East - Middle Branch Deer Wintering Complex (DWC) Management Plan

Upper Peninsula of Michigan Habitat Workgroup - Executive Summary

March 2016

In the northern portions of the Upper Peninsula (UP) of Michigan, deer encounter deep snow which limits access to food. Deer have adapted to deep snow conditions by migrating to find suitable food and shelter to survive the winter. These migratory destinations are called deer wintering complexes (DWC's) and are sometimes referred to as "deeryards."

Severe winters in 2012-13 and 2013-14 raised concern regarding the condition of these DWC's and the Upper Peninsula (UP) Habitat Workgroup was reformed with the mission of improving and conserving UP winter deer habitat. This document is a result of that effort and is intended to provide information and strategies for managing lands to benefit deer wintering within the East - Middle Branch DWC.

Plan Content - This plan contains 6 major sections plus a reference section.

Section 1 - Components of Deer Wintering Complexes

This section provides an overview of the description of and importance of food and shelter for deer in DWC's.

Section 2 - Goals and Objectives for Managing Deer Wintering Complexes

This section provides description of the workgroup's overall goals and objectives for DWC's.

Section 3 - The East - Middle Branch Deer Wintering Complex

This section highlights the current conditions of the East - Middle Branch DWC including information about the ownership patterns plus the key major habitat types and composition.

Section 4 - Summary of Management Objectives and Recommendations for the East - Middle Branch DWC

This section applies the overall goals and objectives from section 1 to the habitats identified in section 3. The recommendation summary is located on page 12.

Section 5 - Strategies for Managing the Key East - Middle Branch Habitats

This section describes each of the key habitats identified for the DWC and makes specific management recommendations for each habitat.

Section 6 - Summary

This section includes the list of workgroups actions to achieve the goals and objectives for this DWC and provides the local county conservation district forester contact # ((906) 667-1100 x 632) for more information

References

The references provide a list of programs and grants that can assist a landowner in implementing recommendations identified in this plan.

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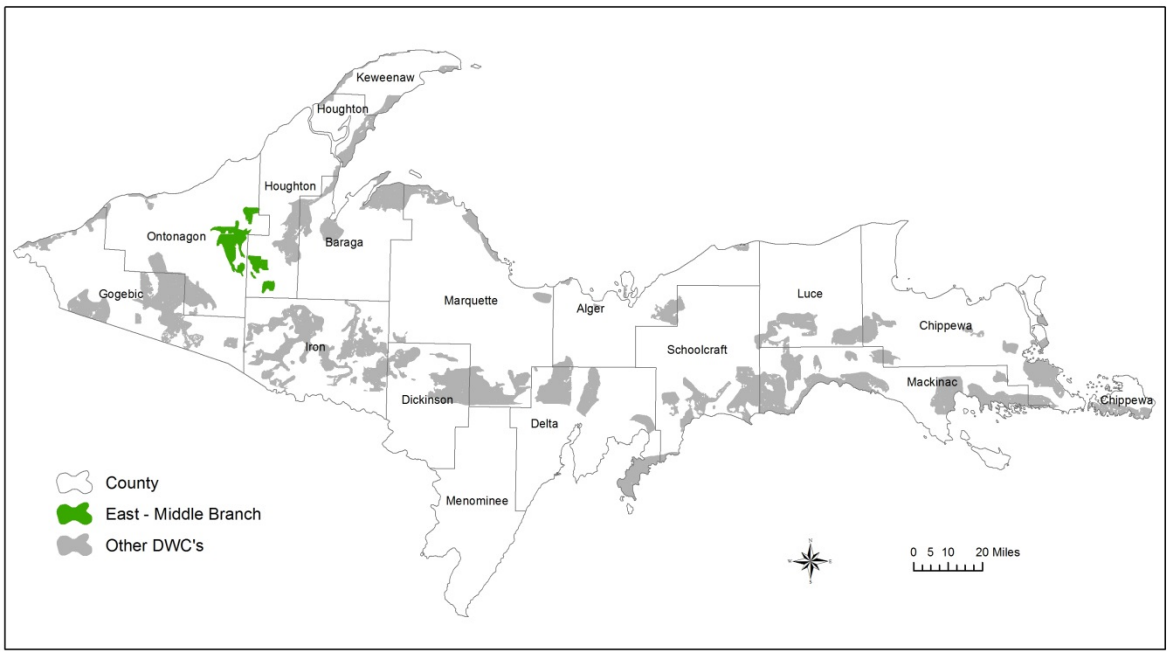

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Components of a Deer Wintering Complex:

In most of Upper Michigan, deer begin migrating to wintering complexes when snow accumulates between 12-18 inches, typically in mid-late December. Deer remain on their winter ranges until snow melts in spring and their mobility is restored. This confinement period on winter range can vary from 60 days to well over 100 days during an especially long winter. Significant winter-related deer deaths plus reduced physical condition and high newborn fawn mortality occur with durations of 90-100 days with greater than 12 inches of snow covering the ground. The UP winters of 1996 and 2014 had winter durations greater than 100 days and are remembered as especially severe for deer. To survive these long confinement periods on winter range, deer seek locations that provide both shelter and food suitably interspersed across the landscape.

Conifer stands with high canopy closure provide deer with shelter by reducing snow depths beneath the canopy and facilitating movement via extensive connected packed trails. Trail systems provide easier access to food and also assist deer in evading predators. These shelter stands also reduce wind chill and perhaps radiant heat loss. Shelter is defined by several categories:

- Functional Shelter: Conifer stands with at least 70% canopy closure and tree heights greater than 30 feet. These thresholds for canopy closure and height ensure the stand is effective at intercepting snow, resulting in decreased snow depths and increased mobility for deer to access food and avoid predators.
- Primary Shelter Species: Cedar and hemlock trees provide the best functional shelter as they intercept larger amounts of snow than other conifers. These species also are a favored winter food source which makes them difficult to regenerate and recruit back into the stand canopy. These species are long lived, however, and on some sites may survive 400 years or more. Most stands in the UP are 100-200 years old.
- Secondary Shelter Species: White spruce, balsam fir and white pine intercept less snow than cedar and hemlock but contribute to functional shelter especially when mixed with cedar and hemlock trees. These trees also provide feeding corridors through hardwood stands and shelter during periods of lower snow depth. Often these species occur as a component of mixed stands in the transitions between upland and lowland, such as in red maple stands.

Food is an integral habitat component for deer in winter. While adult deer can enter winter with sizeable fat reserves, fawns have not yet completed skeletal growth and therefore carry smaller percentages of fat. Thus, fawns must have dependable access to food to survive the winter. Some key sources of winter food are:

- Cedar and hemlock fronds where accessible.
- Litter fall – cedar and hemlock fronds, hardwood stems, and lichens dropped due to wind and snow action.
- Hardwood browse – most of the browse is available in aspen, red maple and northern hardwood stands, either as felled tops from winter timber harvest activity or as regenerating stems of trees and shrubs in years following timber harvests or natural disturbances such as windfall.

- Oak acorns – during especially good acorn year's deer are able to access acorns early and late in the winter as snow depths allow.
- Spring herbaceous foods – forest openings inside and adjacent to DWC's often provide protein-rich food for several weeks in spring and fall before deer enter or vacate the complexes.

Management of Deer Wintering Complexes:

The deer wintering complexes in the UP have been inventoried and mapped by the Department of Natural Resources (DNR) since 1927. Currently, there are around 50 named complexes in the UP. The extent of summer range used by deer in these complexes has been the subject of extensive deer tagging studies over the years. In 2014, the department implemented deer winter range guidelines for managing Michigan state forest lands, which represent about 20% of all DWC acreage in the UP. The UP Habitat Workgroup builds on these previous efforts by identifying goals, objectives and specific habitat management strategies for managing deer winter range across all land ownerships. Below are the goals and objectives defined by the workgroup.

Deer Winter Range Goal:

Sustainably manage shelter and food resources on deer winter range to reduce overwinter deer population fluctuations by:

- Maintaining or enhancing conifer shelter thereby facilitating deer movement to obtain food and avoid predation
- Providing high quality food adjacent to shelter

DWC objectives:

1. Move toward 50% of the complex in shelter species
    - Maintain primary shelter (cedar and hemlock)
    - Increase secondary shelter (white spruce, balsam fir and white pine) when below 50%
2. Move toward 50% of complex in sustainable food stands (primarily aspen and hardwoods) to enhance available browse

These objectives provide the initial direction for habitat management strategies in each DWC management plan to achieve stated goals. Each DWC, however, may have unique characteristics such as percent shelter and deer browse pressure that may result in different recommendations for achieving the goals. The first requirement for planning in the East - Middle Branch DWC is an analysis of the current characteristics.

The East - Middle Branch Deer Wintering Complex:

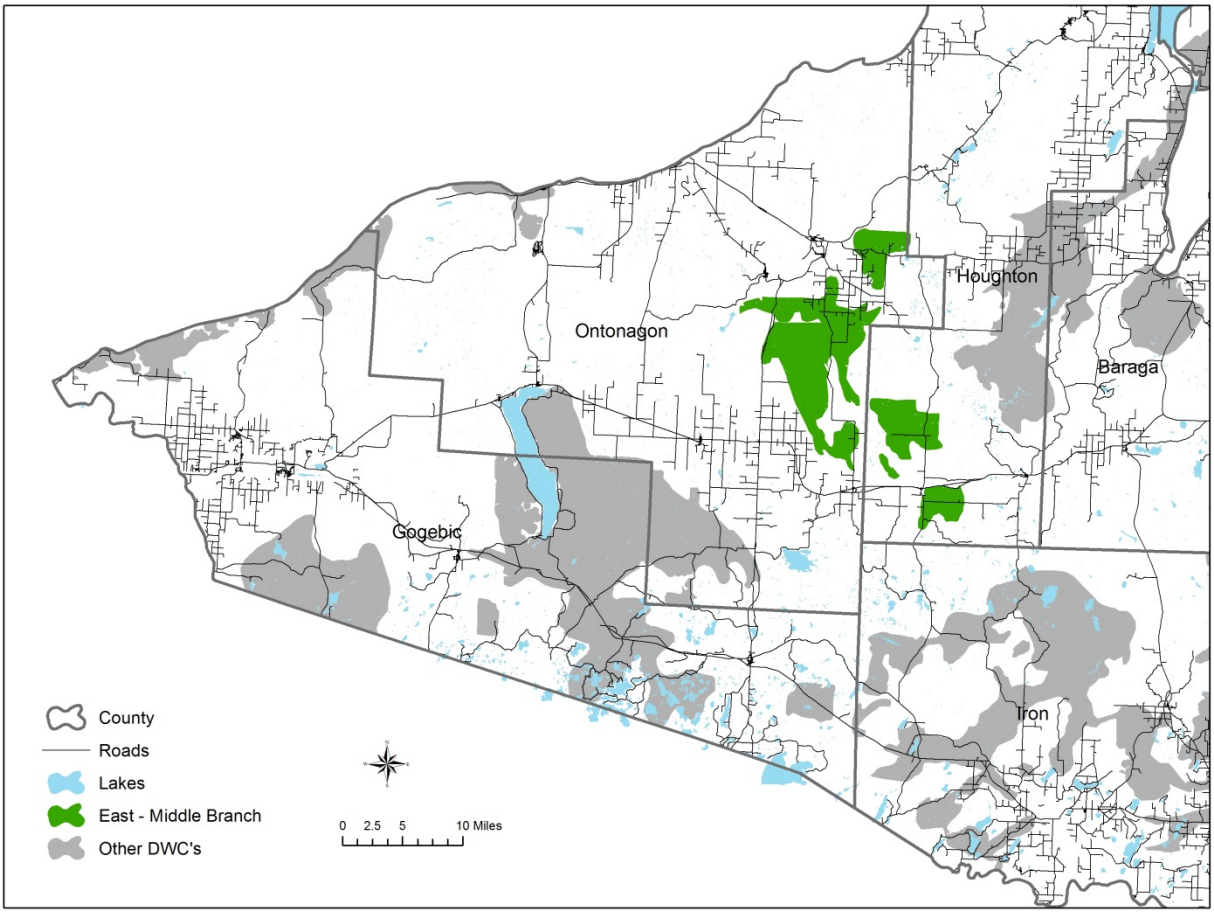

Figure 1 – Central UP DWC map with the East - Middle Branch Deer Wintering Complex in green.

The East - Middle Branch DWC is located in the western UP north of Bruce Crossing spanning portions of Ontonagon and Houghton Counties. This complex encompasses approximately 73,000 acres (Figure 1). Deer use has been documented in parts of this complex by the DNR since 1928. The East - Middle Branch DWC is located in the high snow belt of the UP and averages 91 days of more than 12 inches of snow on the ground. The deer wintering in this complex are spread relatively thinly resulting in low browse pressure in some areas with more moderate – high browse pressure in other areas especially the more southern portions. The summer range extent of the deer using this complex was determined using observations of deer trapped and ear tagged in the winter of 2005 and 2006 by personnel from the Michigan DNR, Ottawa National Forest and local volunteers. The observations of those deer indicate a summer range extent of approximately 315,000 acres (Figure 2). The land ownership of the DWC is comprised of 61% Ottawa National Forest, 12% Commercial Forest Act (CFA) lands, 4% Michigan State Forest with the balance (23%) comprised of private non-corporate landowners (Figure 3).

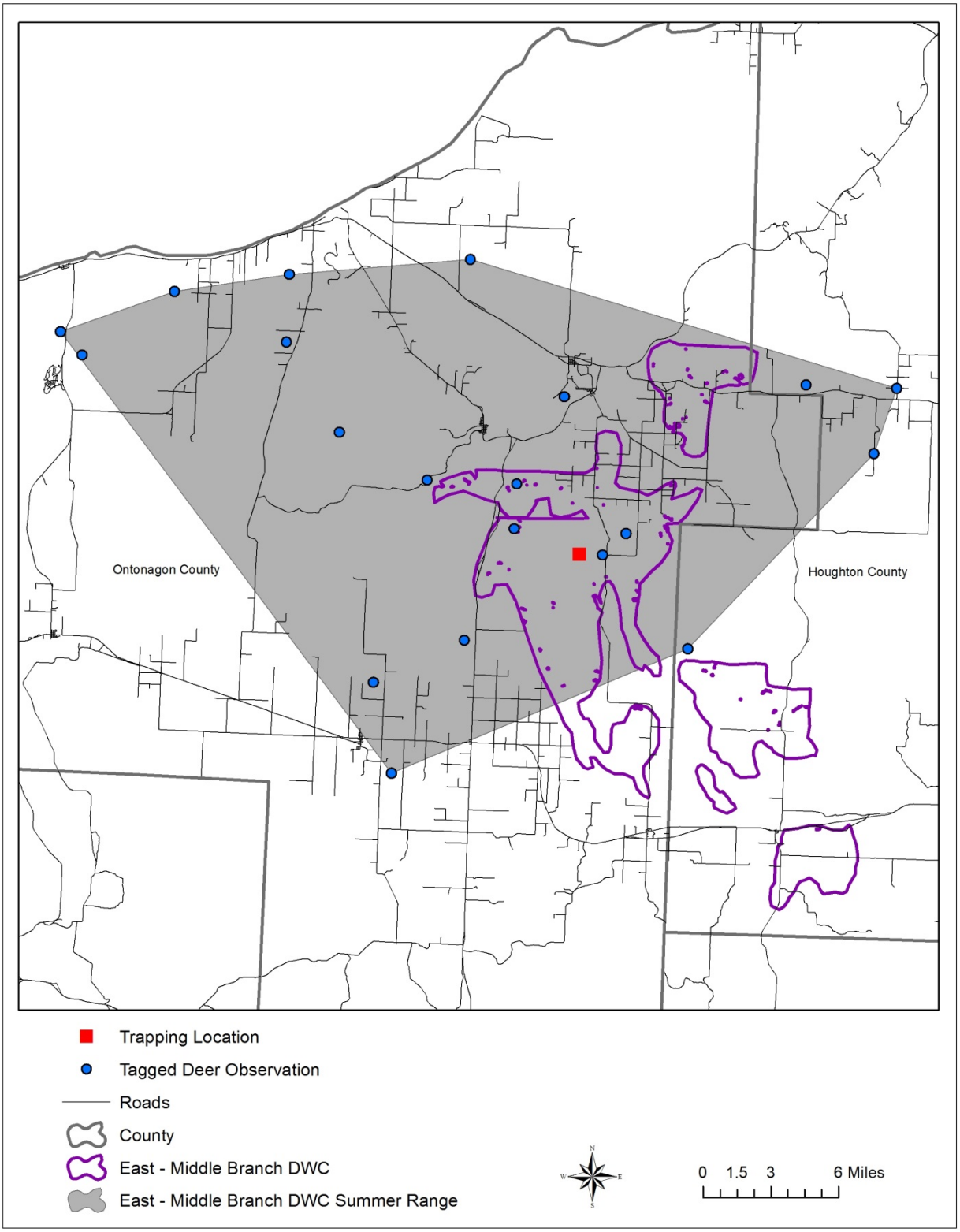

Figure 2 - East - Middle Branch DWC Deer Summer Range Distribution. Summer range is inclusive of spring-fall seasons

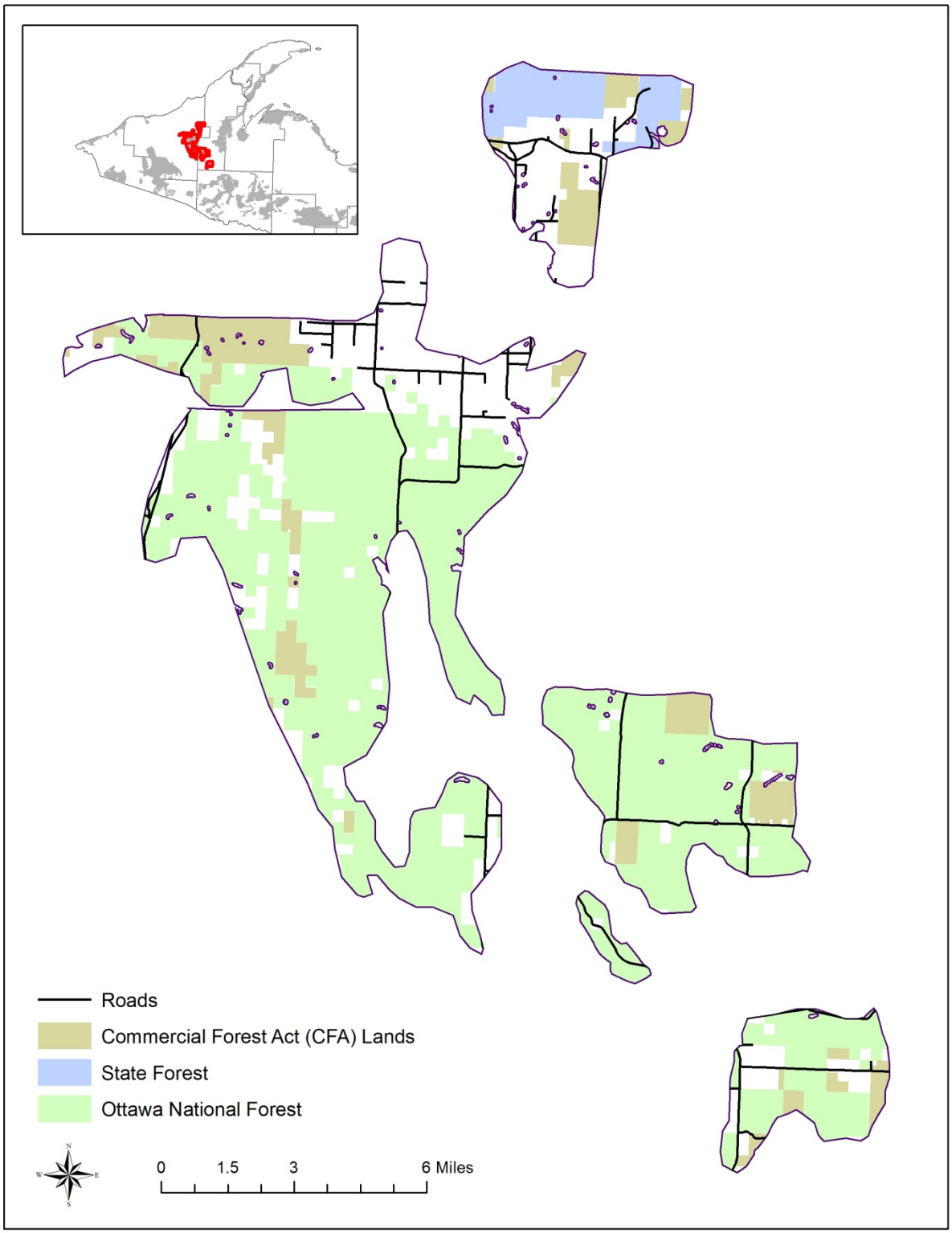

Figure 3 - East - Middle Branch DWC ownership map.

Current Food and shelter conditions in East - Middle Branch DWC:

The U.S. Forest Service (USFS) dominant vegetation layer was used to estimate the current food and shelter conditions of the East - Middle Branch DWC by key habitats and land covers which are important for wintering deer (Figure 4). These analyses have accuracy limitations and are not intended to provide exact habitat contribution percentages. They can be used however to portray the general condition of the food and shelter resources and the relative makeup of the land cover in order to highlight potential strengths and weaknesses in the habitats and also to identify opportunities for improvement.

East - Middle Branch DWC Land Cover Summary (% of the complex)

- Shelter 26%
    - hemlock 7%
    - cedar 6%
    - white spruce, balsam fir, white pine 13%
- Food 58%
    - aspen 26%
    - northern hardwood 16%
    - red maple transitional stands 16%
    - forest openings about 1%
- Other Cover Types 16%
    - Tamarack, black spruce. jack pine

For cedar and hemlock, an additional analysis was conducted to determine the relative occurrence and abundance of these important primary shelter species. The output provides a prediction of locations that have higher amounts of cedar and hemlock and reasonably predicts broader functional primary shelter areas. See hemlock analysis map (Figure 5) and cedar (Figure 6).

Habitat summary: This complex is composed of 26% shelter species with hemlock and cedar only making up 7% and 6% respectively. Secondary shelter species including white spruce, balsam fir and white pine comprise the majority of the shelter resources at 13%. Based on the hemlock and cedar analysis, hemlock provides the majority of the high density shelter (Figures 5 and 6). From a food standpoint, the aspen stands provide the majority of the food opportunities in this complex at 26% and has total food resources representing 58% of the DWC. Ideally, based on our DWC objectives, food and shelter resources should be arrayed at a 50/50 ratio to facilitate deer movement between food sources and functional shelter. Shelter represents only 26% of this complex. There appears to be opportunities to increase the shelter especially in the 16% of the complex identified red maple stands. These stands often form the transition between shelter and food areas and can both increase the shelter composition and the access to adjacent food resources. As previously mentioned, these analysis percentages have limitations and as such the red maple stands should be viewed as opportunity areas for improvement in the shelter/food composition not as literal percentage change goals.

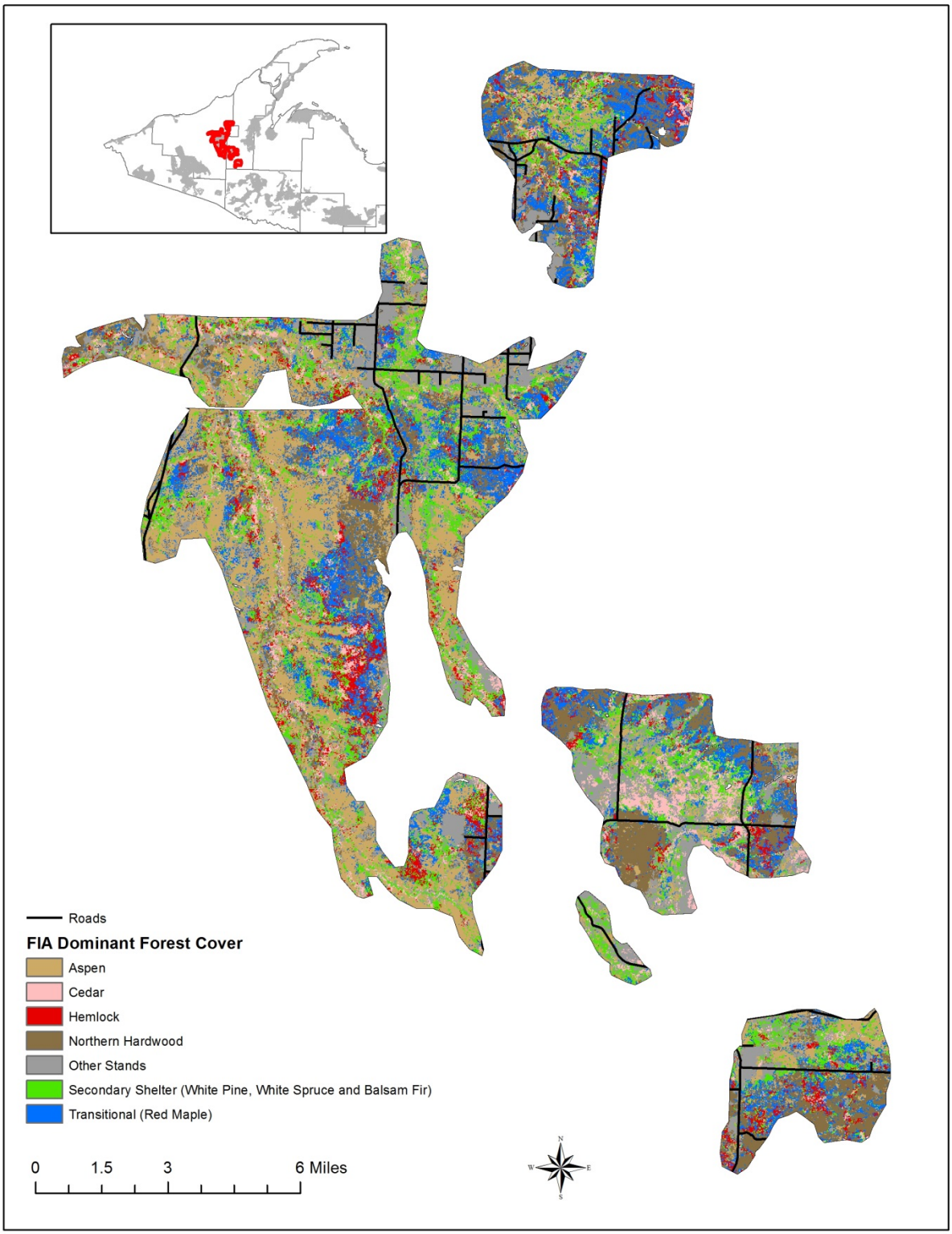

Figure 4 – The East - Middle Branch dominant forest cover

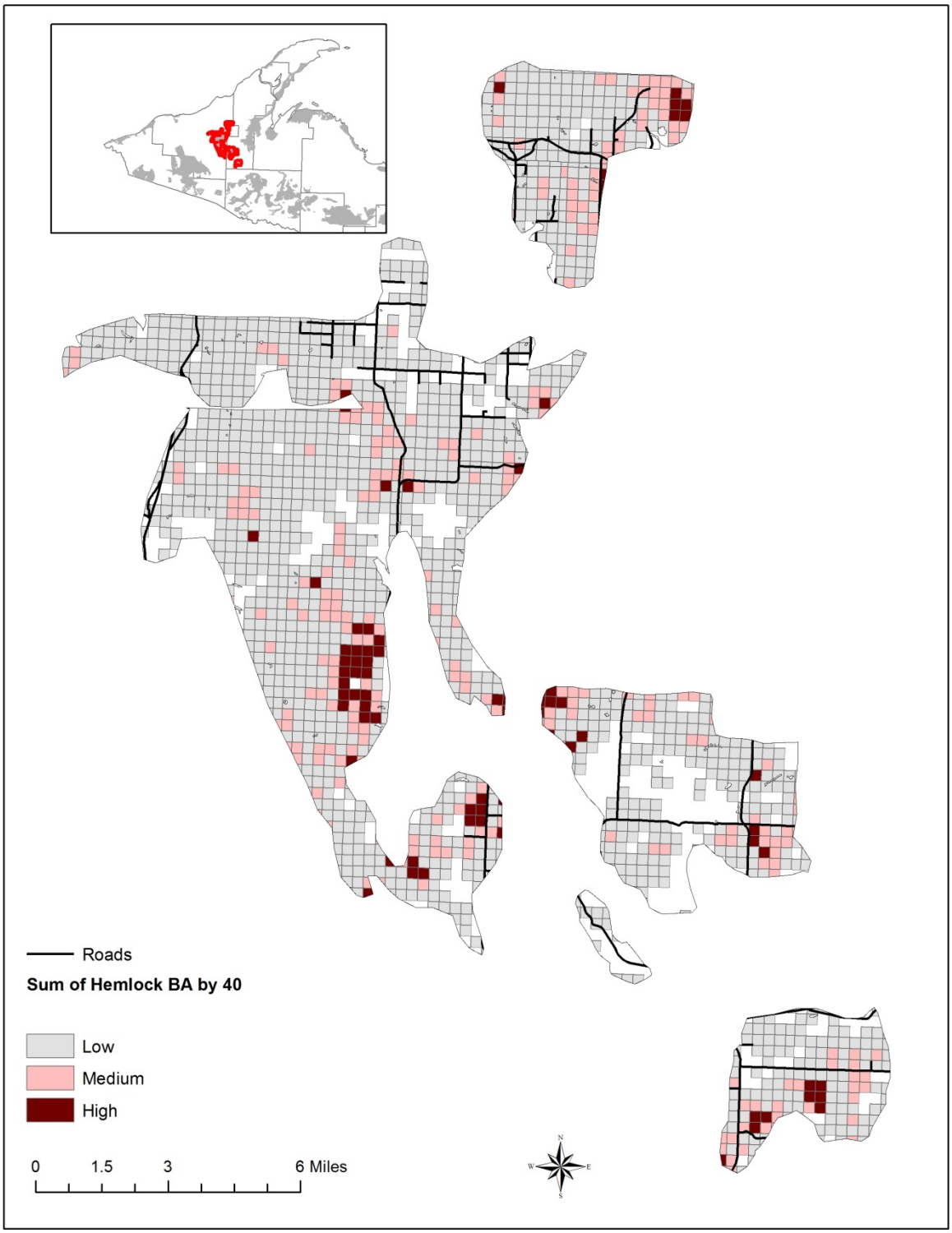

Figure 5 - East - Middle Branch DWC hemlock analysis depicting hemlock basal area by 40-acre parcels. The darker colored squares likely provide the best deer shelter potential. This analysis is based on data obtained from the USFS Forest Inventory Analysis.

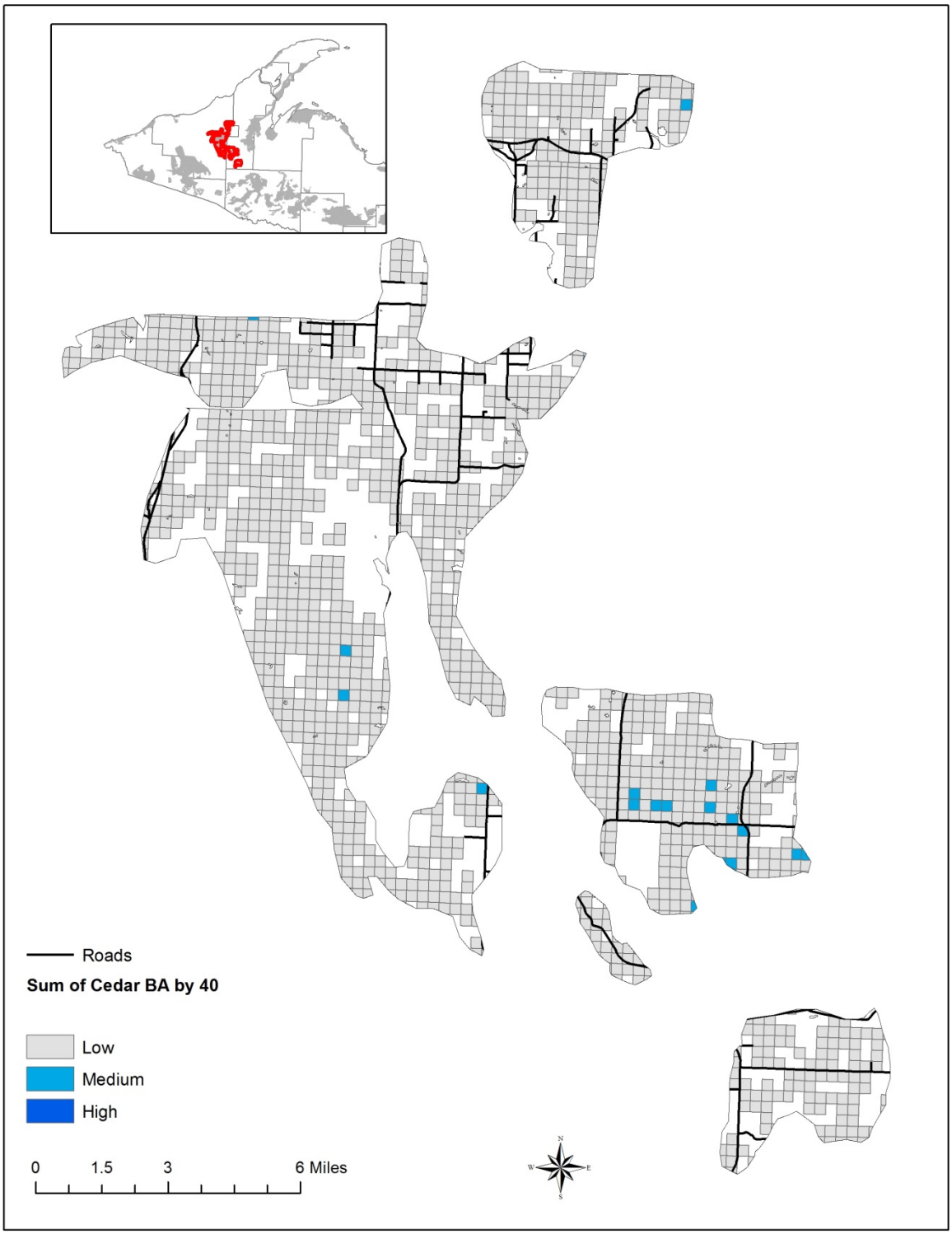

Figure 6 - East - Middle Branch DWC cedar analysis depicting cedar basal area by 40-acre parcels. The darker colored squares likely provide the best deer shelter potential. This analysis is based on data obtained from the USFS Forest Inventory Analysis.

Management Recommendations for the East - Middle Branch DWC:

Application of the DWC objectives to the East - Middle Branch DWC

- 1. Maintain primary shelter (cedar and hemlock)
    - Deer numbers in winter most likely preclude regeneration of these species
    - If timber harvest is necessary, consider retaining these species or implementing shelterwood with reserves systems (Figure 6) that retains higher canopy closures of these species to preserve shelter value for wintering deer while allowing timber harvest
    - Key habitat types – cedar, hemlock
- 2. Increase secondary shelter (white spruce, balsam fir and white pine)
    - Use silvicultural methods to increase the conifer component in stands exhibiting mixed conifer – hardwood conditions especially in areas adjacent to existing shelter.
    - The red maple stands appear to offer the best management opportunity for increasing conifer in this complex.
    - Consider conifer planting especially white pine. Higher deer numbers in the southern portions of the DWC may require fencing or other browse protection.
    - Key habitat types – spruce/fir, lowland conifer, northern hardwood, aspen, red maple
- 3. Enhance food resources
    - Harvest aspen and northern hardwood stands during winter and leave the felled tops for deer to consume
    - Maintain oak in timber harvests to provide acorns during years of abundance
    - While limited in the East - Middle Branch DWC, manage forest openings to provide spring forage
    - Key habitat types – northern hardwood, aspen, red maple, forest openings

Habitat Strategies Overview

Most of the forest land in the East - Middle Branch DWC is actively managed. Meeting the objectives for food and shelter requires the application of appropriate timber harvest methods for each of the key habitats. Recommended habitat management strategies were determined through reference to the silvicultural literature, examination of existing deer winter range management guidelines, and consultation with state, federal and private foresters and biologists.

Hemlock and cedar are the most critical deer habitat components due to their sheltering value. Deferring harvest of these species is the preferred management recommendation to ensure sustainability for providing shelter. If harvest of these species is necessary due to land owner objectives or due to requirements of applicable laws such as the Commercial Forest Act (CFA), a "shelterwood with reserves" harvest system is suggested as an alternative (Fig. 6 and 7) to maximize shelter retention for wintering deer.

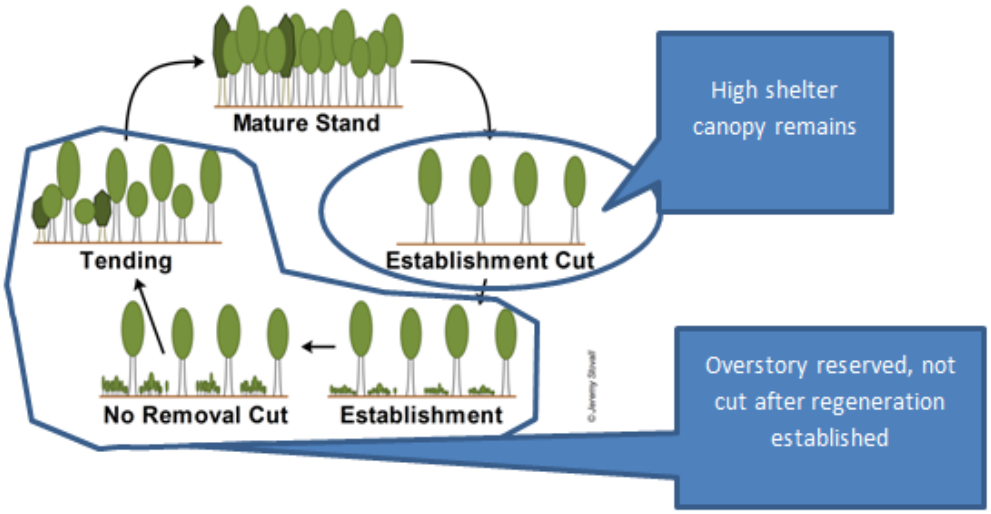

Figure 7– Shelterwood with Reserves Cycle

Figure 8 - Shelterwood with Reserves post harvest cedar stand

Habitat strategies by Key Habitat Type:

Hemlock (Hemlock and Northern Hardwood with Hemlock dominant)

Hemlock provides the best snow intercept. Hemlock stands, based on the USFS FIA data, represent 7% of the landscape (Figure 4). Hemlock stands that provide functional shelter usually have basal areas greater than 100 sq. ft. /acre. These stand conditions reduce snow depths under the canopy and result in increased mobility for deer in the form of trails systems to access food and avoid predators. These stands also reduce the effects of wind and low temperatures and provide a surprisingly large amount of food from litterfall, including hemlock fronds, hardwood stems and lichen.

Hemlock strategies center on retention of this species in the stand as deer browsing makes it difficult to regenerate, and removing the trees can permanently eliminate the shelter value. These stands are relatively young and should be able to sustain periods of deferred harvest until regeneration and recruitment conditions improve. Beyond the deer benefits, retaining these trees has the added value of preserving seed trees for future reforestation and maintaining stand diversity to enhance biological diversity.

Recommended Strategy 1: Defer timber harvest in these stands. This is the simplest method to maintain the current shelter value.

Alternative Strategy 2: Harvest other species but retain the hemlock. Maintain sufficient basal area in the residual stand to minimize windfall of remaining hemlock.

Alternative Strategy 3: Harvest using shelterwood with reserves leaving 70% canopy closure with retention heavy to hemlock (Figure 6). Without future regeneration and recruitment of hemlock this method may have limited repeatability.

Cedar (Lowland conifer with cedar dominant)

While not as efficient as hemlock, cedar also intercepts snow and also is a preferred winter food for deer. Cedar represents only 6% of the DWC (Figure 4) and the basal area analysis in Figure 6 predicts few areas of medium-high shelter areas. Cedar stands that provide functional shelter usually have a cedar basal area greater than 150 sq. ft/acre. These stand conditions function to reduce snow depths under the canopy and result in increased mobility in the form of trail systems to access food and avoid predators. These stands also reduce the effects of wind and low temperatures and provide a surprising amount of food from litterfall, including cedar fronds, hardwood stems and lichen.

Cedar strategies center on retention of this species in the stand as deer browse make it difficult to regenerate and removing the trees can permanently eliminate the shelter value. Cedar stands are relatively young at 100-200 years and should be able to sustain several periods of deferred harvest until regeneration and recruitment conditions improve. Beyond deer benefits, retaining these trees has the added value of preserving seed trees for future regeneration efforts and maintaining stand diversity.

Recommended Strategy 1: Defer timber harvest in these stands. This is the simplest method to maintain the current shelter value.

Alternative Strategy 2: Harvest using shelterwood with reserves leaving 50% canopy closure with retention heavy to cedar (Figure 6). Without regeneration and recruitment of cedar this method may have limited repeatability.

Alternative Strategy 3: Harvest other species but retain the cedar. Other conifer species may be contributing to functional shelter and their removal may significantly reduce the shelter value depending on the arrangement and extent of the cedar retention.

Lowland conifer – (cedar minority but <u>not</u> majority black spruce, tamarack)

Lowland conifer stands used by deer that are not a majority of cedar are typically comprised of combinations of white spruce, black spruce, balsam fir, cedar, hemlock and deciduous trees including balsam poplar and red maple. Mature, heavy cedar/hemlock stocked patches within the mixed species stand often provide patches of functional shelter. Even sub-functional stands (tree heights < 30 ft and canopy closure < 70%) can provide valuable travel corridors between functional shelter and food stands. Similar to hemlock and cedar stands, they provide food in the form of litterfall including hemlock and cedar fronds, hardwood stems and lichens. In addition, the scattered canopy gaps can provide valuable browse such as red maple and red osier dogwood. One concern in these stands is that some timber harvest methods result in conversion from mixed lowland conifer to balsam poplar which provides little shelter or food value for wintering deer. The recommended strategies reflect that concern.

Recommended Strategy 1: Harvest using shelterwood with reserves leaving 50% canopy closure with retention heavy to cedar (Figure 6).

Alternative Strategy 2: Harvest short-lived species but retain cedar if available using other silvicultural methods. The drawback to this alternative is large areas may convert to balsam poplar depending on the stand conditions unless sufficient overstory canopy is retained to discriminate against balsam popular. Without adequate overstory stocking, this could result in a short-term and long-term reduction in shelter.

Alternative Strategy 3: Mark out heavy patches of cedar or functional shelter patches for stand retention and then harvest using other silvicultural methods. Similar to alternate strategy 2, the drawback to this alternative is that large areas may convert to balsam poplar depending on the stand conditions, extent of retention and harvest method. This could result in a short term and long term reduction in shelter.

Spruce/Fir – (white spruce and/or balsam fir dominant)

Spruce/fir stands are typically comprised of white spruce and balsam fir dominant stands often in combination with black spruce, white pine, cedar, hemlock and deciduous trees including aspen, birch, balsam poplar and red maple. Spruce/fir stands can occur in both lowland and upland sites. These stands often provide patches of functional winter shelter in mature stands especially when mixed with cedar and hemlock trees. Even sub-functional stands (tree heights < 30 ft and canopy closure < 70%) can provide valuable travel corridors between functional shelter and food stands. Similar to lowland conifer stands, they provide food in the form of litterfall including hemlock and cedar fronds, hardwood stems and lichens. In addition, scattered canopy gaps can provide valuable browse including red maple, aspen, birch and red osier dogwood. Spruce budworm outbreaks are a concern in these stands as older and denser stands provide the best winter deer shelter, they also are most susceptible during outbreaks. Spruce/fir stands can be managed as even age stands (using clearcuts) or uneven age stands (using partial cuts). Even age management in deer winter range requires sufficient acreage in the DWC to spread the stand ages so that winter shelter is provided on a sustainable basis. In most DWC's however the amount of spruce/fir acreage is relatively small and therefore the recommended strategy centers on maintaining the stand through uneven age management to maximize winter shelter potential.

Recommended Strategy: Harvest using shelterwood with reserves leaving 40-60% canopy closure (Figure 6).

- Target for harvest mature balsam fir and white spruce trees.
- Focus retention heavy to hemlock, cedar, black spruce and white pine to increase stand species diversity.
- Retain white spruce and balsam fir less the 4 inch diameter at breast height (DBH) and protect regeneration from damage during harvest.
- See the spruce budworm section for more management considerations especially during periods of outbreaks.

Northern Hardwood (Hemlock a minority)

Northern hardwood stands where hemlock is a minority component, serve primarily as a food source for wintering deer although patches in the stand heavier to conifers may provide shelter during mild winters. Sugar maple typically makes up a majority of these stands but can be mixed with white ash, basswood, red oak, black cherry and shelter species including hemlock, white spruce, balsam fir and white pine. Often these stands become more mixed with shelter species as the stand transitions from the upland to the lowland. The mixed portions become important travel corridors for foraging on regenerating hardwood stems and moving between functional shelter areas. The recommended strategies center on providing food for deer the year of harvest and in subsequent years from regenerating stems. These strategies may increase the conifer component, especially in transition areas.

Recommended Strategies:

- Harvest in winter using single tree or group selection leaving felled tops to provide easily accessible winter food.
- Retain all cedar and hemlock trees to facilitate deer movement and feeding opportunities and provide diversity in stand.
- Retain oak trees to provide access to acorns during early and late winter as snow depths allow.
- Increase secondary shelter by one or more of the following:
    - Use seed tree silviculture in areas dominated by other conifers
    - Plant combinations of white spruce, balsam fir, white pine and possibly hemlock depending on local site conditions.
        - White pine under planting is preferred given the low-moderate deer numbers in more northern areas of this complex.
    - In red maple areas of stand refer to the red maple recommendations.

Aspen (pure aspen or mixed conifer component)

Aspen stands serve primarily as a food source for wintering deer although patches of conifers may provide shelter. Big tooth aspen, quaking aspen and birch typically makes up a majority of these stands but they can be mixed with shelter species including hemlock, white spruce, balsam fir and white pine. Often, these stands become more mixed with shelter species as the stand transitions from the upland to the lowland. These heavily mixed stands become important travel corridors for deer to forage on regenerating hardwood stems and to move between shelter areas. The recommended strategies center on providing food for deer in the year of timber harvest and in subsequent years from regenerating stems. The strategies also include increasing the conifer component, especially in transition areas.

Recommended Strategies:

- Encourage a mixed conifer – hardwood (aspen) stand condition.
- Retain all conifer less the 4 inch diameter at breast height (DBH)
- Harvest in winter leaving felled tops to provide accessible winter food.
- Consider small cut units (e.g. 20 acres) in order to spread the harvest over multiple winters.
- Avoid cutting near areas recently planted with white pine or hemlock until those plantings have grown out of the reach of deer browsing.
- Retain cedar and hemlock trees to facilitate deer movement and feeding opportunities and provide diversity in the stand.
- Retain oak trees to provide access to acorns during early and late winter as snow depths allow.
- Increase secondary shelter presence where possible using one or more of the following:
    - Retain patches that are heavier to conifer as retention especially those with cedar and hemlock present
    - Protect existing conifer regeneration
    - Plant white spruce and balsam fir post-harvest.
    - In red maple areas of stand refer to the red maple recommendations.

Red Maple (transitional stands between uplands and lowlands)

Red maple stands tend to occupy the transitions between upland and lowland and serve as a food source for wintering deer. Red maple typically makes up the majority of these stands but can be mixed with white ash, basswood, black cherry and shelter species including hemlock, white spruce, balsam fir and white pine. Often these stands become more mixed with shelter species as the stand transitions from the upland to the lowland. These areas become important travel corridors for deer and serve to disperse deer thereby reducing browse pressure. The recommended strategies center on providing food for deer the year of harvest and in subsequent years from regenerating stems. The strategies also may increase the conifer component, especially in transition areas.

Recommended Strategies:

- Harvest in winter leaving tops to provide accessible winter food
    - Summer harvest may occur if scarifying for conifer regeneration is the goal
- Retain cedar and hemlock trees to facilitate deer dispersal and provide diversity in stand.
- Retain oak trees to provide access to acorns during early and late winter as snow depths allow.
- Increase secondary shelter presence using one or more of the following:
    - Reduce overstory to 30-50% and leave conifer patches and mature trees to enhance the conifer component in future stands (leaving 20 ft^ basal area or more conifer recommended).
    - Plant combinations of white spruce, balsam fir, white pine and possibly hemlock depending on local site/soil conditions.
        - White pine under planting is preferred given the low-moderate deer numbers in more northern areas of this complex.
        - White pine and hemlock planting may require fencing or other protections to keep deer away from the plantings until they are out of reach of deer in the more southern portions of this DWC.

Forest Openings

Forest openings within and adjacent to deer wintering complexes may provide a key early spring food source. Deer leave complexes in the spring and move toward their summer ranges as soon as snow depths moderate. In the East - Middle Branch DWC, existing openings are limited and represent less than 1 percent of the complex. Examples of openings include utility corridors, timber harvest landings, old logging roads and remnant forest openings. Snow melts early on south facing slopes and these sites often provide the first available green vegetation for deer. These south facing slopes represent especially good locations for managing for forest openings. Strategies center on maintaining these openings in cool season plants species that provide early spring nutrition.

Recommended Strategies:

- Maintain existing openings by cutting, mowing or burning to control tree encroachment
- Emphasize cool season grasses and forbs.
- For maximum spring deer food benefit, consider maintaining forest openings in wildlife clover mixes with annual late summer mowing and regular 3-5 year maintenance and, if necessary, reseedings.

Spruce Budworm Considerations in Deer Winter Range

The spruce budworm is one of the most destructive native insects in the northern spruce and fir forests of Michigan. Periodic outbreaks of the spruce budworm are a part of the natural cycle of events associated with the maturing of balsam fir every 30-50 years. The last widespread outbreak of the insects in Michigan ended during the 1980s and experts think we may be seeing the beginning of a new epidemic that could persist over the next few years. While balsam fir and white spruce are the most damaged by the budworms, they also feed on black spruce, tamarack, pine and hemlock trees when they are in stands with balsam fir or white spruce. Tree mortality results not just in lost timber value but also can result in reductions of current and future deer winter shelter. As these outbreaks occur there is an interest on the landowner's part to salvage timber value while also preserving deer winter habitat. Below are some recommendations for managing forest lands that may be affected by spruce budworm while also considering deer winter habitat.

Goal: Maintain spruce/fir on the landscape as an important component of deer winter shelter

Facts of spruce budworm epidemics to consider:

- Stands with an extensive overstory (> 40% of stand) of white spruce and/or balsam fir that are older than 50 years are most vulnerable. These are typically spruce/fir stands but sometimes lowland conifer stands.
- Stands mixed with a component of balsam fir and white spruce < 40% are less vulnerable
- Younger white spruce and balsam fir in the understory are less vulnerable unless located underneath heavily stocked older infected trees in the overstory.
- Even without management in an infected stand, white spruce and balsam fir tend to regenerate due to the presence of seedlings and canopy gaps provided by the dead and dying overstory trees.

Management recommendations:

- Where there is an extensive overstory (>40% of stand) of mature spruce/fir and the overstory is showing signs of infection or has a high probability of infection.
    - Harvest the mature balsam fir and white spruce overstory while protecting the understory from further damage.
    - Leave sufficient hardwood overstory to encourage fir and spruce in the future stand.
    - Retain hemlock, cedar, black spruce and white pine to increase diversity and decrease vulnerability in the future stand.
    - Depending on tree survival and subsequent conifer regeneration, conifer planting may be required to ensure future shelter conditions.
- Where spruce/fir is a component <40% of stand.
    - Leaving the stand unmanaged is the simplest option to maintain shelter. Even if the overstory spruce/fir dies the probability is the gaps underneath will regenerate to spruce/fir.
    - However, removing mature infected overstory balsam fir and white spruce trees may protect extensive existing understory regeneration in some cases.

Summary:

While the East - Middle Branch DWC is located in southern Houghton and eastern Ontonagon the deer using this complex also distribute over much of northern Ontonagon County during the spring-fall period based on tagged deer observations. Most of the land located inside this complex is actively managed forestland. To effectively manage the food and shelter resources for deer use during the winter, it requires application of timber harvest strategies to manage those key habitats. This document provides habitat recommendations including timber harvest guidance for each of these key habitats. This complex has been used by wintering deer since at least 1928 and application of these strategies should contribute to the overall winter range goal to "sustainably manage shelter and food resources" and result in the continued use of this complex by wintering deer into the future.

If you are a landowner within this complex and interested in implementing some of the strategies identified in this document, be sure to review the reference section on the next page. The references include resource links that can guide and potentially even help fund your forest management plans. A good starting point is contacting your local county conservation district forester ((906) 667-1100 x 632). They can provide guidance identifying and implementing these strategies based on your interest in timber harvest, or non-timber harvest activities such as tree planting or forest opening creation or maintenance.

UP Habitat Workgroup Strategies to Achieve Habitat Objectives in the East - Middle Branch DWC

- Engage with the Ottawa National Forest to provide input on opportunity areas that fall within the East - Middle Branch DWC.
- Contact forestry consultants in the area, share the habitat goals and summary of this complex and encourage them to consider these recommendations when working with landowners located in this complex.

References:

Deer Winter Range Information

UP Habitat workgroup information and online maps http://bit.ly/uphabitatworkgroup

Michigan State Forest Deer Winter Range Guidelines
https://www.michigan.gov/documents/dnr/DeerWinterRangeGuidelines_469021_7.pdf

Forestry Links

List of Conservation District Foresters by County http://michigan.gov/MIFAP

Summary of forestry programs for landowners in Michigan
http://michigan.gov/documents/dnr/GeneralForestryInfo_474276_7.pdf

Forest Stewardship Program – provides management plan assistance
http://michigan.gov/foreststewardship

Natural Resource Conservation Service (NRCS) - provides management plan assistance
http://www.nrcs.usda.gov/wps/portal/nrcs/main/mi/technical/landuse/forestry/

Grant Programs – these programs are competitive and may help fund some of the recommendations identified in this document beyond timber harvest, including conifer tree planting and opening maintenance.

Wildlife Habitat Grant Program -The Wildlife Habitat Grant Program (WHGP) purpose is to provide funding to local, state, federal and tribal units of government, profit or non-profit groups, and individuals to assist the Wildlife Division with developing or improving wildlife habitat for game species.
http://www.michigan.gov/dnr/0,4570,7-153-58225_67395-324696--,00.html

Upper Peninsula Deer Habitat Improvement Grant - The Deer Habitat Improvement Partnership Initiative is a grant program designed to foster productive relationships between the DNR, sportsmen's organizations, concerned citizens and other partners that produce tangible deer habitat improvement benefits and educate the public about the importance of the work and the scientific principles involved in it.
http://www.michigan.gov/dnr/0,4570,7-153-58225_67395-271849--,00.html

NRCS Environmental Quality Incentives Program (EQIP) - Provides financial and technical assistance to landowners through contracts that provide financial assistance to help plan and implement conservation practices that address natural resource concerns and for opportunities to improve soil, water, plant, animal, air and related resources on agricultural land and non-industrial private forestland.
http://www.nrcs.usda.gov/wps/portal/nrcs/main/national/programs/financial/eqip/

Tree sales –Most county conservation districts have spring tree sales including white pine, white spruce, hemlock and balsam fir.
List of local districts http://macd.org/local-districts.html