crop for the "Food Plot" and "Air Strip" areas totaling approximately 5 acres.

The habitat improvement cover crop will be planted either in the spring or fall in accordance with the standards for the crop chosen. In exchange for this stewardship, the Sportsman Hunt Club will be extended non-exclusive hunting privileges. The Club can access the Clay Tract for deer hunting on Thursday, Friday and Saturday only for the remainder of the 2009-2010 deer hunting season.

If by chance dogs are lost on the Clay Tract on Monday, Tuesday and Wednesday, only the dog owner, the owner's vehicle and a helper will enter the Clay Tract for the express purpose of locating the dog(s). Access to the tract will be coordinated with the President of the Club. No hunting by the Sportsman Hunt Club will occur on Monday, Tuesday or Wednesday. Gate access to the Clay Tract will only be provided via the private access from Mr. Longest field. We understand the Club has access to this field. This will limit the visual appearance of hunting near state roads.

Saluda Professional Center
125 Bowden Street
P. O. Box 286
Saluda, VA 23149-0286
Phone: (804) 758-2311
FAX: (804) 758-3221
email:
PublicAccess@mppdc.com

For ease of understanding, PAA staff has identified specific conditions for access to the Clay Tract in specific detail and described below:

Sportsmen Hunt Club

- Prior to the start of the 2010-2011 hunting season, disk and plant with an agreed upon habitat improvement cover crop for the "Food Plot" and "Air Strip" areas totaling approximately 5 acres.
- Help maintain trails and roads.
- Hunting only by the Club on Thursday, Friday and Saturday.
- Advanced notice of hunts will be provided to 804-758-2311 (extension 23). Leave word with the secretary or voice mail message to extension 23.
- No hunting on Monday, Tuesday, and Wednesday by the Club.
- Dog owner and vehicle and 1 helper may access the tract on Monday, Tuesday, and Wednesday to locate lost dogs.
- Gate access is available along the property line of Tommy Longest field.
- Club President, Mike Ashley will have access to the gate key.
- President will provide a list of club members to the PAA.
- No guests of club members are allowed to hunt the Clay Tract.
- Club member names will be provided to the local Game Warden to assist with determining hunting access permission.
- Any game law violations by Club members must be reported to PAA staff immediately.
- Club will provide an end of the year report on what's been harvested at the Clay Tract

* Received a call 4/2010 from Mr Ashley Club harvested few does

I have also attached a laminated map and special access card with the letter "A" for administrative access to the Clay Tract only. This access permission does not extend to other lands managed by the PAA. Please keep either this memo or the administrative "A" for proof of permission to access the Clay Tract. Access permission covers all members of the Club identified by the list provided to PAA staff.

Please sign below to indicate an agreement has been reached concerning terms of access and stewardship conditions. Retain one copy for your files. Again, thank you for offering to help with the management of the Clay Tract.

December 21, 2009
Mike Ashley- President

December 21, 2009
Lewie Lawrence- PAA Staff

CC: Hon. Doris H Morris, King and Queen County Board of Supervisors
CC: Frank Pleva, Chairman of the Middle Peninsula Chesapeake Bay Public Access Authority

JAN 21 2010

Membership list for King & Queen Sportsmen Club for 2009-2010

1. Jimmy Davis
2. Rusty Fary
3. T. O. Longest
4. George Carter
5. Curtis White
6. Kirk Carlton
7. Clyde Prince
8. Bobby Ashley
9. Wayne Carrington
10. Bill Harris
11. Michael Glasco
12. Chris South
13. David Owens
14. Clyde Pace
15. Bill Cooke
16. Gene Carter
17. Roger Calhoun
18. Dusty Calhoun
19. Michael Ashley
20. Anthony Glasco
21. David Morris
22. Peter Bleeker
23. Bruce Carlton
24. Michael Carlton
25. Kevin Norman
26. Ronald Hudgins
27. Robert Phillips
28. David B. Pace

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CHESAPEAKE BAY PUBLIC ACCESS AUTHORITY
MIDDLE PENINSULA
ESTABLISHED 2003