Department of Natural Resources
SCI-MIC Supported Research Projects
2020 Progress Reports

Upper Peninsula Deer Movement Project

Project Background - Chronic wasting disease (CWD) occurs in free-ranging white-tailed deer in the Lower Peninsula, and in neighboring Wisconsin, where the disease is endemic. In October 2018, CWD was confirmed in in a 4-year-old free-ranging female deer that was removed on a crop damage permit in Dickinson County about 6 km from the Michigan-Wisconsin border. Additionally, CWD has been confirmed in several Wisconsin captive cervid facilities all within 50 km of the Michigan border, and five wild CWD positive deer have been detected in Wisconsin within 80 km of the Michigan border. Deer movements and abundance can influence the probability of disease occurrence, contact rates which can affect transmission rate, and geographic extent of an outbreak. Importantly, these data take time to gather and managers need this information to develop appropriate response plans. A scientifically based understanding of deer movements and estimates of population abundance along the Michigan-Wisconsin border is critical for developing management recommendations in response to CWD.

Progress 2020 - During 16 September 2019–15 December 2020 we monitored 118 collared deer captured during 2018 and 2019 in East Middle Branch (EMB), Little Girls Point (LGP), Lake Gogebic (LKG), or West Iron County (WIC) deer wintering complexes and the southern Dickinson County CWD core area (DNC). Collars transmitted 5,515 GPS location attempts, of which 4,580 were successful fixes (success rate of transmitted GPS fixes = 83.0%). Most migratory deer had started or completed their migration to their winter range by 15 December 2019 or their movements became restricted due to snow depth. The earliest migrations occurred in high snowfall DWCs (i.e., LKG and EMB) following substantial snow fall in November 2019. Though some deer did not migrate, they exhibited small shifts in their range between summer and winter and several returned to private lands where people feed them, especially in WIC, southern LKG, and DNC. Migratory deer continued to have high fidelity of returning to the wintering complexes in which they were captured. Exceptions included individuals that remained in exurban areas where feeding was prevalent (i.e., the cities of Ironwood and Iron River). Average 2020 deer winter space use (1.4 km^2), was similar to 2019 (1.5 km^2) and 2018 (1.6 km^2).

Snow depths remained sufficiently deep (≥ 30 cm [>12 inches]) to inhibit deer from leaving wintering complexes until 5–28 April in the low to high snowfall zones and when deer began migrating back to their summer range, though some deer did not complete migration until early May when most snow had melted. Most deer from LGP, LKG, and EMB migrated from their winter to summer ranges during this time, excluding individuals in WIC, the western part of LGP, and the southern part of LKG that were resident/non-migratory. We observed limited movements in DNC outside of winter home ranges, though most deer in this area were non-migratory and had substantial overlap of summer and winter ranges.

The greatest movements during 2020 from each DWC or the CWD core area were 20.2 km (12.6 mi) for Little Girls Point, 35.4 km (22.0 mi) for Lake Gogebic, 7.6 km (4.7 mi) for West Iron County, 43.9 km (27.3 mi) for East Middle Branch, and 21.3 km (13.3 mi) for the chronic wasting disease core area in Dickinson County. None of these movements were greater than previously observed movements from these wintering complexes.

We estimated migratory behavior of collared white-tailed deer during 2017–2020 using model driven classification of animal movement based on net squared displacement which classified annual individual movements as migrant (*n* = 114), mixed migrant (*n* = 59), disperser (*n* = 15), nomad (*n* = 5), or resident (*n* = 11). Though migration dates varied among years, mean date of migration to leave summer range was 7 December, arriving on the winter range by 28 December. On average spring migration occurred about twice as quickly with mean date of migration to leave winter range on 14 April, arriving on the summer range by 24 April ([visit our website to see figures of results]()). Mean distance between summer and winter ranges for migratory and mixed migratory white-tailed deer increased across DWCs with respect to greater snowfall (1.0 km [DNC], 6.9 km [WIC], 12.5 km [LGP], 23.8 km [LKG], and 32.4 km [EMB]). Average distance between ranges for dispersers was 5.9 km across DWCs.

To estimate deer abundance on the respective summer ranges, we deployed 50 cameras in unbaited arrays in the area occupied by each population (DNC, EMB, LGP, LKG, and WIC) during July–October 2018–2020. We deployed cameras on secondary roads, off-road vehicle trails, or deer trails placed at least 1.2 km apart to ensure independence among sites. Additionally, Michigan DNR Wildlife Management staff deployed cameras (*n* = 44) in an array within Deer Foot Lodge (DFL) wintering complex.

We completed image categorization and species determination for all photos captured as part of the 2018 and 2019 camera surveys for each study population. We estimated densities for each demographic of interest within each study area using the deer density application we developed. Deer densities were similar between 2018 and 2019 which is supported by similarities in survival between years. Deer densities differed across study areas when examined by snowfall zone where deer densities decreased with increasing snow depth. The greatest deer densities were observed in DNC (8.1 deer/km^2 [20.8 deer/mi^2]) and the least in LKG (3.6 deer/km^2 [9.4 deer/mi^2]). Buck to doe ratios tended to be greater with decreasing deer density, ranging from 1:3.3 in LKG to 1:1.5 in DFL and 1:1.7 in DNC. Doe to fawn ratios did not follow trends in deer density, ratios were greatest in LGP (1:1.0) and least in DFL (1:0.5).

During 16 September 2019–15 December 2020 we observed 43 mortalities (4 yearling males, 7 adult females, and 30 adult males). We attributed 36 mortalities to legal hunter harvest (3 adult female, 4 yearling males, and 29 adult males), 4 deer died due to a vehicle collision (1 yearling male, 3 adult females), 2 died due to starvation or exposure, and 1 adult male died after running into an electric fence. We collected the head from each mortality when possible and submitted them to the Wildlife Disease Laboratory (WDL) in Lansing, MI, to test for CWD and tuberculosis. In addition to the 32 mortalities, we censored 3 deer where we were unable to determine if a mortality occurred due to lack of evidence (1 adult female) and 2 cases where human interference involved a cut collar (1 adult female) or partial destruction of the collar (1 yearling female).

The absolute proportion of collared male deer that were harvested was less in 2020 (25.7%) compared to 2019 (38.3%) and 2018 (27.7%). The proportion of collared yearlings harvested was similar between 2018 (13.8%) and 2019 (14.8%).

Cumulative winter mortality during 1 January–31 May 2020 was similar to the same periods in 2018 and 2019 (3% difference) though late winter mortality events were less in 2020 than in 2018 and 2019. We did not collar deer during winter 2019–2020, thus fawns born during 2019 are not represented in the collared sample. When considering overall mortalities for the 2019 biological year (bioyear; 1 June–31 May) totals should only be compared to adult mortalities during bioyears 2017 and 2018.

We used Kaplan-Meier models to estimate survival during the bioyear for adult (>1-year-old) deer without staggered entry of newly captured individuals. Adult deer survival probability was similar between bioyears (0.77 in 2018; 0.75 in 2019). However, survival was 20–30% less for adult males as compared to adult females during both years. We will be unable to estimate survival for bioyear 2020 (1 June 2020–31 May 2021) as collars will not be collecting data during January–May 2021. For collared fawns, we estimated winter survival (1 January–31 May) with Kaplan-Meier models that included staggered entry but caution this is not comparable to annual fawn survival which is much less since these fawns were captured at 7–8 months of age and substantial fawn mortality occurs before 6 months of age. Winter survival for fawns was similar between 2018 (0.63, SE = 0.06) and 2019 (0.58, SE = 0.10) though survival probability for male fawns was greater than for female fawns during both winters.

Partners: Safari Club International-MIC, State University of New York College of Environmental Science and Forestry (SUNY ESF).

Timeframe and budget: The initial phase of this project is being conducted in the western UP with a duration of 4 years (FY2018-FY2021) with an estimated cost of $613,000. After completing this research in the western UP, parallel projects in the central and eastern UP will be proposed to develop this information for the entire peninsula.
