Department of Natural Resources
SCI-MIC Supported Research Projects
2021 Progress Reports

Project Title **- Deer Behavior and CWD**

Project Background - Effective CWD management strategies depend on understanding how disease spreads and grows on a landscape. While DNR and its partners have developed advanced models to estimate the spread and growth of CWD in Michigan, there is a critical need to inform the fundamental process that leads to disease transmission among deer. Transmission pathways for CWD are through direct (deer to deer) and indirect (environment to deer) contacts. This research is designed to quantify how the landscape, deer density, and artificial attractants, such as bait, influence where and to what extent deer congregate. It will also provide estimates of actual physical contacts among individuals, and the accumulation and persistence of deer feces. These are all factors that influence transmission of CWD, but we have very little sound data on any one factor.

Recent studies of CWD transmission pathways in white-tailed deer (Odocoileus virginianus) have focused on common patterns of within and between group interactions of radio-collared deer. These studies imply direct contacts by assuming that animals in close proximity in time and space have an opportunity to directly contact each other; however, direct contact is not observed and likely varies from predictions. In theory, this information is useful, but practical use is limited because direct interactions among a few individuals may fail to represent potential interactions among all deer in a population. For example, interactions among unrelated deer can increase with increasing group size and at concentrated food sources. Indirect contacts are particularly important because unrelated deer are less likely to temporarily occupy the same areas and congregation behavior of unrelated deer varies seasonally. A better understanding of how deer ecology and social interactions facilitate direct and indirect contacts among deer is critical for understanding CWD transmission within populations.

Existing estimates of indirect contacts among deer are based on overlapping space-use by collared deer and do not account for important processes such as the differential shedding of infectious agents. Infectious CWD prions from cervids are shed in feces, saliva, urine, and blood and remain infectious in feces for up to 7 freeze-thaw cycles. Quantifying the accumulation and persistence of feces in different habitats would be informative for understanding the potential for disease transmission through indirect contact, particularly in the Midwest where deer frequently congregate in agricultural areas in late winter and early spring. Seasonal congregation of deer influences localized deer density and may lead to increased bioaccumulation of feces and potential for increased fecal prion seeding. While deer in northern forested regions congregate seasonally in “yards” for thermal cover and food resources, these factors are not limiting for deer from agricultural regions. Thus, we want to know if there are predictable factors influencing deer congregations, social behavior, and associations in agricultural regions of the Midwest.

Direct and indirect contact behavior among deer may be facilitated or disrupted by the presence of bait, which has been shown to alter the movement behavior of deer. In the presence of bait, deer significantly shift space use, potentially increasing opportunities for direct and indirect contact. While changes in deer movement patterns have been documented, little is known about how direct contact behaviors, or the shedding of infectious agents differ in the presence of bait.

Given the controversial nature of baiting deer in Michigan, a better understanding of potential deer behavioral changes related to bait is warranted.

A critical need for CWD management is to identify what factors influence aggregations of deer in agricultural regions and to quantify how those aggregations influence direct contacts (i.e., physical contact behavior) and bioaccumulation of feces at scales relevant for newly developed agent-based models for CWD. Understanding factors that influence congregations in agricultural regions and how deer interact under these circumstances would assist in epidemiological modeling for population management and disease control actions. This research would represent a critical advancement in CWD knowledge, directly inform holes in existing disease modeling efforts, and have clear applications for CWD management.

Progress 2021 - The first field season of data collection was conducted from January 1 to April 30, 2021. We secured permission from 15 private landowners to conduct camera trapping at 10 bait sites and 6 food plots. Cameras recorded videos of deer behavior from January through the beginning of April. Presently, we are processing video footage from all cameras. We also conducted 346 roadside surveys observing deer behavior on 26 different, 3-mile long transects. We observed a total of 238 groups of deer and counted 1,162 individual deer. These data have been plotted in GIS to determine landscape-level patterns of congregation. Analyses of video footage and survey data are ongoing. Additionally, we will use data collected from roadside surveys in a distance sampling framework to estimate deer abundance on the study area.

We performed fecal sampling at all food plots and bait sites at the beginning of April. Following collection, we weighed the samples, dried them in an oven, and then reweighed them. Currently, we are performing statistical analysis to compare the dry weights between food plots and bait sites.

We conducted 2 infrared drone test flights in March 2021 to determine optimal conditions for flights to allow for a high level of confidence for identification of deer from images. Locations and landowner permission for drone flights during the second field season have been identified, and we will begin flying earlier in the 2022 field season.

We conducted one video Interview for Michigan State University Extension (https://www.youtube.com/watch?v=VisXeFUZNFo). Samantha also virtually attended The Wildlife Society Conference and gave a poster presentation titled: “Group size, bioaccumulation, and baiting: quantifying factors affecting chronic wasting disease transmission among deer.”

Partners - DNR, MSU-Boone and Crockett Quantitative Wildlife Center, SCI-MIC

Timeframe and budget - This project was initiated in winter 2021 and is now extended through 2024. Total cost of this project exceeds $400,000 plus in-kind services from MSU and DNR.