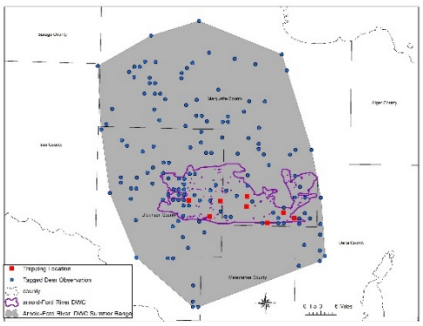
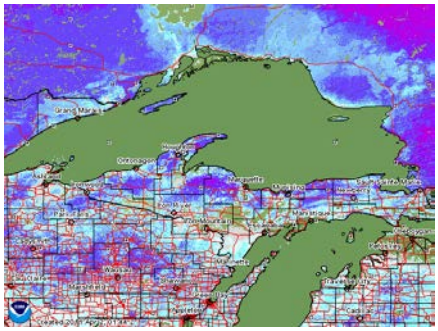
Deer Range Improvement Program (DRIP) Report

Michigan Department of Natural Resources (MDNR), 2017

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Background

Deer are the most recognized, best known and highly valued wildlife species in Michigan. Deer have been important to people and economies for hundreds of years. Reports of Native Americans harvesting deer for food and hides date back hundreds of years. Local rivers have been named for how Native Americans used rivers and built fences to "funnel" deer into enclosures making them easier to kill. During the late 1800's, loggers used deer for food and greatly reduced their numbers in Michigan. Deer are considered a "keystone species" because of the economic, social and ecological role they occupy. Deer prefer early successional forest during the snow free period and mature or old conifers during the winter period thus representing a wide range of plant and animal communities. The value of deer may be positive or negative based on a person's occupation and values. For example, farmers, deer hunters, and foresters, may have different opinions regarding how many deer are desirable.

The white-tailed deer is probably one of the most adaptive big game animals in the world. Although the species apparently evolved in a mild southerly environment, whitetails now thrive in a wide range of climatic and habitat conditions ranging from the southern fringe of Canada's arctic prairie southward into the Amazon rain forests of South America.

This wide geographic distribution attests to the whitetail's remarkable behavioral and genetic plasticity, and reflects its ability to cope with sharply contrasting environmental conditions—even over relatively short distances such as occur from north to south in Michigan

In Michigan, seasonal changes dictate many events in the whitetail's life cycle. Cycles of coat molt, antler growth, movement activity, metabolism, reproduction, and other sequences are closely regulated by photoperiod. These responses are critical if deer are to survive drastic fluctuations in food and shelter availability, brought about by the changing seasons, especially as occur in northern parts of the state where deer must endure harsh winter weather.

For example, whitetails are considered "short-day breeders" in that a decreasing ratio of daylight to darkness in autumn triggers changes in hormone secretions that start their reproductive cycle. The selective pressures to do so, however, are strongest on extreme northern deer range, where the whitetail's "breeding window" must be narrow and properly timed to assure that fawns are born on schedule and have time to fully develop before facing their first, and potentially last, winter. Obviously, such selective pressures regulating the time of breeding, as well as seasonal changes in food and shelter requirements, are not so effective where winters are not normally severe. On resident deer range in southern Michigan, even the progeny of late-breeding, late-birthing doe fawns (6 – 8 months old) can survive the winter season.

Given the whitetail's ability to adapt, it is not surprising that it has evolved diverse physiological and behavioral strategies, hence different lifestyles, to cope with the stresses imposed by the changing seasons.

Keep in mind, whitetails on northern range spend much of their lifetime preparing for, enduring, and recovering from hardships imposed by the winter season. Winter weather severity in conjunction with the quantity and quality of preferred deer wintering habitat, ultimately determines whether deer populations on northern range flourish or fail. Sometimes, however, the status of food and shelter resource availability during the snow-free months can tip the scales one way or the other.

It's important that landowners and resource managers understand how the physiological and behavioral needs of deer change with the seasons and how to manage habitat to best meet those needs. Our purpose here is to provide guidelines for deer habitat management, based on our current understanding of deer behavior and their adaptations for survival in Michigan.

History of the Deer Range Improvement Program (DRIP)

As far back as the 1920's, the Michigan Legislature recognized the importance of deer habitat when they passed an amendment to the Game Law of 1929 (Act 286, P.A. 1929) which could be considered the precursor of the present Deer Range Improvement Program (DRIP). This Act is known as the $1.50 Fund, as it set aside $1.50 from each deer license sold for the "purpose of acquisition, protection, development and maintenance of game refuges and public hunting areas." The act was repealed (Act 305 P.A. 1949) in 1949, but not before about $5,000,000 was spent on wildlife management and land acquisition.

Wildlife Division has public trust responsibility for managing deer in Michigan. Beginning in the 1930's habitat management emphasized supplementing the amount of natural winter food and consisted of planting trees and shrubs, winter tree cuttings and herbaceous food patches. Herbaceous plantings were soon halted as they were evaluated as non-effective. In 1946, an assessment of the tree and shrub planting programs indicated most plantings failed and benefits to deer were negligible. A successful program was "deeryard" cuttings which provided browse for deer when concentrated during the winter. Deeryard cuttings were evaluated as the best method for deer range management.

In 1969, the State Legislature approved the Recreation Bond issue (Act 108, P.A. 1969) which provided money for acquiring deer range lands, especially deeryard and deeryard edge. In 1971, a legislative act (Act 106, P.A. 1971) again allocated $1.50 from each deer license sold "for improving and maintaining deer habitat, for acquiring land for an effective deer habitat management program and payment of ad valorem taxes on lands acquired for effective management. Since 1971, management has emphasized improving habitat to increase the carrying capacity of the land for deer. Habitat management was based on mutually agreed treatments, proposed by foresters and wildlife habitat biologists, for each state forest. The goal of the program was to produce a state-wide deer population of 1,000,000 by October 1, 1980 and for each year thereafter. The 1971 DRIP program was guided by three main principles:

Habitat improvement will be done principally on deer winter range (those areas where deer can be expected to be found during the months of December through March in five out of seven years).

The major emphasis of habitat manipulation will be the maintenance of the intolerant types (aspen, oak, jack pine, upland brush and openings) and cedar, especially on the better soils.

The next most important emphasis will be to create and maintain an adequate distribution of suitable age classes on forest lands.

The 1971 DRIP program had five goals :

1. Forest/Brushland Management. Control forest succession and the forest type: strive for 35% of the upland in aspen, at least 65% of the uplands should be in intolerant types such as aspen, oak, jack pine upland brush and openings and a minimum of 25% of the uplands should be in the seedling-sapling stage.

2. Grassland Management. Maintain, develop or improve herbaceous food resources: at least 15% of the upland acreage should be in permanent openings or upland brush.
3. Deeryard Management. Maintain adequate winter food and cover resources: maintain approximately 25% of the deeryard edge in the brush-seedling-sapling stages.
4. Land Acquisition. Acquire parcels that add to deer range management effectiveness.
5. Priorities for managing the forest:
    - Commercial timber sales
    - Subsidized timer sales
    - Department project

    (Modified from Wood and Carlson)

The importance of deer to the residents of Michigan prompted this update of the 1971 Deer Range Improvement Program (DRIP). The original DRIP habitat guidance manual was produced in 1971. With the advent of improved analytical tools and 40+ years of additional information and experience, Wildlife Division staff recommended the DRIP manual be revisited and updated. This document and the linked outputs are the result of this effort. This new planning document includes several phases which address different issues associated with wildlife habitat planning and management including collaboration with other ownerships, land acquisition priorities, scalable methods for identifying and tracking desired future stand and landscape conditions, on-the-ground actions, and the monitoring, assessment and accomplishment reporting of management actions.

Deer distribution and abundance are influenced by the composition and arrangement of vegetation, which is influenced by site and landscape-scale conditions and disturbance factors. Site and landscape scale conditions include climate, soil, slope, aspect and disturbance factors and intensity. Landscapes may be dominated by agriculture, forest, grassland, and urban development, or a combination of them. At a smaller scale, forest management practices influence tree species diversity, age classes, stand densities, and horizontal and vertical structure. Management also influences the size, shape and spatial arrangement of forest habitat. The term “habitat” refers to the vegetation conditions present to meet the food, cover, water and space requirements of wildlife during different periods of the year.

Historically, fire, insects, disease, and wind throw were the primary natural disturbance agents of forests affecting deer habitat in Michigan. Starting in the mid-1800s, timber harvesting became the dominant factor influencing forest conditions and deer habitat. Natural disturbance and timber harvesting differ in their impacts on forests. Cutting rotations are usually shorter than natural disturbance cycles, and timber harvest usually results in fewer poorly-stocked and open areas and more rapid regeneration and fully-stocked stands of trees. Even-aged cutting rotations alter age-class distributions at the stand level and cumulatively, the landscape scale. Short harvest rotations and high utilization of trees influence species composition resulting in an increase of early successional deciduous forests, on both upland and lowland sites. As plant communities’ change, so do the wildlife communities’ associated with them. The wildlife species assemblage of the original pre-settlement forest differed greatly from that currently found in the state due to the shift in habitat conditions.

This project was completed in phases in order to facilitate the identification and addressing of specific issues related to management and planning for deer habitat. Information may be accessed two ways. The seven phases may be accessed individually via a dashboard allowing individuals easy access to

specific information that may be relevant to the user, or the entire document, including the seven phases, is available in this master document. The phases, and specific products related to the different phases, are identified in the following paragraphs.

Phase 1. Identify, map and verify the landscape-scale winter distribution of deer

Some of the earliest work by the Michigan Department of Natural Resources (MDNR, then the Department of Conservation) Wildlife Division field personnel entailed identifying, visiting and mapping winter deer locations (deeryards) across the Upper and northern Lower Peninsulas. Winter shelter and food were identified as the most valuable components of deer habitat. Winter severity was recognized as a bottleneck for deer. In general, summer (snow free) range can produce more deer than the winter habitat can support. Records exist dating back to the 1920's of field personnel estimating the number of deer in different areas of the state during the winter and mapping their location. This early survey work was used as justification by the Department for purchasing especially valuable deer winter habitat (deeryards) for protection from excessive timber harvest during the 1930's. These mapping efforts occurred regularly and historical maps were compiled and are now available in digital format for the following time periods: 1920's, 1930's, 1950, 1962, 1967, 1977-78, 2000 (EUP) and 2005 (WUP). The early work of field personnel was used as the foundation for the current re-mapping.

Goal for the Deer Winter Range Mapping Effort:

Create an updated Michigan deer winter range GIS layer, with verified Deer Wintering Complex boundaries. The term, Deer Wintering Complex replaces the "deeryard" term for those areas traditionally occupied by migrating deer. The boundaries of the winter range polygons represent the extent of wintering deer distribution including both food and shelter resources while recognizing there are spatial differences depending on winter severity and timber harvest activity from year to year. The focus was to define the outer boundary of deer distribution during winter, not the year-to-year or stand-to-stand differences within the boundary.

This project identified three distinct winter deer ranges based on the movement and/or migratory behavior of deer in response to the depth and duration of snow cover. The three deer ranges; obligate, conditional and resident. Obligate migrating deer occupy the northern portions of the UP and traditionally migrate from areas they occupy during the snow-free period to conifer shelter areas called Deer Wintering Complexes (DWCs). These DWCs function to mitigate deep snow conditions. Obligate migrators are obligated to move to suitably sheltered conifer areas to reduce the effects of deep snow.

Obligate migratory deer completely vacate their snow-free range and migrate to suitable winter shelter (DWCs). This behavior occurs in the northern portions of the UP where winters are consistently severe and occur about 8 years out of 10. Conditional migrators represent deer that move shorter distances and move more infrequently and for shorter periods of time, due to reduced snow cover. This type of movement behavior occurs in the southern UP and the northern Lower Peninsula (NLP) where typical winters are characterized as relatively short periods of snow with moderately severe winter's occurring only on average 1-3 years out of 10 years. Resident deer occupy environments with no snow or with less than 10 days with 12+ inches of snow cover. Resident deer are primarily found in the southern Lower

Peninsula (SLP) and the eastern counties of the NLP; however, a small proportion of resident deer may be found in DWCs and conditional landscapes as winter range overlaps with summer range.

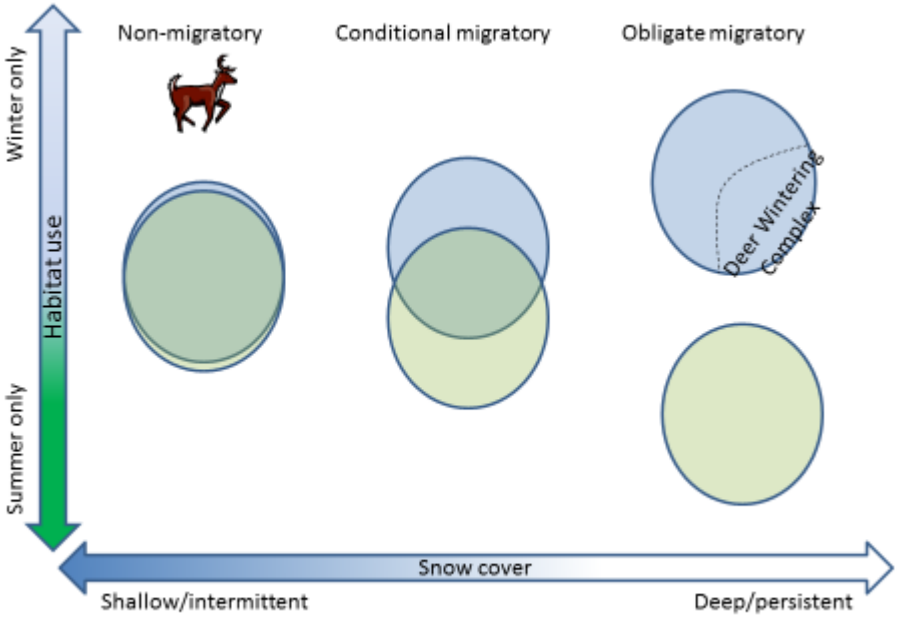

Figure 1. Conceptual diagram of the interaction on migration behavior of deer, snow cover, and habitat in the northern Great Lake region. Habitat consists broadly of forest with conifer canopies capable of providing winter cover (blue circles) and those that are primary deciduous (green circles).

With shallow and intermittent snow cover, deer do not migrate between distinct summer and winter ranges and variation in density is a function of habitat quality, predation and weather factors. Where snow cover is routinely deep and persistent, deer migrate between distinct summer and winter ranges and only portions of available conifer cover (DWCs) are used. When snow conditions are at an intermediate level deer can be non-migratory, migratory, or conditionally migratory (deciding to migrate only during relatively severe winters).

In most of the Upper Peninsula of Michigan, deer begin migrating to Deer Wintering Complexes when snow accumulates to about 12+ 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 40 days to 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 80+ days with greater than 12 inches of snow covering the ground. The UP winters of 1996, 1997 and 2014 lasted more than 100 days and were 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.

Process for identifying and mapping deer winter range:

1. Upper Peninsula (UP) biologists were asked to update hardcopy maps displaying 1978 and 2000/2005 DWC boundaries to define where deer presently occur on the landscape during winter.
2. Wildlife staff utilized aerial surveys, ground reconnaissance, and past knowledge to update maps.

3. Foresters within each state forest management unit provided suggested edits based on a review of the maps the biologists provided. Areas of disagreement on boundaries were identified on maps and given priority for verification.
4. Areas of winter deer occupancy that may have been missed during the mapping process were identified by using a modeled winter habitat layer derived from historic deer pellet count data, average winter severity scores, and dominant vegetation maps. These areas were also a verification priority.
5. A deer observation and a browse impact form were developed to provide documentation of wintering deer use during winter 2012-13. Emails were sent to staff in the DNR's Wildlife and Forest Resource Divisions to solicit input on winter deer verification in areas that might have been missed.
6. The line separating conditional and obligate winter range was determined using a combination of historic deer tagging data, winter deer observations and the deer winter habitat potential model. The line was drawn north of Menominee County and included parts of southeast Iron, southern Dickinson and southern Delta Counties. The results indicated that north of the line >50% of the deer are obligate migrators and south of the line, <50% of the deer are obligate migrators.
7. The outer boundaries of DWC polygons were smoothed by limiting the boundary to ¼ mile surrounding forest cover types that could provide shelter (cedar, hemlock, white pine, etc.). The intent was to eliminate areas that were unlikely to be utilized by deer in winter.

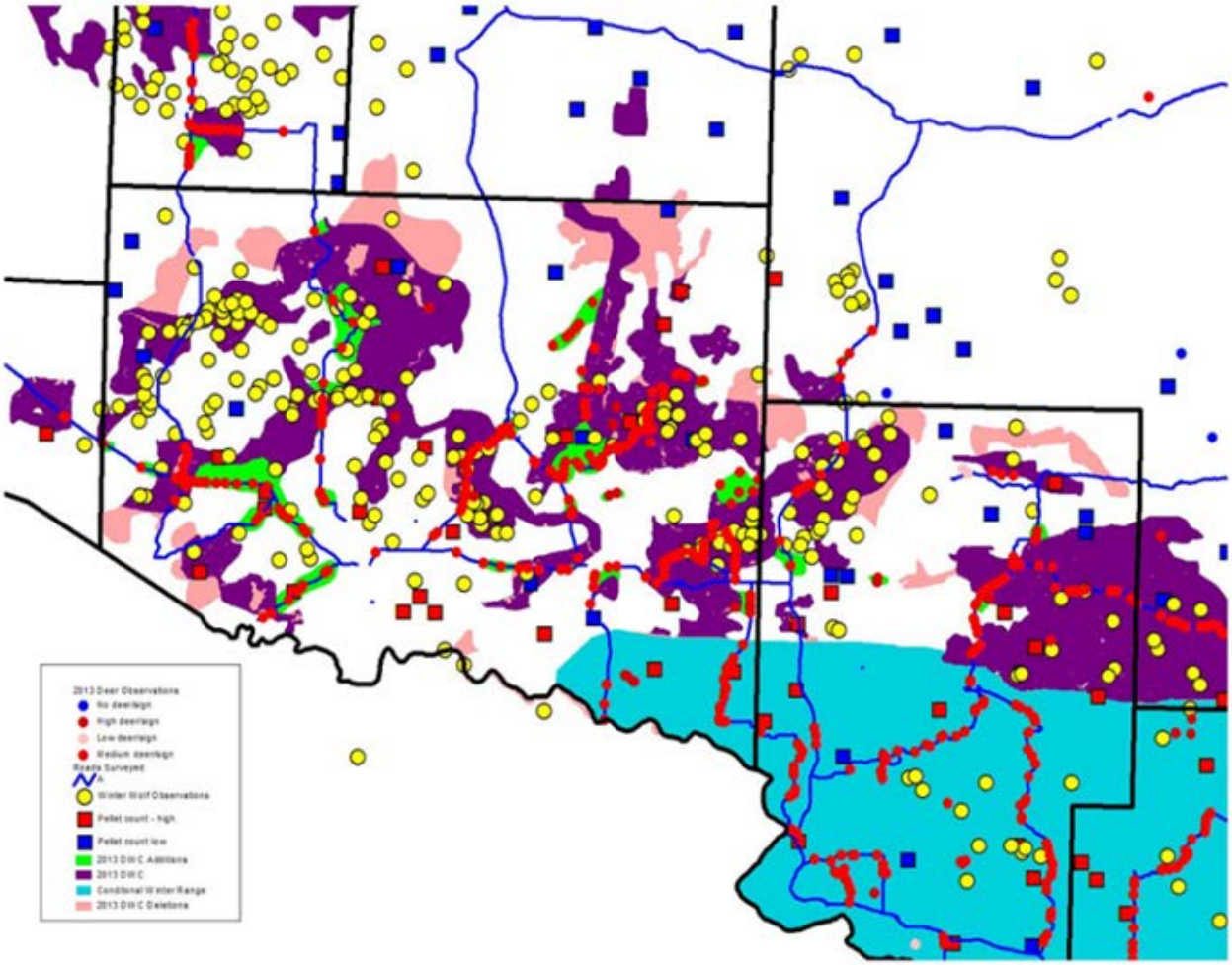

Figure 2. Example of information used to verify the boundaries of DWCs in Iron and Dickinson Counties. The color blue represents conditional deer range, purple represents DWC polygons, pink represents reductions in DWCs and green indicate additions to the DWC.

a. The boundaries of deer wintering complexes were changed, when warranted, and finalized based on the verification data listed below. 2013 winter observations (aerial and ground based) – Characterized as "None, Low, Medium and High."
b. 2000-present winter wolf locations
c. 2000-2010 high vs. low deer pellet group counts
d. Historic DWC map polygons
e. Deer marking and observation data

Boundary Change Rules:

1. Polygons were considered verified if deer observations were recorded inside the polygon, or multiple sources of historic data indicated they were still being used by wintering deer.
2. Polygons that could not be verified with existing data were removed if the state or federal biologist could not confirm wintering deer using the area.

3. Portions of verified polygons that were larger than the 2005 map depiction and did not have any 2012-13 deer observations or multiple historic data in those expansions were reset back to the 2005 boundary.
4. An addition to a polygon required “medium” or “high” deer sign or observations within a mile. In these cases the shelter patch of the observation plus ¼ mile was added to the polygon.
5. Isolated deer observations greater than 1 mile from a polygon were not added, nor were observations that appeared to be related directly to feeding or agriculture.
6. Boundaries were reduced if the only data on the boundary was negative (no deer/sign observed). In these cases, the boundary was moved back to the next shelter patch plus ¼ mile.

Results:

The verification process resulted in five polygons being removed, 5 polygon boundary reductions based on negative data, and 11 polygon lobe set-backs to 2005 boundaries. Twenty-three polygons had additions, and 4 new polygons were added.

Following approval of an acceptable boundary for the individual DWCs, the deer pellet group survey data were used to evaluate differences between DWCs, non-winter obligate summer range and conditional range in the UP. Conditional range had the highest mean number of deer pellet groups for the 1957 through 2011 period, with 21.3 +/- 16.5 pellet groups. Deer Wintering Complexes averaged 19.6 +/- 21.6 pellet groups per course and non-winter obligate summer range had the lowest pellet count with 8.8 +/- 12.3 pellets per course.

The line separating conditional and obligate winter range was determined using a combination of deer marking data, winter deer observations and the deer winter habitat potential model. The deer tagging and observation information, in concert with the snowfall data were used to estimate the percentage of deer that were migratory. If >50% of the deer that were captured and marked during winter in a DWC were observed outside of the DWC boundary, the landscape was considered obligate deer range. If <50% of the deer migrated out of the DWC, the landscape was considered conditional range. The boundary line between obligate (DWC) and conditional range was closely associated with a major snow contour, so the contour line was used as the boundary. It is worth noting that during mild winters the approximated boundary line moves north and during severe winters the boundary line moves south. The final boundary line was moved north of Menominee County and includes part of southeast Iron, southern Dickinson and southern Delta Counties to correspond to the snowfall contours and the recommendations of field personnel.

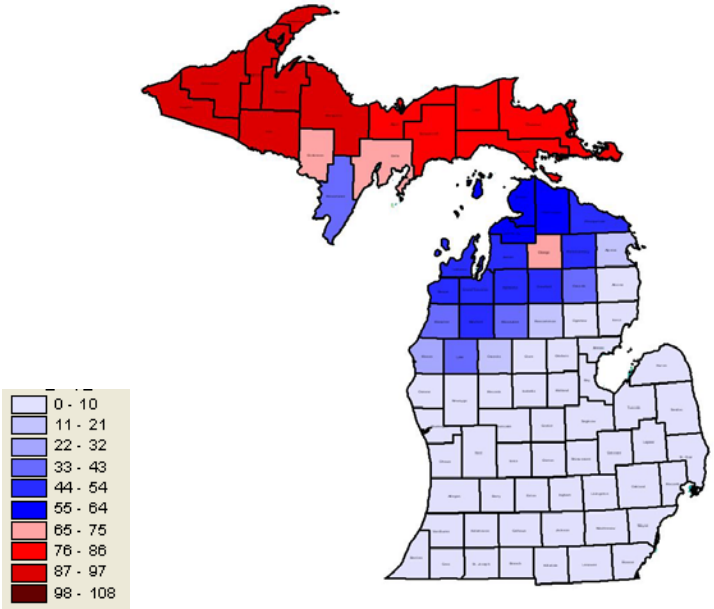

FIGURE 3. CLASSIFICATION OF MICHIGAN COUNTIES INTO OBLIGATE (RED), CONDITIONAL (MEDIUM BLUE AND PINK) OR RESIDENT (LIGHT BLUE) DEER RANGE USING THE NUMBER OF DAYS WITH >12 INCHES OF SNOW COVER.

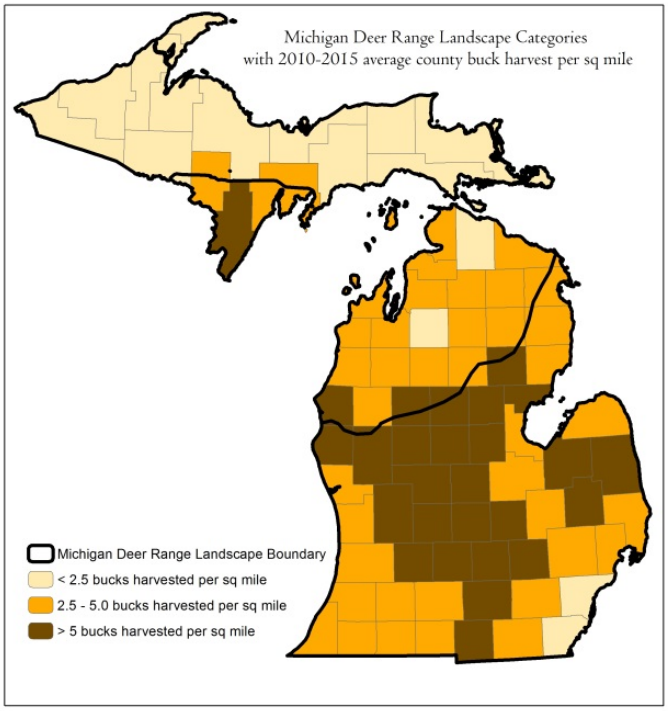

FIGURE 4. NUMBER OF BUCKS KILLED PER SQUARE MILE IN OBLIGATE, CONDITIONAL AND RESIDENT DEER RANGE CLASSIFIED COUNTIES.

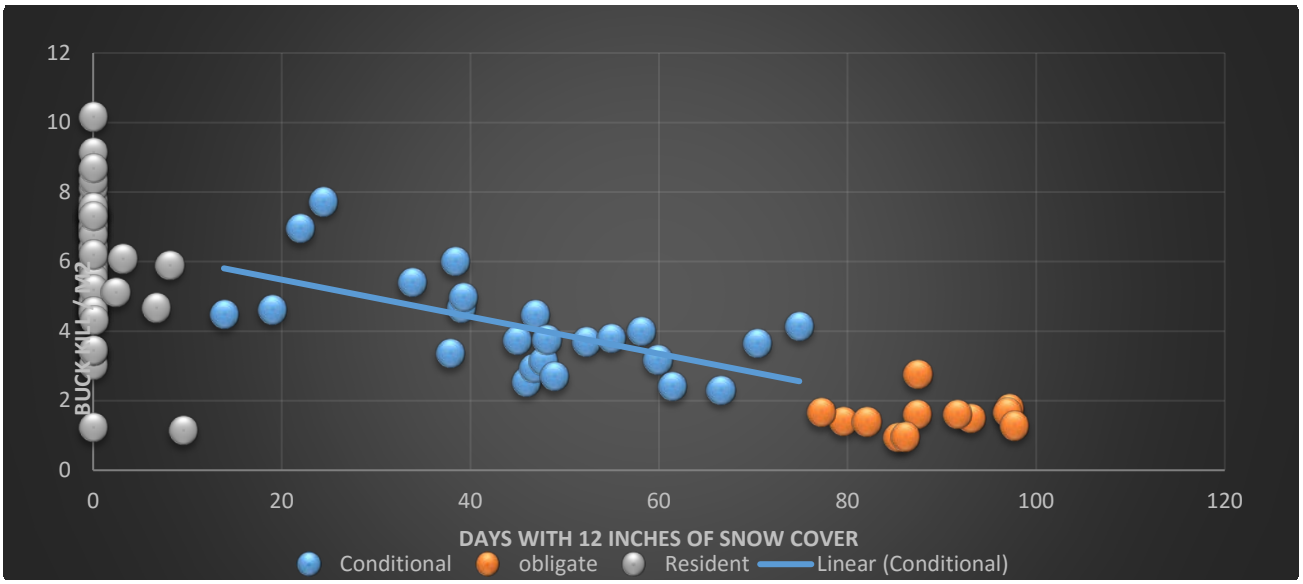

FIGURE 5. AVERAGE BUCK KILL/PER SQUARE MILE FOR COUNTIES CLASSIFIED AS OBLIGATE, CONDITIONAL OR RESIDENT DEER WINTER RANGE, 2000-2012

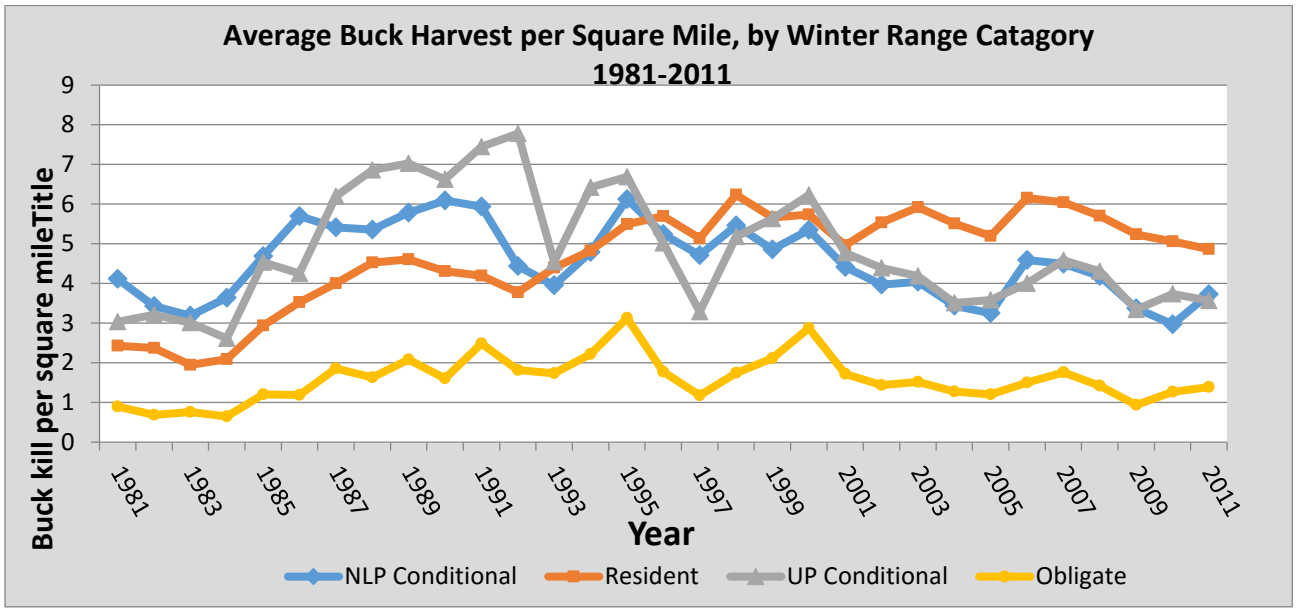

FIGURE 6. AVERAGE BUCK KILL PER SQUARE MILE BY OBLIGATE, CONDITIONAL NLP AND UP, AND RESIDENT DEER RANGE.

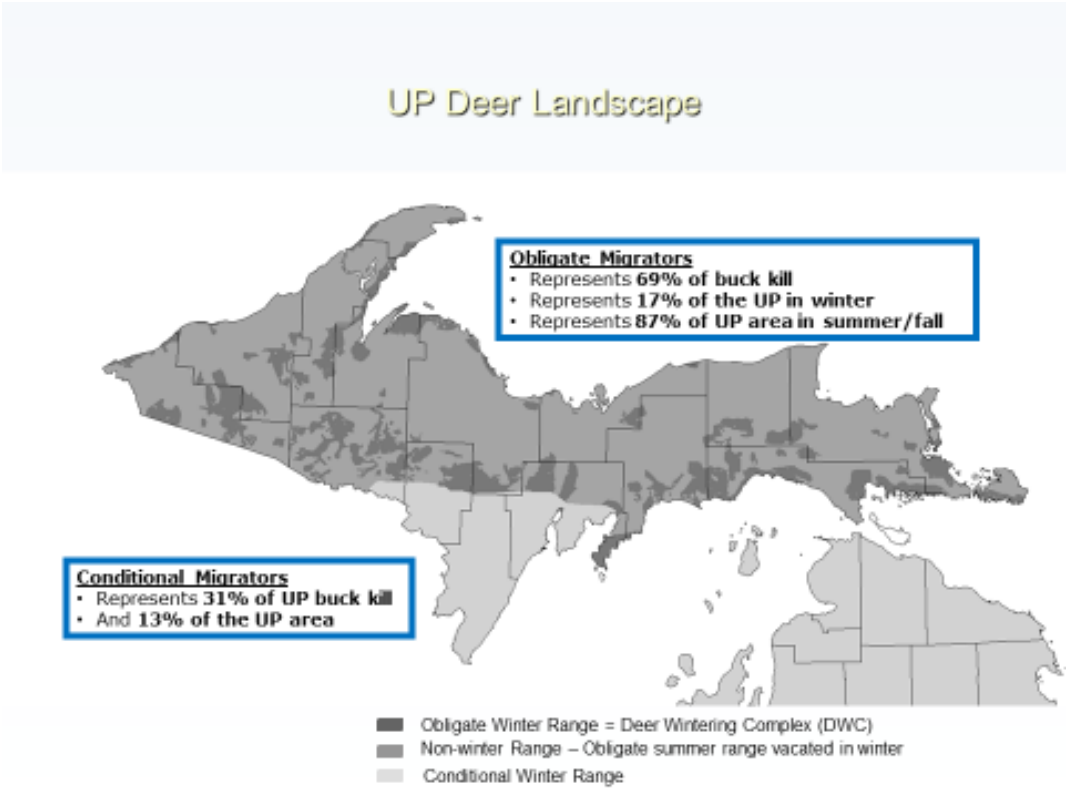

FIGURE 7. AVERAGE BUCK KILL 2001 - 2012 BY MIGRATORY CATEGORY

Obligate – Conditional Boundary Line

Classification of deer into obligate, conditional and resident deer range was based on snowfall and the animal's response to the depth and duration of snowfall. Counties were assigned to deer range categories based on the percent of the county being in the three deer range categories: Obligate range is indicated in red and maroon; Conditional range in pink and dark and medium blue, and resident range is indicated in light blue (Figure 3). Average buck kill / square mile from 2001 – 2015 is represented spatially in Figure 4 and graphically in Figure 5. The annual buck harvest from 1981 – 2011 demonstrates the differences in buck kill between counties assigned to different deer range categories and the similarity in buck kill for the UP and NLP conditional range (Figure 6). Conditional deer range represents only 13% of the land area of the UP but represents 31% of the buck kill (Figure 7).

In the low snowfall areas, representing landscapes receiving an average of 50 days or less with 12+ inches of snow, deer moved an average of 5.6 miles. In the moderate snowfall landscapes, representing those landscapes with an average of about 75 days with 12+ inches of snow cover, deer moved an average of 12.9 miles, and in the high snowfall areas, those receiving 90+ days with 12+ inches of snow, deer moved an average of about 16.8 miles (Figure 8).

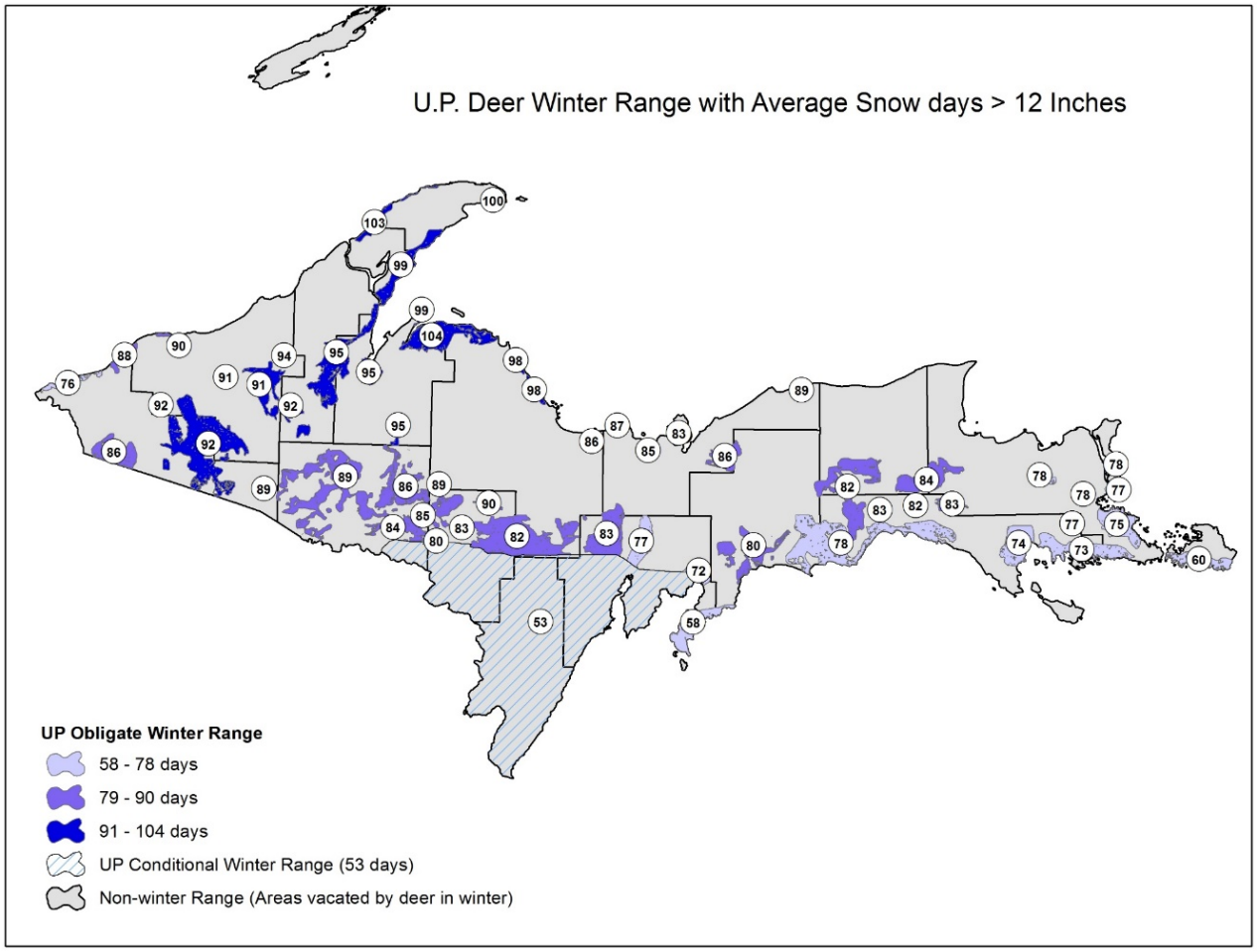

Figure 8. Average number of days with >12 inches of snow cover for Conditional Deer Winter Range and for individual Deer Wintering Complexes.

The occurrence, number and distribution of deer in a DWC is dynamic and depends on several factors including size of the deer population, snow depth, temperature and amount and distribution of available food. In low snowfall areas of the UP and NLP, deer can be classified as conditional migrators. Typical deer behavior in low snowfall environments is to remain on their snow free range during the winter and only move to conifer shelter during extreme weather events, such as periods of high snowfall or extremely cold temperatures. Under these conditions, deer may occupy suitable conifer shelter for a few days or weeks, until weather conditions moderate.

Deer may occupy and have their winter habitat needs met in conifer stands that function as suitable shelter in low snowfall areas, however, stands exhibiting similar characteristics may not function as suitable shelter in high snowfall areas. The most important environmental factor for deer living in high snowfall areas is the availability of suitable winter shelter to mitigate the negative impact of deep snow. Unlimited natural food alone, in the form of browse is insufficient to provide adequate energy for deer throughout the winter. They must have suitable shelter to reduce energy demands. The classification of

deer range in Michigan, based on deer response to depth and duration of snow cover (Figure 9) is supported by a deer observation survey developed to evaluate the categories (Figure 10).

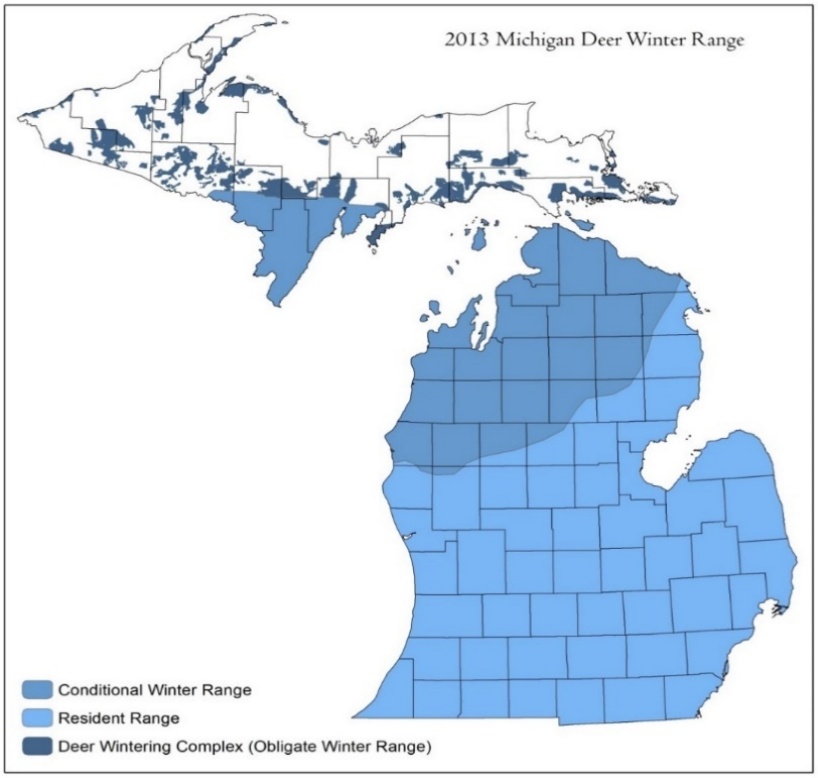

Figure 9. Final classification of Michigan into obligate summer and winter ranges, conditional and resident deer range.

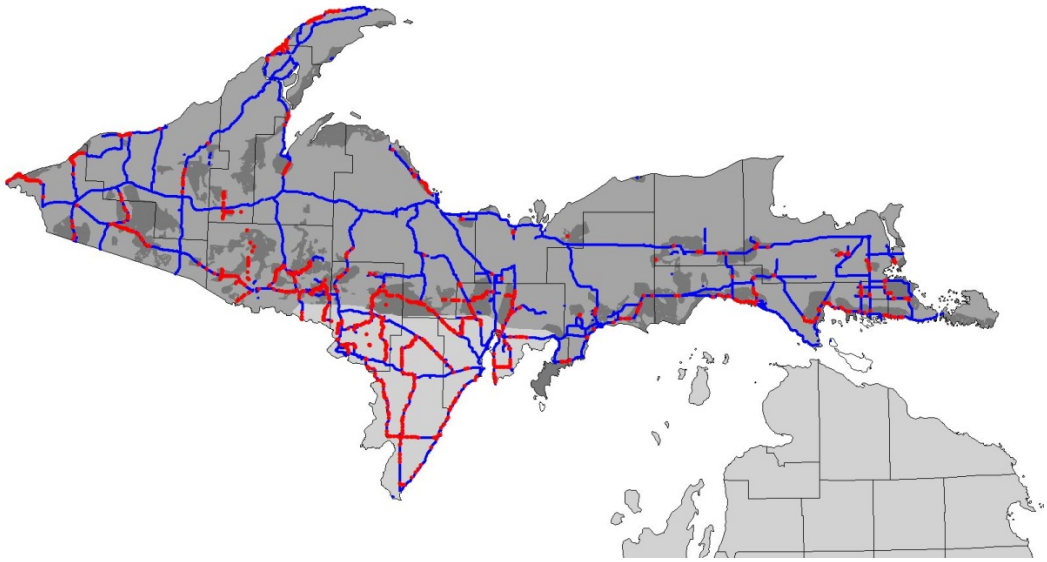

FIGURE 10. WINTER DEER OBSERVATION SURVEYS TO VERIFY DWC BOUNDARIES. RED INDICATES WHERE DEER SIGN WAS OBSERVED AND BLUE INDICATES NO DEER SIGN.

Phase 1 Status: Complete - Deer winter range categories established in Michigan Forest Inventory (MIFI) and ARCGIS service online

Products:

Description of Deer Wintering Complexes, Deer Wintering Complex County Maps, Wintering Deer Observation Form

Map of Deer Wintering Complexes (obligate range) in ArcGIS

Phase 2. Develop landscape-scale habitat management guidelines for the protection, enhancement and sustainable management of deer winter range on state forest land

The goal of Phase 2 was to collaboratively develop habitat management guidelines for state forest lands identified as obligate and conditional deer winter range. The Michigan landscape was classified into 3 categories of deer winter range: obligate (deer wintering complexes), conditional or resident. These categories are based on the migratory response of deer to the depth and duration of snow cover. A team of 8 personnel from the northern 2/3 of Michigan was assigned to the project by Wildlife and Forest Resource Divisions, and 3 meetings were held during spring 2013. Most meeting discussions centered on the importance and management of conifers for shelter for deer during winter. The management of cedar and hemlock were the most contested management issues. Recent silvicultural information indicated a partial cutting regime such as shelterwood with reserves or irregular shelterwood were favored over final harvest systems. Where deer numbers are high, in wintering complexes and on conditional range, harvesting of cedar or hemlock is not recommended. The long time frame these two preferred browse species require to grow out of reach of deer preclude potential recruitment. Discussion centered on life history characteristics of these species and the best silvicultural techniques for regeneration and recruitment. A slot limit for managing cedar was discussed and partially approved, however, the final agreement could not be reached. Final decisions were made at the regional level.

Phase 2 Status: Complete - Michigan State Forest Deer Winter Range Guidelines document

Products:

- Deer Winter Range Guidelines
- Description of Upper Peninsula Obligate and Conditional Winter Range and Map

Phase 3. Develop strategic habitat management plans for Deer Wintering Complexes (DWCs)

Recent consecutive severe winters (2012-13 through 2014-15) have resulted in declining deer numbers and concerns about winter shelter reductions in the Upper Peninsula. The Upper Peninsula Habitat Work Group (UPHW) was reconvened with new members and renewed efforts to address deer habitat in the UP with special emphasis on winter habitat. The new mission focused on improving and conserving critical U.P. winter deer habitat. The workgroup consisted of natural resource professionals, large and small private landowners and members of sportsmen's groups. The goals and objectives of this DRIP effort and the DHWG were similar and the collaboration produced improved outputs compared to only one entity.

The goal is to maintain or enhance conifer shelter for deer to conserve energy and to enhance deer mobility to obtain food and avoid predation.

The primary objective is to move toward 50% of the DWCs into conifer shelter with emphasis on sustainably maintaining functional primary shelter and increasing secondary shelter.

The second objective is to move towards 50% of the complexes into sustainable food stands.

The third objective is to make recommendations for broad-scale habitat guidelines for enhancing habitat conditions, especially winter habitat, for the 36 largest deer wintering complexes.

These plans address food and shelter resources across ownerships and propose habitat management recommendations based on the unique habitat condition of each DWC. The intent is to make recommendations for meeting the habitat goals and objectives identified for each DWC and to provide guidance for private and governmental landowners to manage their forest land to meet landscape scale DWC goals.

Phase 3 Status: Completed 36 DWC plans.

Products:

- Strategic DWC Management Plans for the Upper Peninsula
- Background on Deer Winter Range

Phase 4. Develop landscape and stand specific habitat management guidelines for summer and winter range for obligate, conditional and resident deer range. (Winter range guidelines were developed separately for state-owned land, in Phase 2).

The habitat preferences of deer change with the seasons. Habitat preferred in the snow free seasons are avoided in the winter due to the depth and duration of snow cover. Deer cannot meet year round habitat requirements on obligate summer range. They must find suitable shelter to survive the winter. Winter is the most difficult season for deer, and depending on winter severity and the depth and duration of snow cover, deer may not survive. Phase 4 provides guidance for managing summer and winter habitat for deer.

The presence, distribution and abundance of deer depends on their year-round environment. Deer function as an integral part of ecosystems and they respond to the different climate, weather, soils, habitat and other environmental factors. Deer occupying obligate range experience frequent periods of high snow cover for long periods of time. Conditional range deer experience reduced snow depths for much shorter periods of time, compared to obligate migratory deer. Resident deer in the SLP may not experience a single day with >12 inches of snow (Phase 1, Figure 4). Obligate migratory deer spend much of their time recovering from or preparing for winter.

Guidance recommendations are provided to address the landscape scale direction of habitat management for deer summer and winter range for obligate, conditional and resident animals.

Phase 4 Status: Completed guideline documents by December 1, 2017

Products:

- Michigan White-tailed Deer Landscape Habitat Management Guidelines
- Michigan White-tailed Deer Stand Specific Habitat Management Guidelines

Phase 5. Develop operational plans for State Lands within DWCs .

These documents serve as operational plans for the state forest portion of DWCs. They build on other efforts by consolidating information for the DWC strategic plans, into cover type-specific recommendations. These recommendations can be referenced by biologists and foresters during any portion of the habitat review process. The recommendations in the operational plans are consistent with white-tailed deer habitat management guidelines in the Regional State Forest Plans and featured species habitat management recommendations. Implementation of these recommendations will help meet featured species goals for deer and many other wildlife species.

Operational plans will guide stand specific management actions. The cumulative effects of the stand management actions function to address the desired landscape winter range goals and objectives for each DWC. For efficiency, the 180+/- forest stand types identified in the Michigan Forest Inventory System were combined into 10 key habitat types. The 10 key habitat types represent commonly used forest cover type terminology used by private landowners and various units of government. The operational level represents stand level decision-making which cumulatively address the goals identified in the strategic plans.

Operational opportunity assessment evaluates existing stand conditions and identifies appropriate management actions to achieve the desired DWC goals and objectives. Management actions may be either extensive or intensive for accomplishment and budget reporting, and for monitoring to evaluate if management actions produced the desired results

Extensive recommendations refer to those management actions agreed upon during the annual forest review process between Wildlife Division (WDL) and Forest Resources Division (FRD) and commonly implemented through the normal timber sale process and procedures. Examples include leaving additional residual to encourage conifer, or cutting all trees to encourage hardwood browse. Intensive management recommendations are those that require significant investment of WLD or FRD time and

money to achieve the desired future forest condition. Examples include opening construction and maintenance using mechanical or herbicide methods, prescribed burning, planting conifers for shelter, planting oak for mast production or planting shrubs for soft mast or to add diversity to openings.

Evaluation and monitoring are important issues that can be addressed through the operational planning process. Monitoring and evaluation consists of three parts; determining if the recommended habitat management action was implemented, was the treatment applied as proposed, and at 5 – 10 year intervals, re-visiting the site to determine if the treatment was successful in meeting the desired stand condition. Monitoring could be linked with deer population objectives. Ecological indicators of deer presence and abundance, such as browsing intensity, could be identified at the appropriate scale to link deer population trends with impacts on vegetation.

Phase 5 Status: Draft operational plans and processes being developed and reviewed by UP Region staff.

Products:

- The UP region will have at least 9 DWC operational plans developed from this effort.

Phase 6. Develop a system to evaluate and prioritize potential land actions.

In collaboration with the UPDHW, a process was proposed for evaluating and recommending future winter deer range purchases to the MDNR. A simple system for prioritizing DWCs does not address unique differences between parcels considered for conservation action nor does it address conditional range opportunities. A categorical ranking system is proposed with 3 DWC categories.

In addition to a categorical winter range rank, a numerical scoring process was suggested as the most appropriate method to incorporate the landscape scale winter range ranking along with other pertinent parcel scoring information.

Phase 6 Status: Incomplete, still in DRAFT stage.

Products:

- Draft prioritization document

Phase 7. Collaborate with the UPHW and FRD to inform corporate and small private landowners of the importance of deer winter habitat and aid with on-the -ground forest management actions benefitting deer, especially winter habitat.

An information exchange process for sharing information about managing habitat for deer with interested landowners and deer enthusiasts is being developed. Key to the process are the MDNR extension foresters and the Natural Resources Conservation Service (NRCS) Conservation District foresters. They represent the front-line, face-to-face contacts for

interacting with landowners. It is important for MDNR biologists to have regular contacts with NRCS District foresters to share information about winter and summer deer habitat management, management to enhance habitat for featured species and to share information about cost sharing opportunities. Biologists should be encouraged to attend and give presentations at Society of American Foresters (SAF) and other forestry related meetings to interact and share information with state and private foresters.

Information layers were developed and posted to the Michigan GIS website.

Phase 7 Status: Ongoing

Products:

Deer Winter Range Information

- UP Habitat workgroup information and online maps
- Michigan State Forest Deer Winter Range Guidelines

Forestry Links

- Michigan Forests
- **List of Conservation District Foresters by County**
- **Summary of forestry programs for landowners in Michigan**
- **Forest Stewardship Program** – provides management plan assistance
- **Natural Resource Conservation Service (NRCS)** - provides management plan assistance

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.
- **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.
- **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.

Tree sales –Most county conservation districts have spring tree sales including white pine, white spruce, hemlock and balsam fir.
List of local districts