

East Keweenaw Deer Wintering Complex (DWC) Management Plan

Upper Peninsula of Michigan Habitat Workgroup - Executive Summary

December 2015

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 Keweenaw 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 Keweenaw Deer Wintering Complex

This section highlights the current conditions of the East Keweenaw 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 Keweenaw DWC

This section applies the overall goals and objectives from section 1 to the habitats identified in section 3.

Section 5 - Strategies for Managing the Key Lake East Keweenaw 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

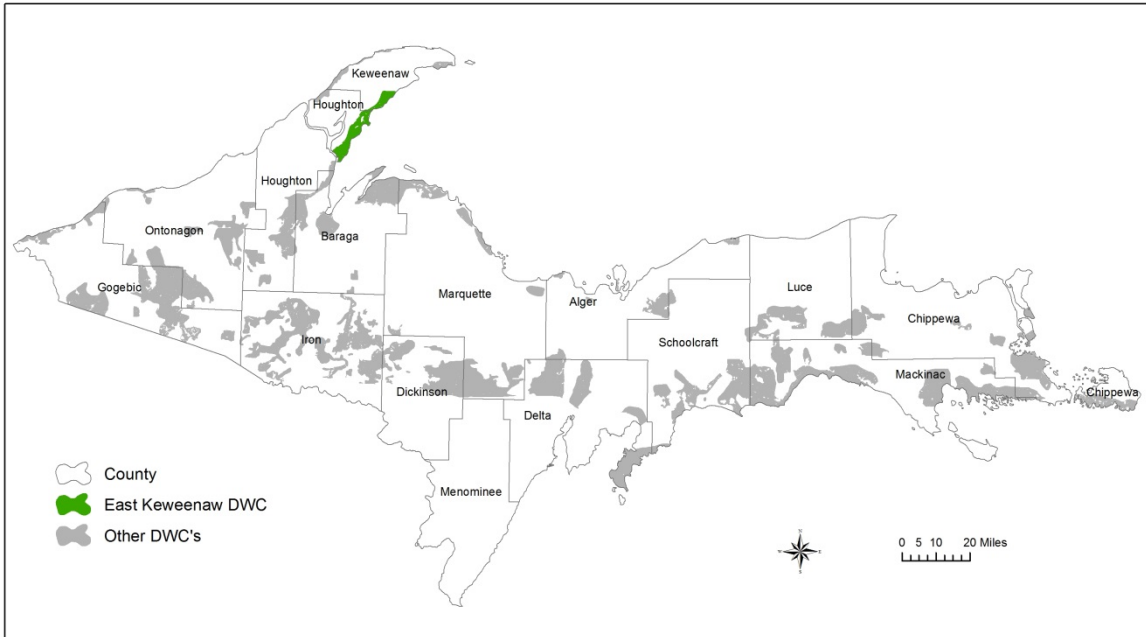
References

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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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 57 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 Keweenaw DWC is an analysis of the current characteristics.

The East Keweenaw Deer Wintering Complex:

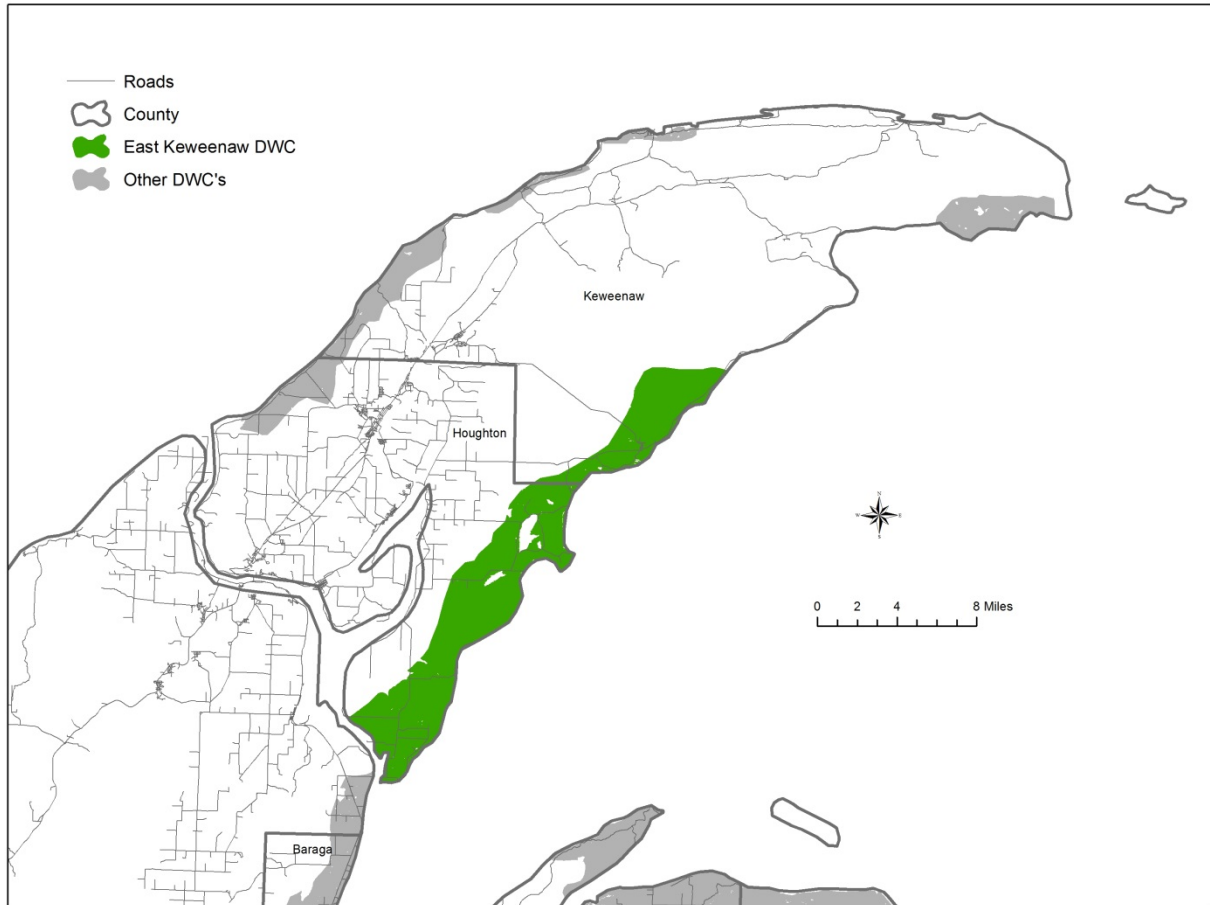


Figure 1 – Keweenaw Peninsula DWC map with the East Keweenaw Deer Wintering Complex in green.

The East Keweenaw DWC is located in the western UP northwest of Houghton, spanning Keweenaw and Houghton Counties. This complex encompasses 40,248 acres (Figure 1). Deer use has been documented in parts of this complex by the DNR since 1937. The East Keweenaw DWC is located in the heavy snow belt of the UP and averages 99 days of more than 12 inches of snow on the ground. The deer wintering in this complex are spread relatively evenly across the landscape, and forest browse pressure is typically high as evidenced by hardwood regeneration browse damage in many locations. The summer range extent of the deer using this complex is not known as only a limited amount of winter deer tagging operations occurred in this DWC. The land ownership of the DWC is comprised of 28% GMO Threshold Timber CFA, 21% other corporate forest owners, 2% state forest and other state of Michigan lands with the balance (49%) comprised of private non-corporate landowners (Figure 2).

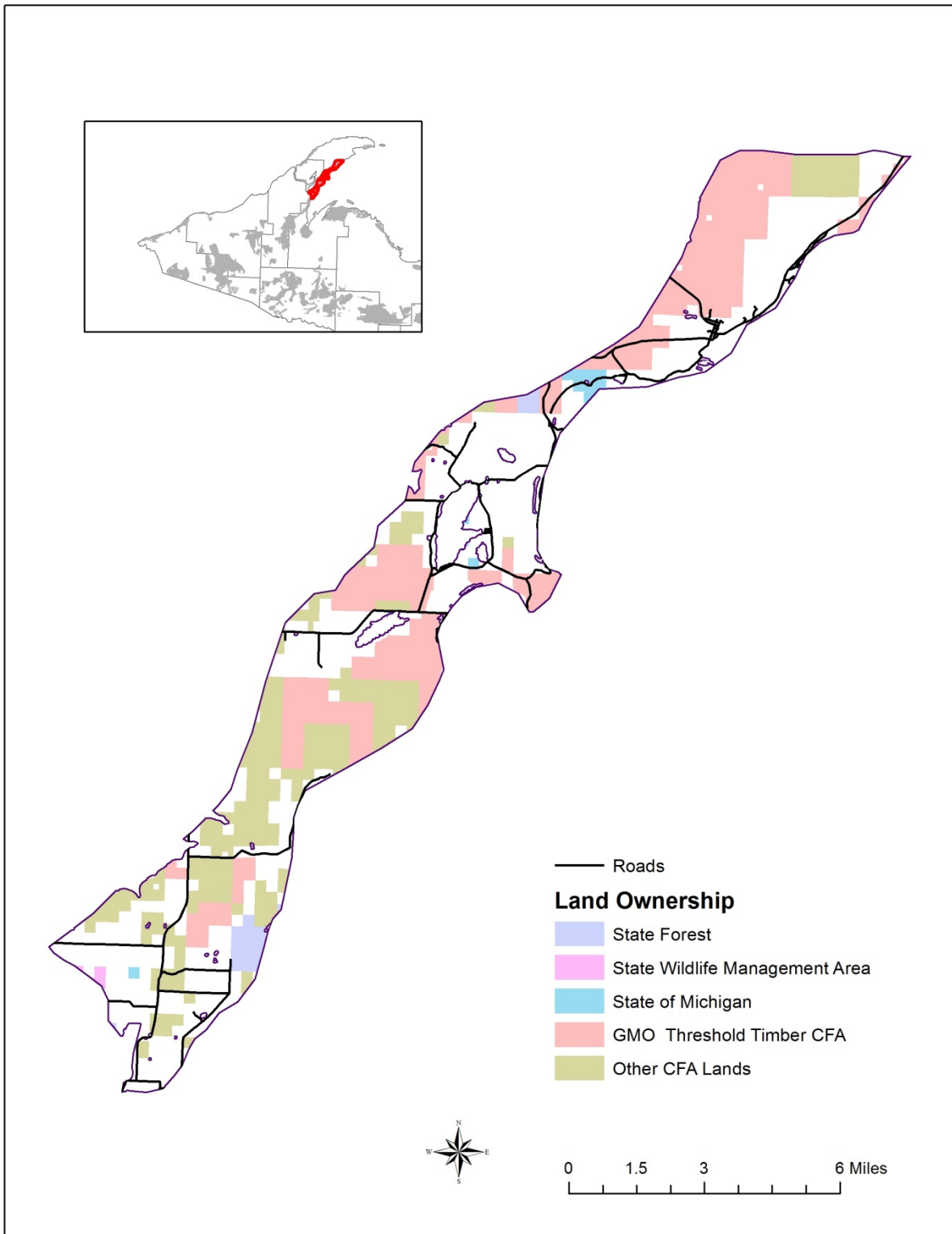


Figure 2 - East Keweenaw DWC ownership map.

Current Food and shelter conditions in East Keweenaw DWC:

The U.S. Forest Service (USFS) dominant vegetation layer was used to estimate the current food and shelter conditions of the East Keweenaw DWC by key habitats and land covers which are important for wintering deer (Figure 3). 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 Keweenaw DWC Land Cover Summary (% of the complex)

- Shelter 38%
 - hemlock 7%
 - cedar 19%
 - white spruce, balsam fir, white pine 12%
- Food 37%
 - aspen 3%
 - northern hardwood 10%
 - red maple transitional stands 23%
 - forest openings < 1% (too small to map)
- Other Cover Types 25%
 - Tamarack, black spruce, jack pine, wetlands

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 4) and cedar (Figure 5).

Habitat summary: This complex is composed of 38% shelter species with hemlock and cedar making up 7% and 19% respectively. Secondary shelter species including white spruce, balsam fir and white pine make up another 12%. Based on the hemlock and cedar analysis, both species appear to be providing areas of high density shelter (Figures 4 and 5). From a food standpoint, the red maple stands provide the majority of the food opportunities in this complex at 23% and has total food resources representing 37% 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. While shelter represents only 38% of this complex when considering all cover types, if we calculate the ratio while only considering the shelter and food cover types (shelter=38%/food = 37%) then the actual ratio is very close to the desired 50/50 ratio.

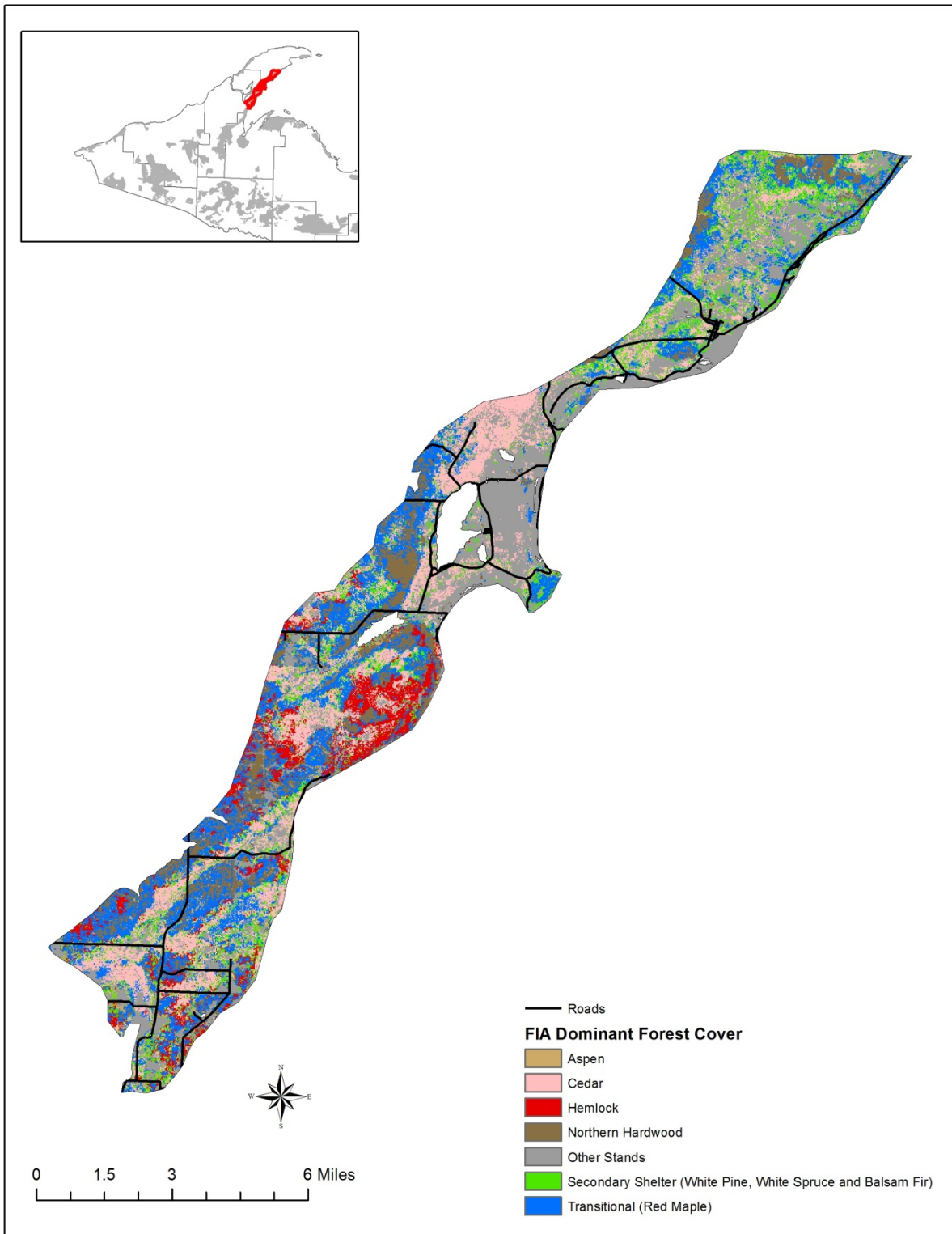


Figure 3 – The East Keweenaw dominant forest cover

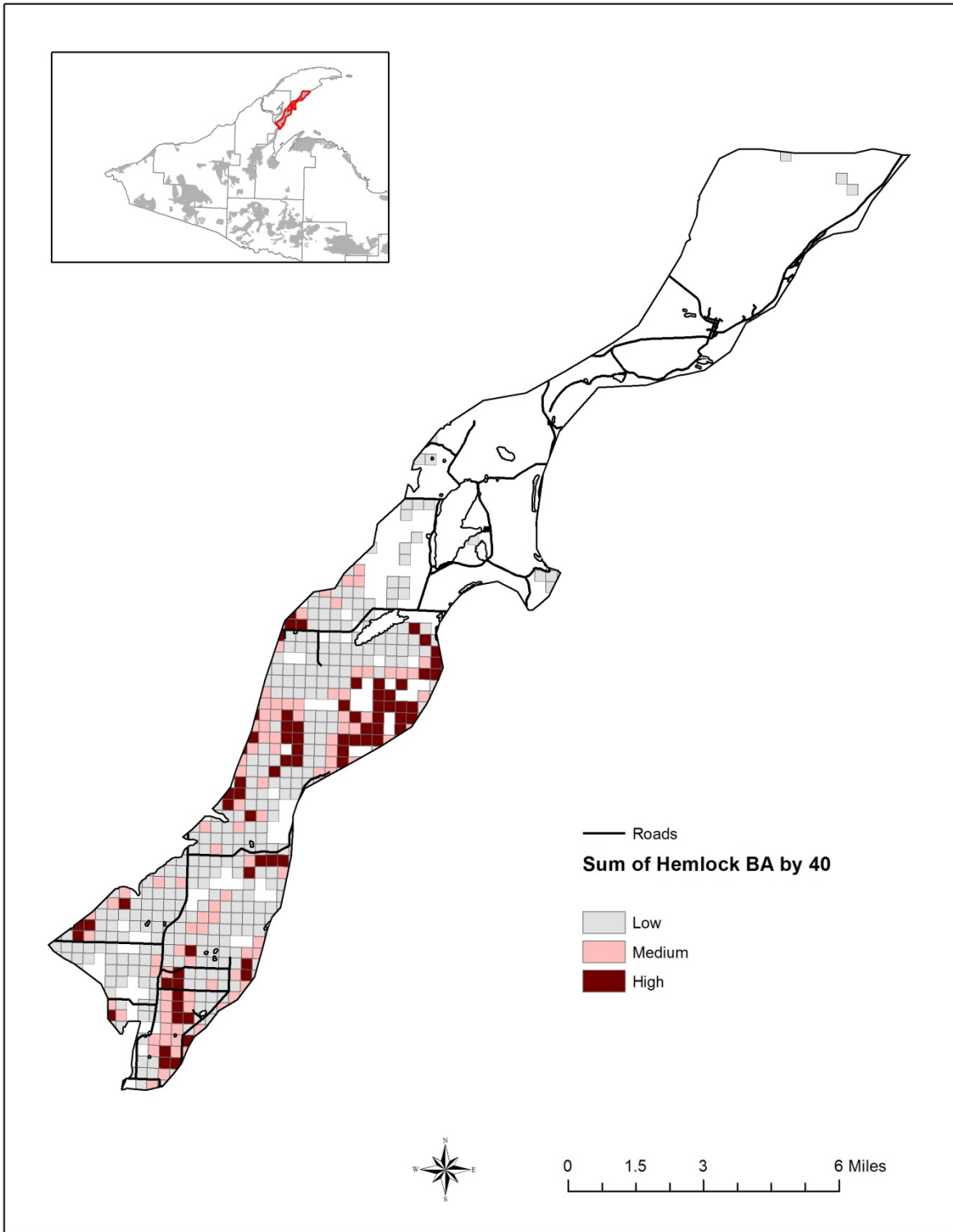


Figure 4 - East Keweenaw DWC hemlock analysis depicting hemlock basal area by 40-acre parcels. The darker colored squares likely provide the best deer shelter potential. This analysis is based on data obtained from the USFS Forest Inventory Analysis.

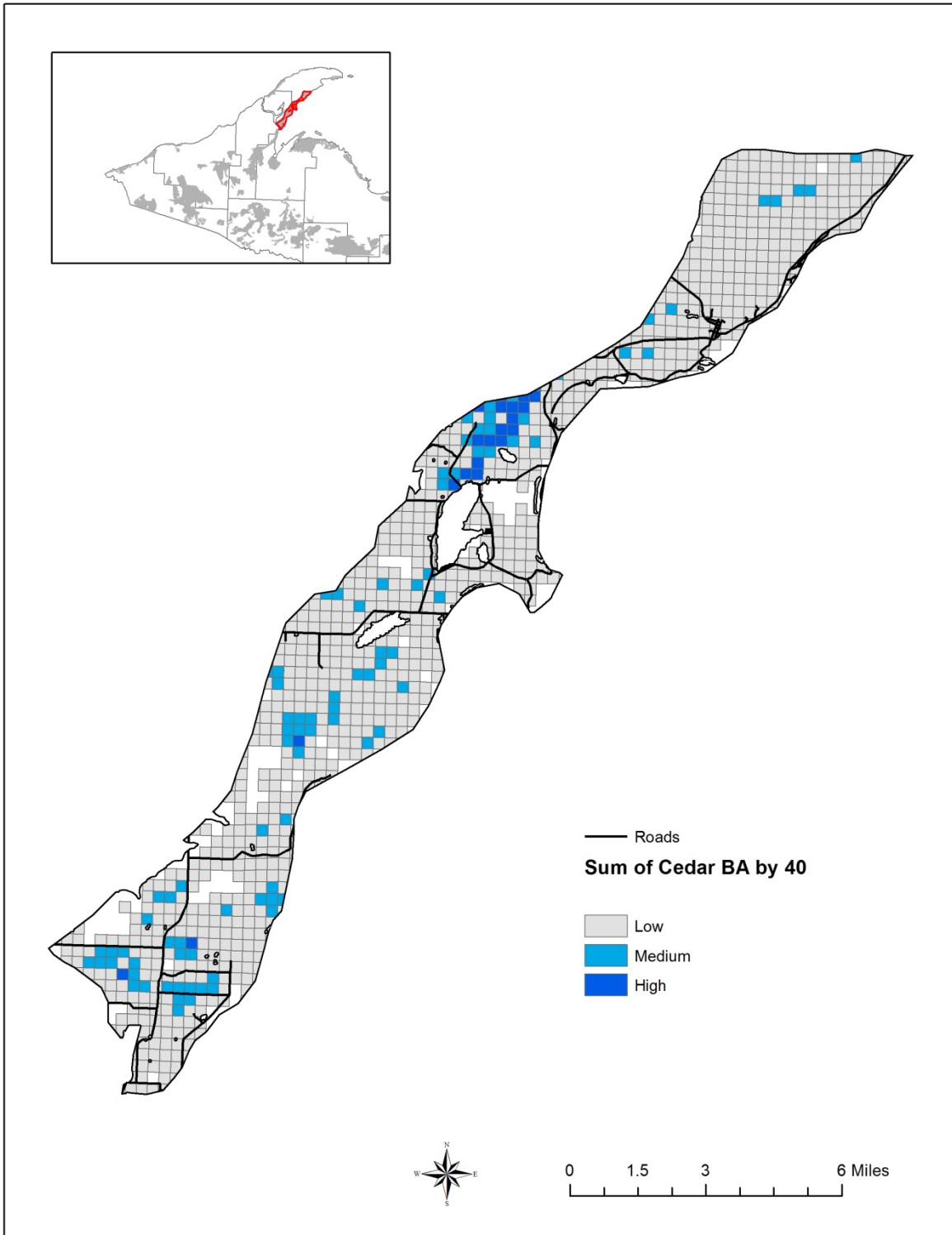


Figure 5 - East Keweenaw DWC cedar analysis depicting cedar basal area by 40-acre parcels. The darker colored squares likely provide the best deer shelter potential. This analysis is based on data obtained from the USFS Forest Inventory Analysis.

Management Recommendations for the East Keweenaw DWC:

Application of the DWC objectives to the East Keweenaw 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. Maintain secondary shelter (white spruce, balsam fir and white pine)
 - Use silvicultural methods to maintain the conifer component in stands exhibiting mixed conifer – hardwood conditions especially in areas adjacent to existing shelter.
 - Key habitat types – northern hardwood, lowland conifer, 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
 - 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 Keweenaw 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.

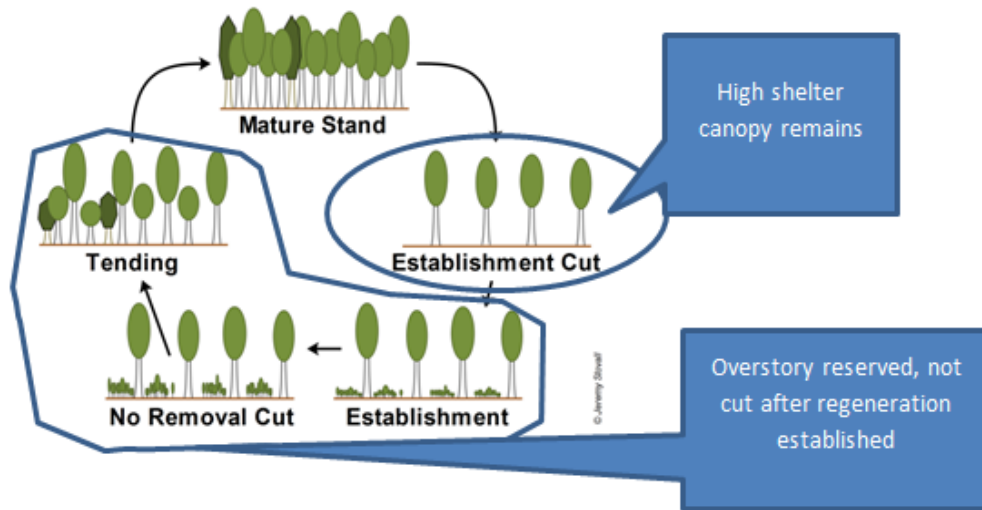


Figure 6 – Shelterwood with Reserves Cycle



Figure 7 - 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)



Cedar is a preferred winter food. While not as efficient as hemlock, cedar also intercepts snow and provides the majority of the primary shelter in the complex. Cedar stands, based on the USFS FIA data, represent 19% of the landscape (Figure 4) and the basal area analysis (Figure 6) demonstrates that much of the cedar is in higher basal area densities that likely are serving as functional shelter. 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 not 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. These stands often provide patches of functional winter shelter in mature, heavy cedar/hemlock stocked patches within the mixed species stand. . Even sub-functional stands (short tree heights and poor canopy closure) 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 poplar. 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.

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.

Recommended Strategies:

- Maintain a mixed conifer – hardwood stand condition where it exists.
- 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.

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.

Recommended Strategies:

- Maintain a mixed conifer – aspen stand condition where it exists.
- 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.

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:

- Maintain a mixed conifer – hardwood stand condition where it exists.
- Harvest in winter leaving tops to provide accessible winter food
- 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.

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 Indian Lake 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, reseeding.

Summary:

The East Keweenaw DWC covers the shoreline area of much of the eastern side of the Keweenaw Peninsula in both Houghton and Keweenaw Counties. While the summer range extent of this complex is unknown it certainly is an important complex for deer in much of Houghton and Keweenaw Counties. 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, application of timber harvest strategies is required 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 1937 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 (for Keweenaw and Houghton Counties: (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 Keweenaw DWC

- Work cooperatively with GMO Threshold Timber CFA to identify, protect and manage for functional shelter where feasible within the constraints of corporate policy and applicable laws such as the Commercial Forest Act (CFA).
- 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) <http://bit.ly/uphabitatworkgroup>

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

https://www.michigan.gov/documents/dnr/DeerWinterRangeGuidelines_469021_7.pdf

Forestry Links

[List of Conservation District Foresters by County](http://michigan.gov/MIFAP) <http://michigan.gov/MIFAP>

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

http://michigan.gov/documents/dnr/GeneralForestryInfo_474276_7.pdf

[Forest Stewardship Program](http://michigan.gov/foreststewardship) – provides management plan assistance

<http://michigan.gov/foreststewardship>

[Natural Resource Conservation Service \(NRCS\)](http://www.nrcs.usda.gov/wps/portal/nrcs/main/mi/technical/landuse/forestry/) - 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](http://www.michigan.gov/dnr/0,4570,7-153-58225_67395-324696--,00.html) -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](http://www.michigan.gov/dnr/0,4570,7-153-58225_67395-271849--,00.html) - 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 \(EQIP\)](http://www.nrcs.usda.gov/wps/portal/nrcs/main/national/programs/financial/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) <http://macd.org/local-districts.html>