MICHIGAN DEPARTMENT OF NATURAL RESOURCES
Wildlife Division
February 6, 2017

Winter Severity Index Report

Background Information

Deer are adapted to survive most Michigan winter weather conditions. However, research suggests that winter weather can affect deer mortality, fawn production, and deer physical condition (including antler development). Factors such as the quality and quantity of habitat types, deer population density, food availability, weather conditions of the previous summer, timing and duration of severe winter weather events, and timing of spring green-up affect the relationship between overall winter weather and the impact on the deer population. Deer may also avoid the worst winter weather by moving to wintering habitat that provides shelter from wind and snow and provides food sources to maintain energy reserves to counteract the effects of low temperatures.

Although the exact nature of a winter's impact on the deer herd can never be predicted, the Michigan Department of Natural Resources (DNR) monitors winter conditions by calculating a winter severity index (WSI). The WSI reflects the estimated effect of winter weather conditions on the energy reserves of deer; the higher the index value, the larger the potential impact on the herd. More severe winters may require deer to expend more energy than they have available or may require the deer to use energy stores for survival rather than fawn or antler production. Using the WSI can help DNR biologists understand potential impacts of winter weather on the deer herd.

The current WSI system takes advantage of standard weather data available from the National Climatic Data Center. The DNR uses weekly data on air temperature, wind speed, and precipitation from weather stations throughout Michigan and the surrounding area in a series of mathematical equations to calculate a weekly index value from November through April. The WSI values from individual stations are averaged across the three regions of Michigan to give a regional perspective on winter severity. The DNR plots these values over time to provide insight into the pattern of winter severity over the course of the winter and to identify severe weather events. Extended periods of severe weather and very early or very late peaks in severity tend to have the greatest effect on deer.

Due to the complexity of the relationship between the deer population and winter conditions, no single index can predict over-winter mortality, fawn production, or physical condition. Using the WSI as a tool to qualitatively evaluate winter weather severity, the DNR can identify winters that have the potential to severely impact the deer herd. DNR biologists may also measure snow depth and make field observations of deer wintering areas to assess winter mortality and winter physical condition. The biologists use the WSI and their field observations along with a variety of other information to assess the deer population and adjust annual harvest quotas and make management decisions.

Weekly 2016-2017 WSI Data

The figures below show the progression of the WSI throughout the 2016-2017 winter season (November through April). These figures will be updated weekly**,** but all values are preliminary until posted as final after the end of the season. All data are summarized by region; the three regions of Michigan are broken down according to the boundaries shown in Figure 1.

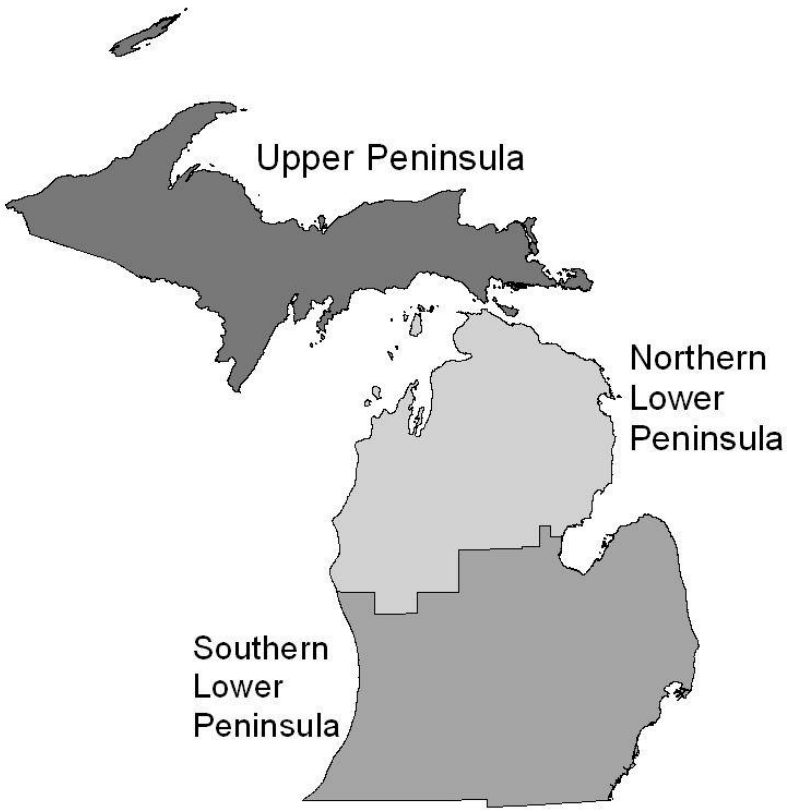

Figure 1. Regions of Michigan used in the winter severity index calculations.

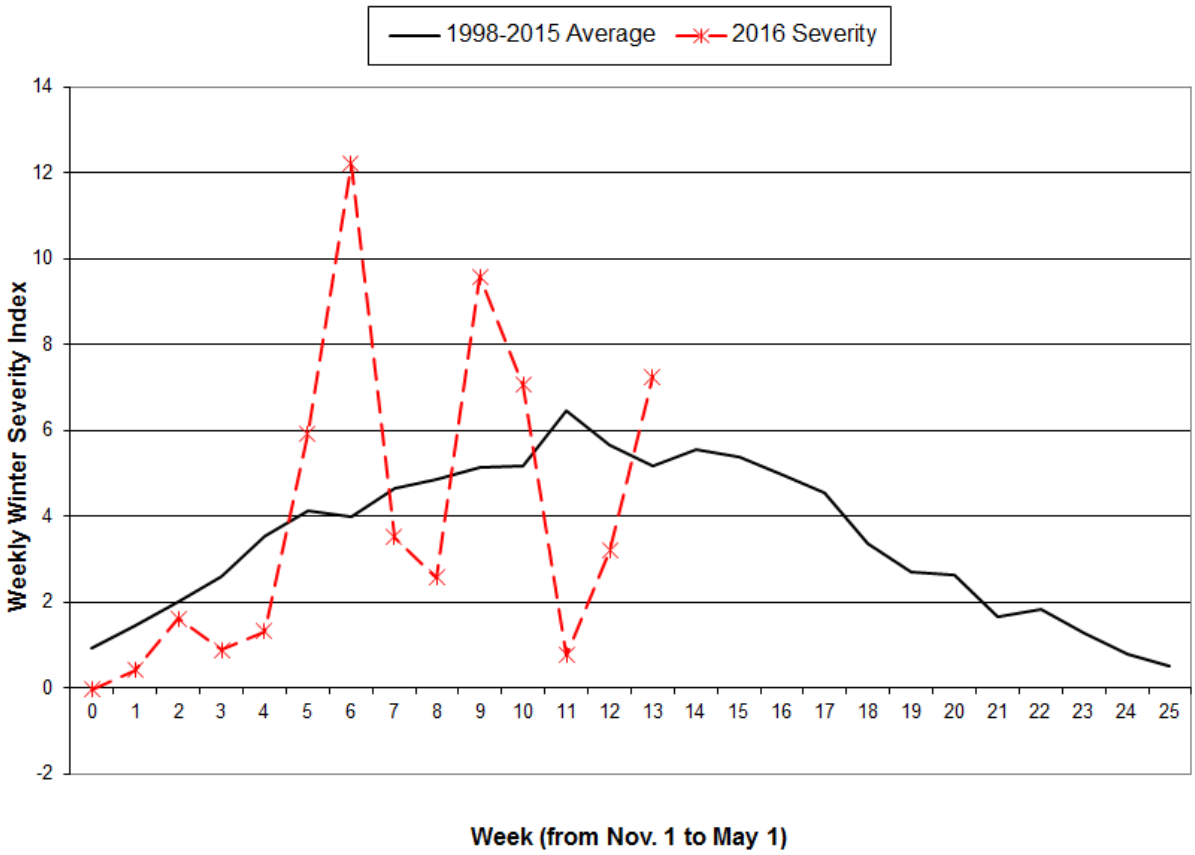

Figure 2. Winter severity index for the Upper Peninsula, 2016-2017 season. The graph shows the weekly regional WSI value for the current season (dashed line) and the average weekly regional WSI value for the 1998 through 2015 seasons (solid black line).

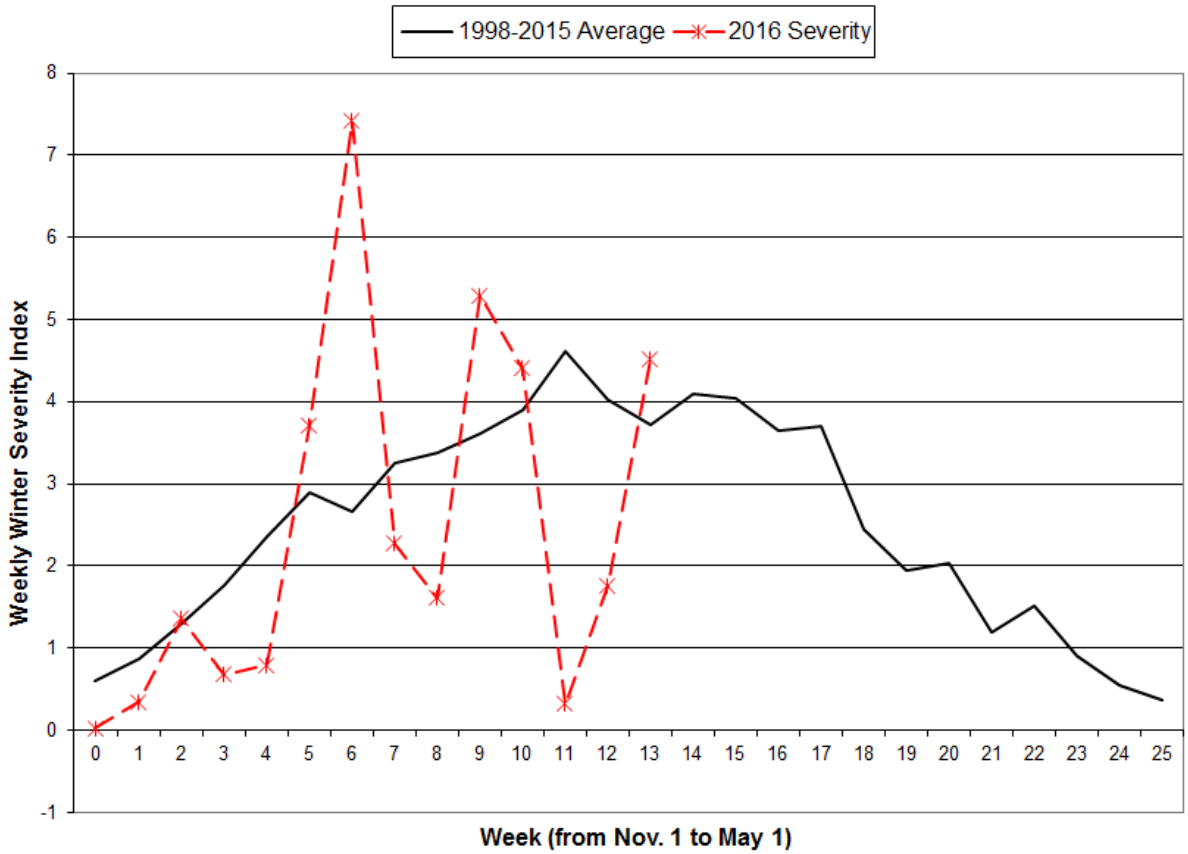

Figure 3. Winter severity index for the Northern Lower Peninsula, 2016-2017 season. The graph shows the weekly regional WSI value for the current season (dashed line) and the average weekly regional WSI value for the 1998 through 2015 seasons (solid black line).

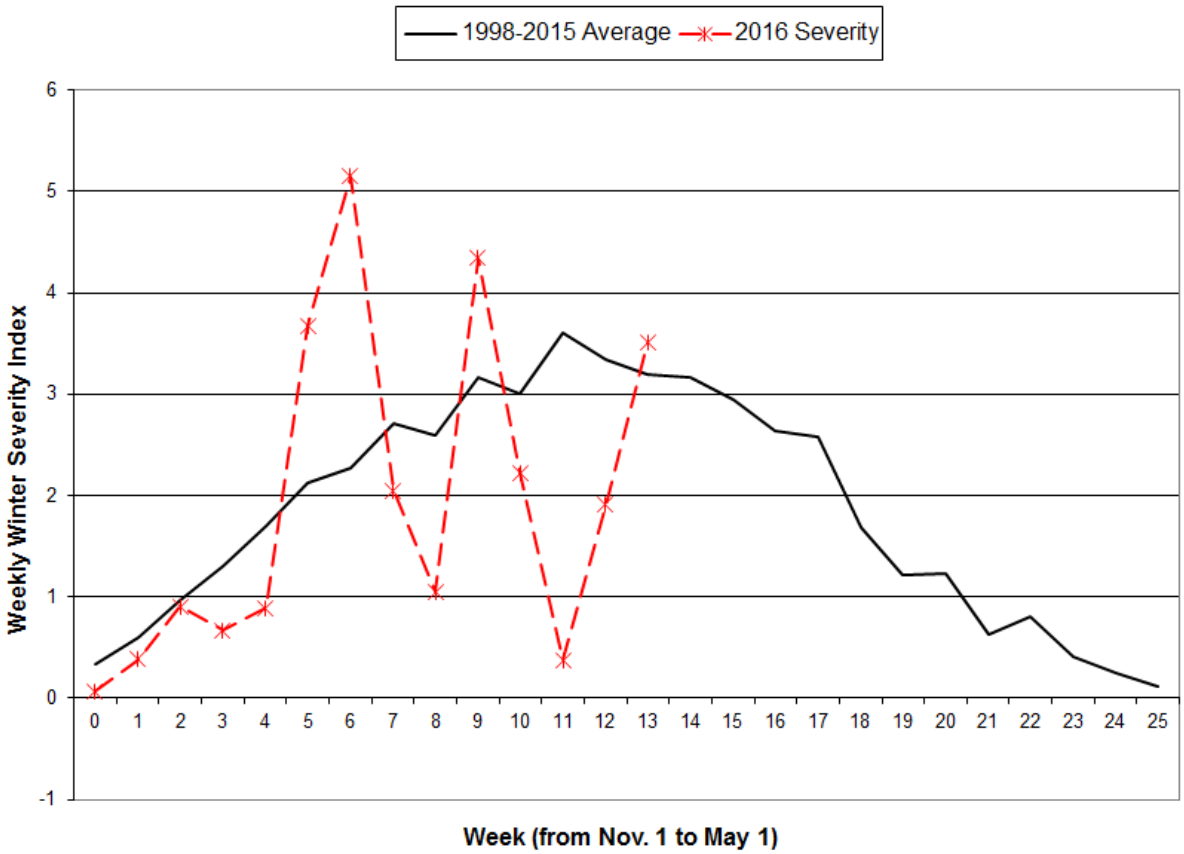

Figure 4. Winter severity index for the Southern Lower Peninsula, 2016-2017 season. The graph shows the weekly regional WSI value for the current season (dashed line) and the average weekly regional WSI value for the 1998 through 2015 seasons (solid black line).