

Michigan White-tailed Deer Landscape Habitat Management Guidelines



Michigan Department of Natural Resources (MDNR), 2017



Robert Doepker, Wildlife Biologist (ret), MI DNR
Steve Carson, Wildlife Biologist, MI DNR
Pam Nankervis, Wildlife Biologist, US Forest Service
John Ozoga, Wildlife Biologist (ret), MI DNR
Jim Hammill, Wildlife Biologist (ret), MI DNR
Stuart Boron, Forester (ret), WI DNR
Chris Webster, Professor, MTU

Contents

Overview of Michigan’s Deer Range	2
SEASONAL HABITAT CONDITIONS	4
SUMMER HABITAT	4
Summer Shelter	5
Summer Food	5
Summer Habitat GOALS	6
WINTER HABITAT	6
Winter Shelter	7
Winter Food.....	9
Winter Habitat GOALS.....	10
MICHIGAN’S DEER RANGE CATEGORIES.....	10
OBLIGATE DEER RANGE	10
Obligate Deer Summer Range Objectives	12
Obligate Deer Winter Range Objectives.....	13
CONDITIONAL DEER RANGE.....	13
Conditional Deer Summer Range Objectives	14
Conditional Deer Winter Range Objectives.....	15
RESIDENT DEER RANGE.....	15
Resident Deer Range Objectives	16

Overview of Michigan’s Deer Range

White-tailed deer (*Odocoileus virginiana*) are found in every county of Michigan. Deer in Michigan prefer different habitats during summer (snow-free) and winter (snow-cover) depending on where they live in the state. Deer movements between summer and winter range are greatest in northern latitudes which receive abundant snow, and the snow lasts for long periods of time. The areas that provide the required winter food and shelter resources are more limited in the north compared to southern portions of the state. In harsh winter conditions, winter survival drives a deer population. Deer that don’t survive winter do not contribute to growing, or maintaining, the population. Reduced numbers of deer that do manage to survive severe winters may be in a weakened physical state and females give birth to fawns with smaller body size and mass and thus have reduced chances for survival.

While winter severity can be measured by multiple methods, a simple method is to measure winter severity for deer by estimating the number of days that snow cover is equal or greater than 12 inches. Snow depths greater than 12 inches' limits food access and hinders their ability to escape predators. Exertion required for moving through deep snow to seek food also increases their metabolism which depletes body fat which is necessary to cope with subzero temperatures and wind chill.

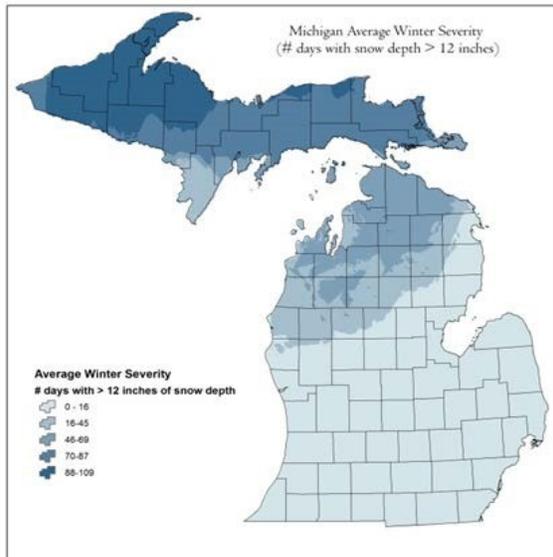


Figure 1. Michigan Average Winter Severity (#days with snow depth > 12 in.

In Michigan, days with snow depth over 12 inches' range from zero days to over 100 days (Figure 1) with northern areas of the Upper Peninsula (UP) consistently receiving the greatest amounts of snowfall. In response to this high annual snow fall, deer in these areas are obligated to move from being widely distributed on summer range (Figure2) to concentrate on winter range that offers appropriate conifer shelter which increases mobility, provides thermal protection, and more readily available food sources (Figure 3). Not only is winter range crucial for survival, these winter range resources are more exacting and limited in the north compared to southern portions of the state. In the northern UP, deep snow conditions often result in large areas mostly vacated by deer in winter as depicted in the white

areas shown in Figure 3.

Michigan is classified into three deer range categories: 1) Obligate, 2) Conditional and 3) Resident. The categories are based on deer movement or migration as a response to the depth and duration of snow cover (Figure 4 and Figure 5). Obligate migrators occur in the northern UP where winters are typically



Figure 2. Michigan Deer Summer Range.



Figure 3. Deer Winter Range in blue, non-occupied in white.

severe. Deer cannot fulfill their year-round habitat requirements on summer range and are obligated to migrate from their summer habitat to occupy suitable winter shelter. Conditional range occurs in the southern UP and most of the northern Lower Peninsula (NLP) where winters are less severe (compared to obligate range) and of reduced duration. Deer on conditional range are typically scattered across the landscape and only move to specific areas of suitable winter habitat depending on the combined effects of harsh winter conditions and limited food supply. Resident deer range occurs primarily in the southern LP where winters are typically mild with only a few days of snow cover and most deer find suitable winter habitat within their summer range

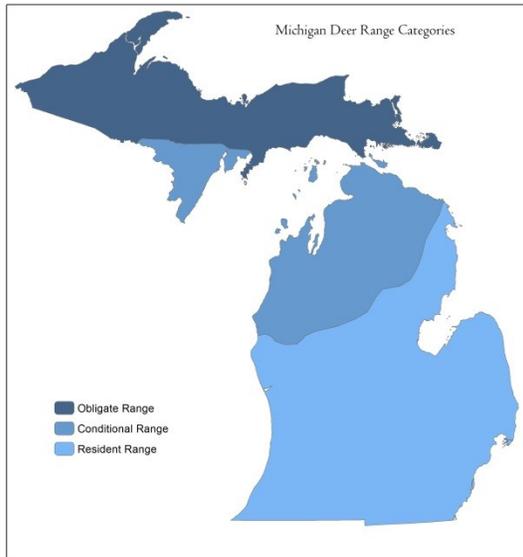


Figure 4. Michigan Deer Range Categories

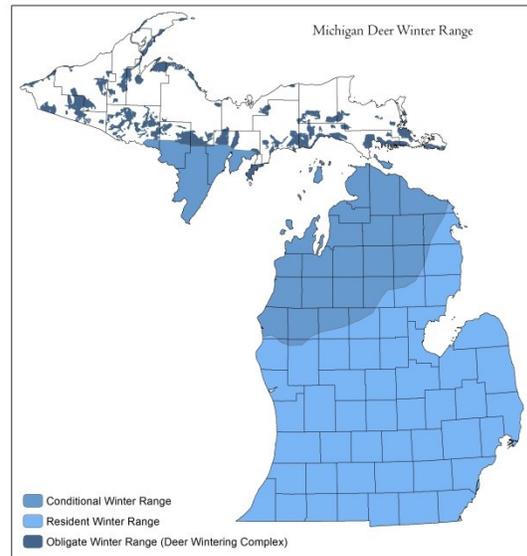


Figure 5. Michigan Deer Winter Range Categories.

These three categories describe the behavior of the majority of deer within each range category but there is always some overlap. For instance, in obligate range there will always be a few “resident” and “conditional” deer due to local habitat conditions, artificial feeding and localized winter severity differences.

SEASONAL HABITAT CONDITIONS

SUMMER HABITAT

Deer have seasonal preferences for habitat which satisfy varying social and nutritional needs across the seasons, for example, pregnant and lactating does, fall rut and antler-growing bucks. Snow-free habitat is used in spring, summer and fall and is referred to as “summer” habitat.

Deer abundance, productivity and physical condition may be enhanced with increasing proportions of early successional habitat on summer range. Early successional habitat is comprised of upland forest openings, upland brush, poorly stocked forest stands and young aspen/birch stands. Early successional aspen provides food, nesting, and escape cover for grouse, many different bird species,

snowshoe hare (and other featured species), as well as deer. Disturbance resets forest succession by creating semi-open conditions. Succession is the replacement of one type of forest community, with another type of community. Disturbances may be large scale events like a wind storm, disease outbreak, and fire or timber harvest. The disturbance may also be as small as a canopy gap resulting from a single large tree falling out of the stand and creating a hole in the tree canopy

In spring, as deer emerge from winter refuge, they seek early greening-up ground vegetation. Spring habitat can be broken down by early spring and late spring habitat. Early spring habitat is ideally close in proximity to winter habitat. Deer may dig beneath the shallow and patchy melting snow to seek early spring green ground vegetation. Late spring habitat is more closely associated with summer habitat characteristics as plants begin to flower and buds are leafing out and snow cover is completely gone. Following a severe winter, early spring green-up is crucial for weakened does to improve their physical condition and give birth to healthy offspring. Delayed spring green-up can have devastating impacts on new born fawns, as 2/3rds of the fawn's mass is acquired during the last 1/3rd of gestation. If spring green-up is delayed, fawns are born weak and stunted and the mother may abandon them, fail to defend them or cannot produce sufficient nourishment.

In summer, deer prefer to use highly disturbed and fragmented, open and shrubby areas, regenerating aspen and hardwoods and when available, agricultural areas. Summer is a period of relative abundance for deer. Many plant species favored by deer in summer are associated with openings or young tree and shrubs that begin to invade openings. The initial plant species occupying a site following disturbance are sometimes called pioneer species.

Autumn is an important season for deer to obtain and store energy in the form of subcutaneous fat. Stored fat reserves are metabolized by deer to help offset the impacts of reduced food supply and poorer quality diets which they experience during winter. Deer may lose up to 30% of their body mass during winter and still survive, so it is important to store as much fat as possible. It is in early fall that bucks need to store enough fat to carry them through the rut as well as survive winter. Bucks feed for much shorter periods of time during the rut, therefore acorns, beech nuts, hazelnut, and agricultural food sources are preferred. Females must prepare for pregnancy and the oncoming winter, they too seek similar high protein food. Acorns are the single most important natural food for deer during autumn due to the high carbohydrate, fat and protein in the acorn. Heavy acorn crops are visited by deer into January if snow is not limiting.

Summer Shelter

Low horizontal cover is important for deer and assists in deterring predation and to provide summer food in the form of tree leaves of aspen and northern hardwood. Regenerating aspen and two-aged northern hardwood provide horizontal obstruction; however, conifers like spruce-fir and white pine regeneration provide better horizontal shelter.

Summer Food

- Appropriate summer habitat increases the physical condition of deer and increases their ability to survive overwinter by providing early spring green-up areas and hard mast in the fall.
- Oak/beech/hazel mast – Acorns and beech nuts, when available in the fall, are a premier food as they provide exceptional nutrition levels which can be stored as fat in deer and can be

metabolized for energy during winter. Exceptional good acorn years provide deer access to acorns early and into winter. Acorns have been shown to have positive impacts on deer survival and physical condition and antler development. Acorn crops are unpredictable and good crops may be separated by 2-4 years.

- Herbaceous foods – Forest opening and upland brush sites inside and adjacent to DWCs often provide protein-rich food for several weeks in spring and fall before deer enter or leave the complexes.

Summer Habitat GOALS

- Provide a diverse composition of herbaceous, shrub and tree species to provide diversity in hard and soft mast and plant species to benefit deer and other species using similar habitat.
- Follow early successional recommendations in the Regional State Forest Management Plans.
- Enhance and sustainably manage early successional habitats to improve deer physical condition prior to winter and upon emerging from winter confinement.
- Provide adequate and sustainable hard mast to build fat reserves in the fall and enhance physical condition and overwinter deer survival.
- Provide sufficient early spring green-up grasses and herbaceous species in opening, upland brush and poor stocked stands that benefit deer as deer emerge from winter concentrations.

WINTER HABITAT

Winter is the most stressful and challenging period of the year for deer and other wildlife species. Deer in the northern latitudes of Michigan are near the northern periphery of their primary range in North America. Snow cover can last from November to well into April. Depth and duration of snow cover, adequate winter shelter, available browse and proximity to early successional spring food are major factors impacting the survival, condition and reproduction of deer. In winters when snow is deep and persists for a long time, large numbers of deer may die. Physical condition of survivors is diminished resulting in deer dying over winter and in low fawn birth weights and high newborn fawn mortality.

Deer have adapted to winter conditions in northern environments by evolving a variety of physiological, morphological and behavioral responses to conserve energy during winter. Winter is the “bottle neck” for deer.

Summer range is usually capable of producing more deer than the winter range can support, thus deer numbers are reduced each year to the number of deer that the winter habitat can support. Deer densities in Michigan track winter severity, with lowest deer densities in northern areas where they experience the most severe winters, and highest deer densities are in southern portions of the Upper and Lower Peninsulas that experience milder winter conditions. Winter range conditions are an important factor in determining how many deer are alive in the spring.

The most important habitat characteristic for deer living in high snowfall areas is availability of suitable winter shelter. On obligate deer range, unlimited amounts of food in the form of natural browse are not sufficient to hold deer throughout the winter. Primary shelter species, cedar and hemlock, in appropriate stocking levels must be available to benefit deer. The goal for obligate winter range is to have 50% of the complex in sustainable shelter (Figure 6). They must have suitable shelter to reduce energy demands and reduce predation risk. Deer wintering in locations with easy access to early spring vegetation recover more quickly from the harsh effect of a severe winter.

Figure 6. Characteristics of deer wintering areas, by state/province and DWA type (modified from Maine).

Characteristics of the shelter portion of deer wintering areas, by state/province and DWA type (modified from Maine).

State/Province	DWA Type	Percent Softwood	Softwood Basal Area (ft ² /acre)	Percent Softwood Crown Closure	Stand Height (ft)	Minimum Shelter Stand Size (acres - ft)	Shelter as percent of DWA	Actual or Recommended	Source
Maine	SFC, WPH	> 75		> 41	35-64	> 100 ft wide		Actual	Cill 1957, a, b; Cill 1966
	SFC, WPH	> 50		> 75	> 35		> 50	Recommended	Marston 1975, 1977, 1983, 1986
	SFC, WPH	> 50	60 - 100	≥ 70	≥ 35	> 100 ft wide	≥ 50	Recommended	MDIFW 1987
	SFC					60 – 100 ac		Recommended	Wiley 1988
	SFC, WPH, CED	> 50		≥ 50	≥ 35			Recommended	LURC 1989
Nova Scotia	SFC	> 75	85 - 185	> 70	> 35			Actual	Telfer 1968
New Brunswick	SFC	≥ 75		≥ 70	≥ 35			Recommended	Boer 1978
Quebec	SFC, WPH	> 50		40 - 66	> 35			Actual	Hout 1974
	SFC, WPH			> 40				Recommended	Morasse and Choquette 1975, Germaine et al. 1986
Ontario	WPH	> 50		50 - 70	> 35			Actual	Euler and Thurston 1980
	WPH	> 75		> 66				Actual	Armstrong et al. 1983b
New Hampshire	SFC	> 75		> 70	≥ 35			Actual	Strong 1977
	SFC, WPH	> 50		67 (32-88)	≥ 35			Actual	Weber et al. 1983
Vermont	SFC, WPH	> 50	150 - 200	50 - 90	≥ 35	> 200 ft wide		Recommended	Dickinson 1972, Dickinson 1977, Alexander and Garland 1984
	WPH	> 75	> 100	≥ 80	≥ 35		> 50	Recommended	Reay 1986
Michigan	WPH	> 66	≥ 155		≥ 35			Actual	Westover 1971
	CED	> 75	≥ 100	≥ 75	≥ 35	40 – 160 ac	≥ 50	Actual	Verme 1965, Krefling and Phillips 1970
Michigan	WPH, SFC	49					58	Actual	Doepker and Ozoga 1991
New Brunswick	WPH	43		> 50			≥ 43	Actual	Morrison et al. 2003
Ontario	WPH			60 - 80	> 33				Voigt et al. 1997

New Brunswick	WPH, CED (severe WSI)		> 87	≥ 50	33	25	> 75	Recommended	NBNR 2005
	WPH, CED (moderat WSI)		> 52	≥ 30	33	12	> 75	Recommended	NBNR 2005
New Hampshire	WPH, CED	≥ 50		65 - 70	35		50		
Vermont	WPH, CED, SF			> 70	35		> 50	Recommended	Reay et al 1990
Maine	WPH, Ced, SF (severe WSI)			≥ 70	35		> 50	Recommended	Wiley and Hulsey 2010
	WPH, CED, SF (moderate WSI)			50 - 70	35		> 50	Recommended	Wiley and Hulsey 2010
Nova Scotia				60 - 80	33	> 10	> 50		

Deer Wintering Area type Descriptions

SFC – Spruce, balsam fir, northern white-cedar, may or may not include eastern hemlock

WPH- White pine, eastern hemlock, sometimes with northern white cedar and black spruce

CED- Northern white-cedar swamp

SF – Spruce/Fir

Winter Shelter

Conifer stands with high canopy closure provide deer with shelter by reducing snow depths beneath the canopy which facilitates movement via extensive connected packed trails. Trail systems provide

easier access to food and assist deer in evading predators. These sheltered stands also reduce wind chill and perhaps radiant heat loss. Shelter is defined by several categories:

- **Functional Shelter** –Conifer dominated stands with at least 50% conifer canopy closure for conditional and 70% conifer canopy closure on obligate deer range. Tree heights should be 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. Functional shelter may be important as summer refuge if global climate predictions are achieved. Black bear and moose may be especially impacted.
- **Primary Shelter Species:** Cedar and hemlock trees provide the best functional shelter as they intercept a larger percentage of snow than other conifers. The growth forms of mature cedar and hemlock are well suited for intercepting snow. Both species are preferred winter browse for deer 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.

The importance of cedar and hemlock has been recognized for years for state-owned land and is expressed in DNR procedure 32.22-07 which states, “Coniferous swamps are important as winter deeryards and shall be managed primarily for deer. The objective shall be to maintain them for this purpose and through commercial cuttings and silvicultural practices, improve these areas to provide winter cover and food for deer.

The hemlock type shall be managed primarily for deer. Hemlock was a significant component in the virgin northern hardwood forest, but did not reproduce extensively after timber harvest. The present stands rate a high priority as game habitat, especially as winter cover for deer. Management will be directed toward maintaining present stands and expanding the type where feasible.”

- **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. Stands exhibiting these conditions are readily used by deer on conditional and resident deer range, however, during most years, these species are not adequate to mitigate winter impacts on obligate winter range. These trees 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.

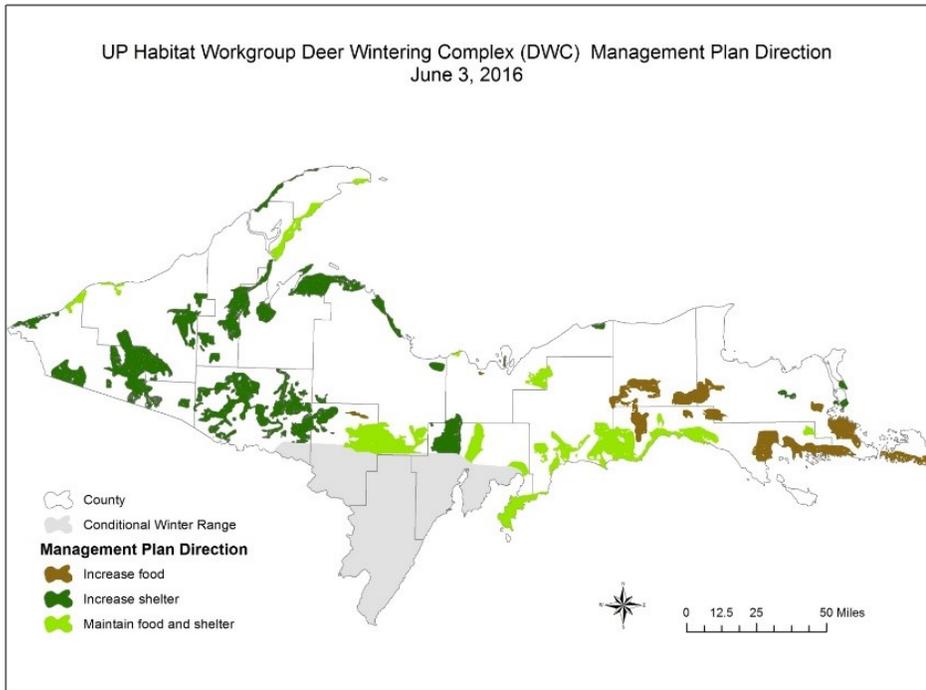


Figure 7. Deer Wintering Complex and Management Plan Direction.

- **Tertiary Shelter Species:** Any type of hardwood or conifer species may be used by deer in the southern Lower Peninsula (SLP) to reduce winter weather impacts. Hardwood woodlots, shrubby areas and riparian corridors are adequate shelter for deer during most winters. Deer inhabiting intensively managed agricultural areas without some type of winter shelter would be the first to exhibit decreased physical condition and increased overwinter mortality.

Winter Food

Food, in the form of browse, 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 compared to their mass. 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, snow action or red squirrels.
 - Hardwood browse – Most browse is available in aspen, red maple and northern hardwood stands, either as felled tops from winter timber harvest activity, regenerating stems of trees and shrubs in years following timber harvests and natural disturbances such as windfall.
 - Acorns if good crop and not consumed by other wildlife species.

Winter Habitat GOALS

- Maintain and/or enhance suitable conifer shelter thereby facilitating conservation of energy and deer movement to obtain food, improve physical condition and avoid predation.
- Maintain existing hemlock and cedar stands. Only harvest if high probability of regenerating and recruiting these species past deer browsing.
- No net loss of openings and upland brush sites.
- Provide an adequate and sustainable high quality browse adjacent to shelter.

MICHIGAN’S DEER RANGE CATEGORIES

The depth and duration of snow cover, the need for shelter during winter, and changing seasonal nutritional demands, indicate deer range can be classified into three categories based on movement of deer on or between summer and winter range: 1) Obligate, 2) Conditional, and 3) Resident ranges. Within these deer range categories, there are both summer habitat and winter habitat requirements which are met differently depending on climate and location within the state of Michigan.

Deer Range Category	Deer Migration	Location in MI	Key Summer Habitat Types	Key Winter Habitat Types
Obligate	Deer must migrate to wintering areas (Deer Winter Complexes) due to deep snow conditions	Northern Upper Peninsula	northern hardwood, aspen, red maple, openings, upland brush, oak	cedar, hemlock
Conditional	May migrate to wintering areas depending on depth and duration of snow cover	Southern Upper Peninsula and Northern Lower Peninsula	northern hardwood, aspen, red maple, openings, upland brush, oak	upland spruce/fir, lowland conifer, cedar, hardwood, aspen, red maple, hemlock, white pine
Resident	Don't migrate; deer move around locally based on preferred food availability (weather conditions not limiting)	Southern Lower Peninsula	agricultural, northern hardwood, oak	Upland and lowland shrub and tree species, agricultural

OBLIGATE DEER RANGE

In obligate deer range, most deer are obligated to leave the areas they occupy during spring, summer, and fall and move up to 50 miles to occupy suitable sheltered sites to spend the winter. Movements to winter range typically begins in November or December. Winter and non-winter ranges are spatially separated for most deer, although a few animals are year-round residents in and around DWCs. In Michigan, obligate deer range is found in northern portions of the Upper Peninsula. Obligate

deer range represents approximately 87% of the land area of the UP. Obligate deer summer range represents about 70% of the UP and obligate deer winter range is about 17% of the UP (Figure 8).

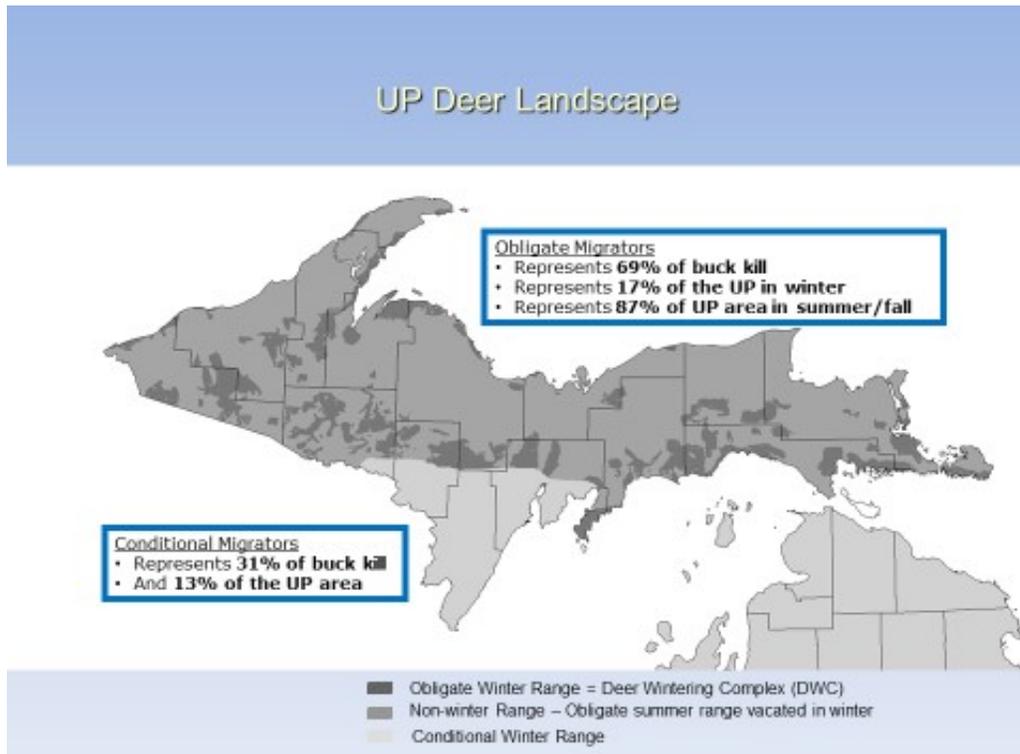


FIGURE 8. LAND AREA AND AVERAGE BUCK HARVEST (2001-2012) BY CONDITIONAL AND WINTER RANGE CATEGORY IN MICHIGAN'S UP.

Obligate summer range includes historic DWCs which are areas where deer have been documented to be present during winter sometime during the 80 years of effort that preceded the current efforts (Figure 9). Historic DWCs are areas that provide the opportunity to be managed to re-create adequate winter habitat conditions using experimental silvicultural techniques. These areas may experience reduced deer browsing pressure compared to current DWCs.

Historic DWC's now in Non-winter Range

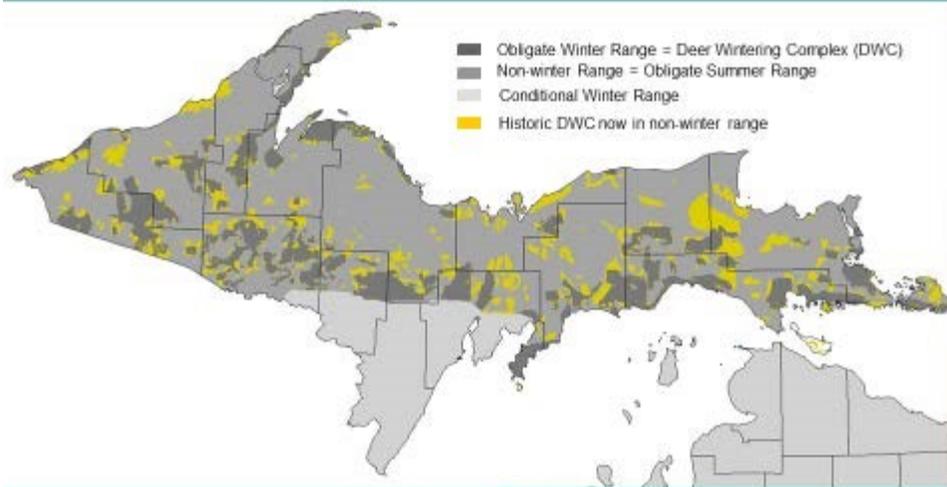


FIGURE 9. YELLOW SHADED AREAS REPRESENT HISTORIC BUT CURRENTLY NOT USED DEER WINTERING COMPLEXES.

Obligate winter range encompasses 37 individual Deer Wintering Complexes (DWCs) (Figure 7). Some of the traditionally used DWCs have been documented to hold deer in winter for 80+ years. Fawns learn migratory behavior and wintering locations from their mother or possibly related family groups. Unlimited natural food availability does not allow deer to survive winters in obligate range without adequate shelter. **Functional winter shelter provided by the primary shelter species of cedar and hemlock, is the highest priority habitat condition in obligate and conditional winter range.**

Obligate Deer Summer Range Objectives

1. Maintain forest openings and upland brush as recommended in the Regional State Forest Management Plans.
2. If necessary and appropriate, re-distribute openings and upland brush inside the DWC or within 1/4 mile of the DWC boundaries.
3. Look for south facing aspect to encourage early snow melt and favor early green-up of grasses and forbs.
4. Provide sufficient early spring green-up grasses and herbaceous species in openings, upland brush and poorly-stocked tree stands that benefit deer as they emerge from winter concentrations.
5. Locate openings and upland brush sites as close as possible to the DWCs.
6. Encourage oak stands and manage to produce oak mast on a sustainable basis.
7. Encourage oak in stands that possess the appropriate site characteristics.
8. Manage to maintain or expand the aspen and mixed forest types.

9. Provide a variety of early successional habitat conditions across a variety of habitat types and size (acreage) classes.

Key habitat types – northern hardwood, aspen, red maple, openings, upland brush

Obligate Deer Winter Range Objectives

1. The primary objective is to strive for 50% of the forested land within each DWC be managed for shelter and ensure functional shelter be managed on a sustainable basis.
 - a. Conserve, enhance or increase primary shelter. Cedar and hemlock growing on productive sites with >70% canopy closure and trees that are >30 feet represent functional shelter and is desired. Clumps of these long-lived conifer species retain sufficient snow in their canopy to improve deer mobility, aid in predator avoidance, and improve access to food in the form of browse.
 - b. Increase secondary shelter (white spruce, balsam fir and white pine) when below 50% shelter goal.
 - c. Enhance food conditions during winter through winter timber harvesting and leaving tops.
2. If cedar and hemlock must be harvested and local browse conditions are favorable and site conditions are appropriate, implement a shelterwood with reserves to provide the highest probability to regenerate and recruit cedar and hemlock. Leave 70% or greater canopy coverage to provide winter shelter and emphasize the conifer component in future stands.
3. Ensure that secondary shelter species are maintained as a within-stand component to provide biological diversity and summer conifer shelter during winter.
4. Sustainably manage food resources (primarily aspen, birch, openings, upland brush, sugar and red maple hardwoods) to enhance availability of winter browse and spring food.
5. Manage forest openings in or within 1/4 mile of the DWC; south facing slopes are ideal locations.
6. In general, emphasize shelter in the west UP and browse in the east UP (Figure 7). **Key habitat types – cedar, hemlock, white spruce, balsam fir, white pine**

CONDITIONAL DEER RANGE

Conditional range are those areas of the UP and NLP that experience milder winter conditions compared to obligate range. About 13% of the UP-land area and most of the northern Lower Peninsula are classified as conditional deer range (Figure 5). The buck kill / sq. mi. is similar between UP and northern Lower Peninsula counties classified as conditional deer range (Figure 10). The greatest divergence in harvest occurs between 1987 and 1995, a period of expanded timber harvest in the UP and especially conditional deer range due to two major paper mills opening in Dickinson County (Figure 10).

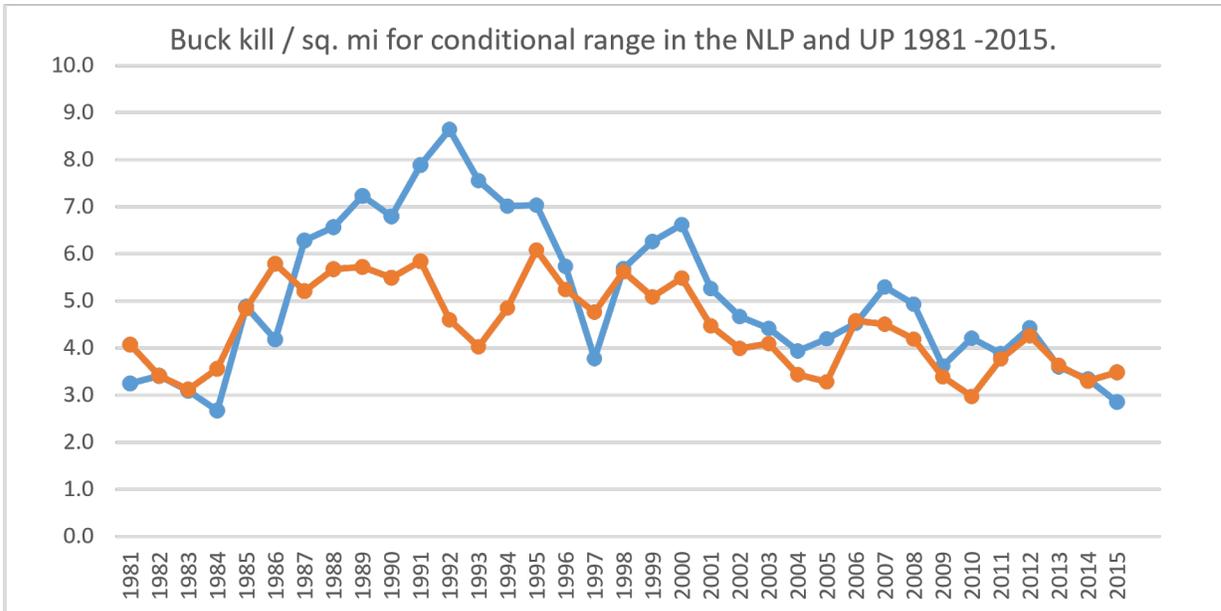


Figure 10. Buck kill per sq. mile for NLP and UP counties classified as conditional deer range.

Conditional migratory deer migrate only when snow cover is deep enough to prevent them from accessing their preferred herbaceous food, forcing them to switch to poorer quality browse. Conditional range is occupied by deer that move shorter distances to occupy suitable winter shelter and generally remain for a shorter period of time (compared to obligate migrators) during most winters. Deer may not seek winter shelter at all, if snow depth is low. Shelter species in conditional winter range include cedar and hemlock and unlike on obligate range, conifer species such as white pine, white spruce and balsam fir are suitable and often utilized by deer during the winter. Animals begin moving back to their summer ranges as soon as snow cover begins to recede. Maintaining primary and secondary shelter species is critical to minimize over winter deer losses during infrequent severe winter snow conditions.

Conditional Deer Summer Range Objectives

1. Maintain oak mast production at the highest practical, sustainable level. Acorns are the highest natural carbohydrate food available to deer in the fall.
2. Maintain, enhance or expand oak as a component in other forested stands for fall food.
3. Harvest aspen and northern hardwood stands during summer or winter depending on stand objectives and deer population goals.
4. Manage forest openings with mixtures of cool and warm season grasses to provide summer, fall and especially spring forage.
5. Maintain current openings and upland brush/shrub sites to meet the desired future conditions and goals identified in the Regional State Forest Plans.
6. Provide a range of size classes of openings, across a variety of sites exhibiting different moisture and productivity classes.

7. Maintain large opening complexes (barrens) on dry or dry-mesic habitat types due to the rarity of these once common conditions.

Key habitat types – northern hardwood, aspen, red maple, openings, upland brush, oak

Conditional Deer Winter Range Objectives

1. Maintain and sustainably manage existing primary (cedar and hemlock) and secondary shelter. High deer numbers and browsing pressure during winter generally preclude the recruitment of cedar and hemlock.
2. Functional conifer shelter stands should possess >50% canopy closure, grow on productive sites (site index >20 for cedar) and be > 30 feet in height.
3. If timber harvest is necessary, retain cedar and hemlock and implement a shelterwood with reserves system that retains >50% canopy closures.
4. If harvest of cedar is unavoidable, treat stands based on the amount of the cedar canopy closure:
 - 2-15% cedar canopy – harvest cedar, concentrate on leaving patches
 - 16-45% cedar canopy - harvest short lived tree species and leave cedar
 - 46-100% cedar canopy – no harvest of any species
5. Emphasize maintaining or expanding secondary shelter (white spruce, balsam fir and white pine).
6. Use appropriate silvicultural methods to increase the conifer component in stands exhibiting mixed conifer–hardwood conditions. The red maple wet-mesic to mesic stands appear to offer the best management opportunity for increasing conifer shelter.
7. Manage aspen and hardwoods on shortened rotations, make timber sales as small as economically possible and distribute harvests across the landscape.
8. Emphasize conifer planting of white pine.
9. Attempt to schedule winter harvests every entry period and extend as much as possible.

Key habitat types – upland spruce/fir, lowland conifer, northern hardwood, aspen, red maple

RESIDENT DEER RANGE

Resident deer range consists of the southern Lower Peninsula of Michigan and the eastern counties of the NLP. Due to the mild winters and reduced snow depth, deer may use woodlots, riparian corridors, or almost any clump of shrub or tree species providing adequate shelter. During the few years when snow persists, hardwoods in addition to conifer tree species appear to provide adequate shelter. Because there aren't clearly defined summer and winter habitat requirements for the southern Lower Peninsula of Michigan, habitat management objectives are recommended for the entire region.

Resident Deer Range Objectives

1. Maintain or expand escape and winter shelter by maintaining existing wood lots and shrub areas plus hardwood and conifer vegetation along water courses.
2. Work with local conservation Districts to initiate tree and shrub plantings.
3. Encourage openings and upland brush sites on state and private lands to benefit deer and to enhance biodiversity for early successional habitat.
4. Ensure a variety of acreage size classes are available for openings, and emphasize the larger the opening the better for deer.
5. Emphasize hunter access programs to private lands.

Key Habitat Types: openings, upland brush, aspen, oak, mixed hardwood and conifer, northern and southern hardwoods

1. DWC (directed by DWC plans and SFDWR guidelines)

1. Through review process/timber specs

1. Conservation of cedar and hemlock (defer harvest)
2. Enhancement of oak, white pine, white spruce, balsam fir in stands
3. Winter cutting aspen/maple and leaving of tops

2. Intensive

1. White pine, white spruce and balsam fir plantings
2. Opening maintenance for spring forage

2. Conditional range (Summer range)

1. Through review process/timber specs

1. Conservation of cedar and hemlock (defer and slot limits)
2. Enhancement of oak, black cherry beech in stands

2. Intensive (leverage with recreational and other species objectives)

1. Opening maintenance
2. Planting of oak, apple (sapling stock and/or fenced)

3. Non-winter range (Summer range)

Through review process/timber specs

1. Enhancement of oak, black cherry beech in stands
2. Aspen management

2. Intensive (leverage with recreational and other species objectives)

1. Opening maintenance
2. Planting of oak (seedling stock, large acres)

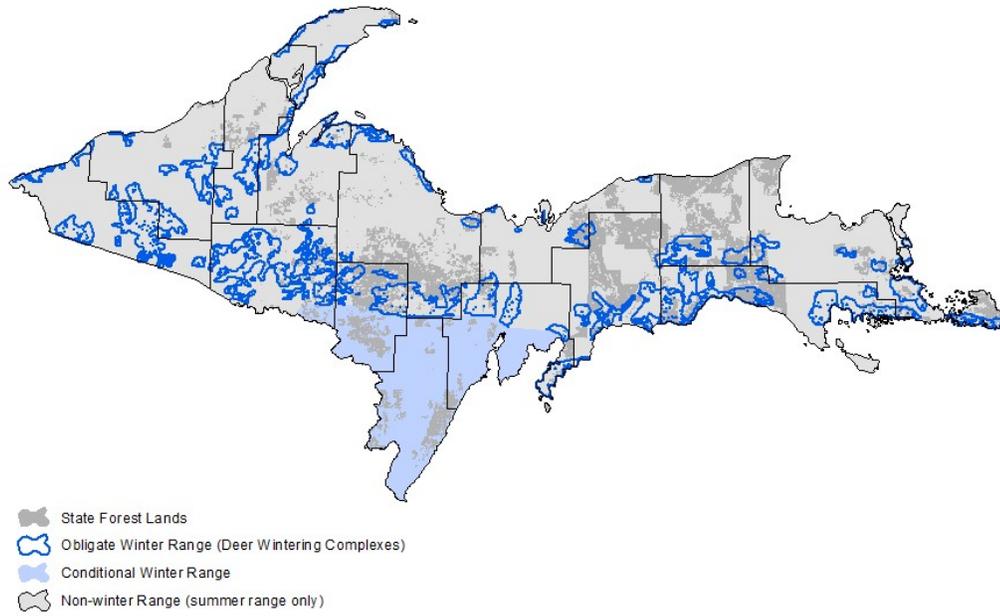


Figure 11. GENERAL SUMMARY OF DEER HABITAT ENHANCEMENT PROJECTS, BY DEER RANGE CATEGORY.