Wisconsin Deer Research Studies

Annual Report 2013–2014

Bureau of Sciences Services
Wildlife and Forestry Research Section
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STUDIES

1. Estimating survival and cause-specific mortality of adult male white-tailed deer in Wisconsin (study timeline: 2010–2015)

2. Impact of predation, weather, and habitat on white-tailed deer fawn survival in Wisconsin (study timeline: 2011–2013)

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CONTRIBUTORS

HIGHLIGHTS

Note: If deer survived to the May following winter capture we considered yearlings as adults and juveniles as yearlings.

Buck mortality study

- During December 2012 – April 2013, we radiocollared and ear tagged 37 adult males (≥ 1.6 years old) and 59 juvenile males (7–10 months old) in the northern forest study area, 30 adult males and 56 juvenile males in the eastern farmland study area.
- During December 2013 – April 2014, 37 adult males (≥ 1.6 years old), 61 juvenile males (7–10 months old) and 35 juvenile females were radiocollared and ear tagged in the northern forest study area, while 38 adult males, 52 juvenile males and 32 juvenile females were marked in the eastern farmland study area.
- 2013 annual adult male survival was 48% and 41% in the northern forest and eastern farmland study areas, respectively; hunter harvest was the greatest (67%-70%) source of mortality in both areas.
- 2013 annual juvenile/yearling male survival was 36% in both the northern forest and eastern farmland study areas; hunter harvest was the greatest (33%–50%) source of mortality in both areas.
- 2014 January – May 31 adult male survival was 89% and 91% in the northern forest and eastern farmland study areas, respectively.
- 2014 January – May 31 juvenile survival was 48% and 86% in the northern forest and eastern farmland study areas, respectively.

Fawn mortality study


DNR FILE

- During May and June 2013, we radiocollared 29 (10 males and 19 females) and 45 (24 males and 29 females) neonate fawns in the northern forest and eastern farmland study areas, respectively. We also ear-tagged 8 additional fawns in the eastern farmland study area.
- Fawn survival (to 6–7 months of age) was 44.8% and 57.8% in the northern forest and eastern farmland study areas, respectively.
- Most fawn mortalities occurred during mid-May and June. Among mortality causes, predation (68.8%) and starvation (47.4%) were the leading causes of mortality (6–7 month of age) in the northern forest and eastern farmland study areas, respectively.

Movements

- 30% and 55% of male deer (10–18 months old) dispersed in the northern forest (range: 1.5 – 22 miles) and eastern farmland (range: 1.0 – 20 miles) study areas, respectively.
- Fall yearling male dispersal rates and distances were similar between study areas; however, spring dispersal in the northern forest study area occurred at ≤ 50% the rate of spring dispersal in the eastern farmland study area.

Public outreach

- 189 volunteers helped with fawn capture over a 26 day period during May and June 2013.
- Since the project began in 2011, more than 1,000 volunteers from around the state and beyond have helped with the project.
- Our project website http://dnr.wi.gov/topic/wildlifehabitat/research/whitetaileddeer.html was updated with new information, including maps of buck movements and photos from the projects.

BACKGROUND

White-tailed deer (*Odocoileus virginianus*) are the most widespread and abundant cervid in North America, occurring throughout the contiguous United States except Utah[1, 2]. In Wisconsin, deer are a favored wildlife species among hunters and non-hunters and are considered a major factor in the state's recreational economy[3]. Wisconsin's deer herd is managed by adjusting harvest quotas relative to population trend objectives in established deer management units across the state. Broadly speaking, effective deer management strategies strive to balance ecological, social, cultural, and economic factors to maximize positive (while minimizing negative) impacts of deer on people and the environment. Understanding survival and cause-specific mortality factors is essential for accomplishing deer management objectives, particularly as it relates to population dynamics[4]. Thus, a greater understanding of mortality factors throughout Wisconsin's deer management regions will provide wildlife managers and decision makers with information critical for improving the state's current deer management program.

The Wisconsin Department of Natural Resources (WDNR) has relied on a mathematical formula known as the Sex-Age-Kill (SAK) model to estimate white-tailed deer populations in deer management units across the state since the early 1960s. These estimates formed the basis for management (hunting quotas) and have been a source of ongoing controversy with stakeholders (particularly hunters) for the past 50 years. A primary weakness of the model is that rigorous direct estimates of mortality in adult male deer, a key variable in the SAK model, currently do not exist. To improve the SAK population estimates, an independent review of the SAK model by an external review panel recommended that the WDNR implement a long-term radiotelemetry study to obtain direct estimates of the buck (male deer) harvest rate or its components (buck survival and cause-specific mortality rates) over multiple years and across varying habitat types[5].

SAK Background: The model is a procedure that estimates the pre-hunt population prior to the start of the annual hunting season, therefore population estimates are based on the number of deer available for harvest at the beginning of the hunting season. This method allows pre-season predation to be accounted for in pre-hunt deer population estimates. An important assumption of the SAK method is that the aged sample of harvested bucks represents the population age structure. This assumption could be violated if hunters actively select against harvesting bucks with smaller antlers (primarily yearling bucks) or if vulnerability to harvest is higher in yearling than adult male deer. The age structure of harvested bucks in much of the state, particularly in the farmland regions, has changed markedly since the 1990s with the percentage of yearlings in the harvest declining from 80–85% in the 1980s to 50–60% in the mid-2000s. Increasing interest among hunters in harvesting large antlered bucks during the past 10–15 years has raised concerns about possible hunter selection bias against yearlings. There is uncertainty about how much changes in harvest age structure reflects changes in hunter selection and how much is due to changes in mortality rates.

JOSH WEB

Recruitment, or the addition of new animals to a population, influences deer population change[6]. Recruitment is often influenced by many factors (e.g., winter severity or habitat), but predation is commonly believed to be a major influence in decreased recruitment rates[7]. Fluctuating populations of large predators including black bears (*Ursus americanus*), wolves (*Canis lupus*), bobcats (*Lynx rufus*), and coyotes (*Canis latrans*) in Wisconsin, have increased concerns of stakeholders and wildlife managers that fawn predation may be

limiting recruitment in Wisconsin's deer population. Predation of white-tailed deer fawns has been studied extensively throughout North America, yet no information currently exists on the potential effects of predation on fawn survival in Wisconsin.

DNR FILE

The DNR uses annual observation of August-September fawn:doe ratios to track recruitment rates. Fawn:doe ratios have generally declined statewide, and could be a result of increased neonatal mortality rates or decreased pregnancy rates and litter sizes. These factors are typically interdependent and can collectively influence recruitment. Although predation may affect fawn recruitment, predation rates may be influenced by the interaction factors (e.g., harsh winter or ground cover density) that predispose deer to predation[10]. Improved understanding of factors that influence fawn survival can help explain why recruitment has changed. Additionally, research evaluating the magnitude of cause-specific mortality and survival of white-tailed deer fawns in relation to winter severity and habitat would provide much needed information to wildlife managers for decisions of deer management strategies across Wisconsin.

DNR FILE

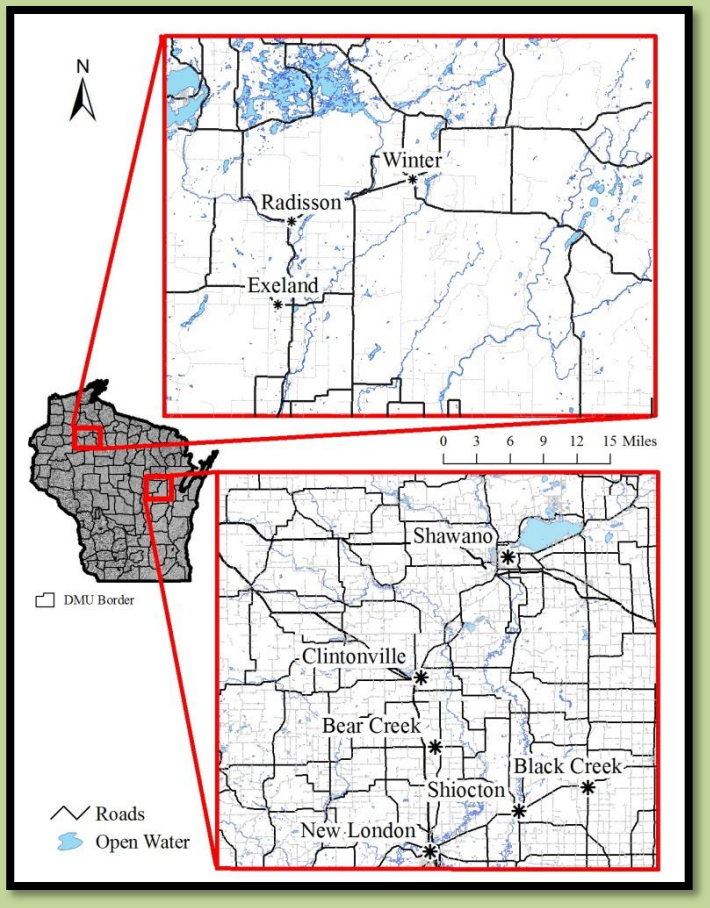
A primary goal of our research is to estimate survival and cause-specific mortality rates of adult male and fawn white-tailed deer in the northern forest and eastern farmland deer management regions of Wisconsin. Also, we are quantifying the influence of predation, weather, and potential habitat effects on fawn survival in these same deer management regions.

OBJECTIVES

1. Estimate monthly, seasonal, and annual survival and cause-specific mortality rates of fawn and adult white-tailed deer, with focus on neonates and adult bucks.
2. Evaluate movements, home range, and habitat selection of fawns and bucks.
3. Evaluate radiotelemetry as a technique for obtaining short-term direct estimates of buck harvest rates.
4. Develop an integrated population model for white-tailed deer.
5. Quantify dispersal characteristics of white-tailed deer.

STUDY AREAS

Research is occurring in two study areas within the northern forest and eastern farmland regions of Wisconsin. These areas were selected because of dissimilar habitat compositions and variability in buck harvest rates. The northern forest study area (3,557 mi^2), including portions of Sawyer, Price, and Rusk counties, is about 34% publicly owned land and about 80% forested with moderately rolling hills[11]. Comparatively, the eastern farmland study area (2,318 mi^2), including portions of Shawano, Waupaca, and Outagamie counties, is about 3% publicly owned land and about 35% forested with gently rolling hills of small woodlands interspersed throughout predominant row crop and pasture land. Road density is about 1.6 mi/mi^2 in the northern forest study area, compared to 2.6 mi/mi^2 in the eastern farmland study area.



The northern forest study area annually averages about 58 inches of snow, whereas the eastern farmland study area receives about 46 inches[12]. Annual temperatures are similar between areas, ranging between about 13–67°F. Post-hunt deer densities in the northern forest are between 15–31 deer/mi^2 of deer range (*i.e.*, land available to deer), but are to 44–80 deer/mi^2 of deer range in the eastern farmland (Wisconsin DNR, unpublished data). Hunting pressure on opening day of the 9-day gun deer season ranges between 8–15 hunters/mi^2 of deer range in the northern forest, but ranges between 21–36 hunters/mi^2 of deer range in the eastern farmland (Wisconsin DNR, unpublished data). Black bear, gray wolf, coyote, and bobcat are typical predators in the northern forest, whereas bobcat and coyote are typical predators in the eastern farmland.

CAPTURE AND SAMPLING METHODS

BUCK MORTALITY STUDY

Capture

Project staff used several methods to capture deer from December through March, including netted-cage (Clover) traps, box traps, drop nets (see SUPPLEMENTS) and darts (chemical immobilization). Once captured, adult and yearling (≥ 1.6 years old) and juvenile (7–10 months old) males were restrained and blindfolded to reduce handling stress. Juvenile females were radiocollared during the 2013-2014 capture period to improve juvenile survival estimates and to assess female dispersal. If necessary, antlered males were chemically immobilized and monitored for temperature, heart rate, and respiration rate. All deer were given uniquely-numbered metal ear tags and select males were fitted with expandable mortality-sensing radiocollars that allow

DNR FILE

Box trap in the northern forest study area.

for neck growth with age or during the breeding ("rut") season. Before release, chemically immobilized deer were administered a chemical that "reverses" the effects of the immobilization drugs. Deer collared as juveniles were considered yearlings once they survived to their 1st birthday and adults if they survived beyond their 2nd birthday.


DNR FILE

Chemically immobilized buck with blindfold.

Sampling

When available, we estimated several deer anatomical measurements (*e.g.*, chest girth, hind foot length), body weight, body condition, and age class.

Survival and movements

Movement and survival status of radiocollared males was monitored 1–2 times weekly using aerial or ground telemetry. We analyzed location data from male and female deer (10–18 months old) to assess permanent dispersal, defined as permanent emigration when post-dispersal locations did not overlap pre-dispersal locations [13]. Mortalities were assigned into categories, such as harvest, road kill, and predation. Identification of predator-specific mortalities was assessed using signs at kills (*e.g.*, tracks, hair, and tooth spacing) and the manner of predation. Researchers conducted field necropsies when available to search for presence of tissue hemorrhaging that indicates deer were alive when killed, thereby attempting to differentiate predation from potential scavenging events. When mortality cause was not evident, deer were sent to the WDNR Wildlife Health Laboratory for complete necropsy. Male movements were estimated using radiotelemetry locations to assess seasonal dispersal, migration, and habitat selection. Males are being monitored until death or until loss of contact with radiocollars. We estimated survival using the staggered-entry design of the Kaplan-Meier estimator[15] when the sample size exceeded 10 individuals. Juvenile winter survival in 2014 includes males and females as 2014 was the first year the project radiocollared juvenile females.


DNR FILE

Volunteers accompany DNR staff to help find neonate fawns. Staff then take measurements and place collars on the fawns.

FAWN SURVIVAL STUDY

Capture

Neonate fawns—during May and June 2013, fawns were captured opportunistically and during systematic searches around areas of probable fawning habitat (*e.g.*, grasslands and swamps). Fawns were blindfolded to reduce handling stress, fitted with expandable mortality-sensing radiocollars, and ear tagged with individually identifiable metal ear tags. Fawn radiocollars are designed to drop off after about one year. During the initial phase of the study, we fitted does with radiocollars and vaginal implant transmitters, to aid fawn capture.


DNR FILE

Measuring the weight of a neonate fawn.

Sampling

Neonate fawns—researchers recorded body weight, new hoof growth, sex, and estimated age at capture. Also, researchers recorded fawn handling time, fawn and dam behavior at capture, and presence of dam and/or additional deer during handling.

Environmental variables—researchers estimated vegetation structure, composition, and density at and around fawn capture and bed sites, and the distance of capture and bed sites to water and nearest habitat edge. These estimates were also collected at random sites across the study areas to assess if fawn survival is related to birth site selection of does and habitat variables which could influence deer nutritional condition and predation risk. Daily temperature and precipitation data for the period from the first fawn collared of the year through the end of August were obtained from the closest NOAA[14] weather stations to the study areas (Green Bay and Hayward, WI).

Survival and movements

We monitored radiocollared fawns daily through August and weekly after August using aerial or ground telemetry. Adult female and fawn mortality assessment and categorization followed the same protocol used in the buck mortality study. However, beginning in 2012 we submitted intact fawn carcasses to the University of Wisconsin–Madison, Department of Pathobiological Sciences for necropsy. Fawn survival was estimated using the staggered-entry design of the Kaplan-Meier estimator[15]. We assessed if survival differed between sexes, study areas, or years from birth to 16 weeks of age because most mortalities of fawns captured in 2011 and 2012 occurred before this date. Adult females and fawns are being monitored until death, radiocollars drop off (fawns), or until loss of contact with radiocollars.

RESULTS

BUCK MORTALITY STUDY

Northern forest 2012-2013

Capture

We captured 217 unique deer from December 12th, 2012 to April 1st, 2013, including 96 males and 121 females (Figures 1, 2). We radiocollared 92 males, including 37 adults (>18 months old) and 55 juveniles (7–10 months old). We recaptured 131 deer, including 54 females, 52 males and 25 unknown. We captured 160 deer with netted cage traps, followed by 40 with drop nets, 16 with box traps and 1 with dart guns. We captured 114 deer on industrial forest land, 69 on public land, and 34 on private land.

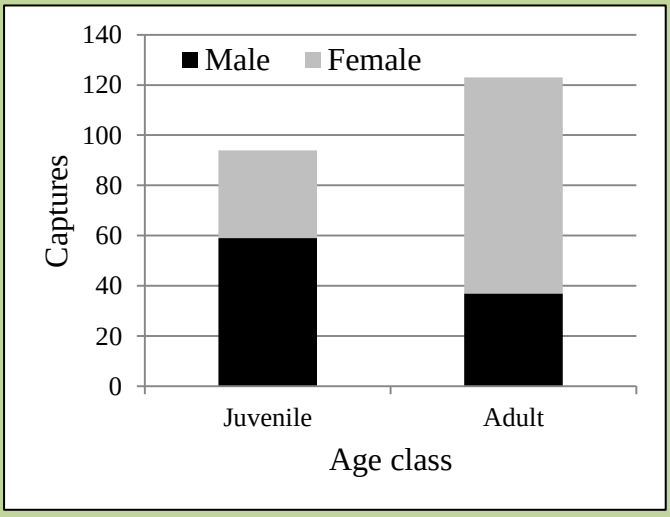


Figure 1. Juvenile (7–10 months old) and adult deer captures by sex in the northern forest, mid-December 2012 through April 2013.

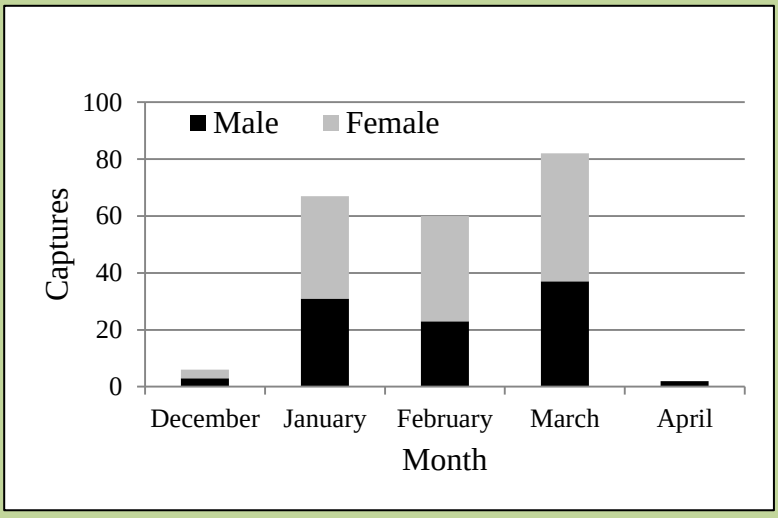


Figure 2. Male or female deer captures in the northern forest, mid-December 2012 through April 2013.

Mortality

Annual survival during 2013 for all radiocollared males was 42%. Eighteen of 51 adult and 33 of 59 yearling (*i.e.*, juveniles during winter capture) males died during 2013, representing 48% and 36% survival (Figure 3) for these cohorts, respectively. For adult males, hunter harvest (n = 12; [2 archery, 10 firearm]) was the greatest source of mortality, followed by coyote (n = 2) predation, wolf (n = 1) predation, starvation (n = 2), and poaching (n = 1). For male deer collared as juveniles, hunter harvest (n = 11; [10 firearm, 1 wounding]) was the greatest source of mortality, followed by starvation (n = 7), wolf (n = 6), coyote (n = 3) and unknown (n = 3) predation, road kill (n = 2), and poaching (n = 1). Winter survival (through May 31st) was 91% and 61% for adult and yearling males, respectively (Figure 4). Hunting season survival (through January 5th) was 53% and 56% for adult and yearling males, respectively (Figure 5).

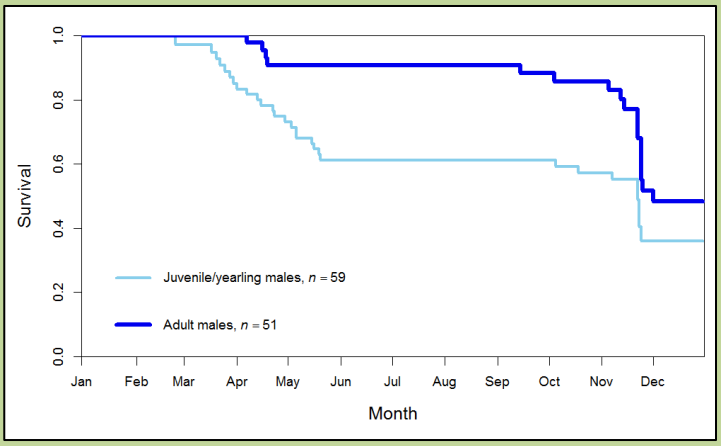


Figure 3. Annual survival[15] for juvenile/yearling (<18 months old) and adult (>18 months old) males from January 1st, 2013 through December 31st, 2013 in the northern forest.

Telemetry

We estimated 5,163 male locations as of December 31st, 2013, including a median of 27 locations/adult male (range = 1–72; n = 31) and a median of 30 locations/yearling male (range = 1–67; n = 43).

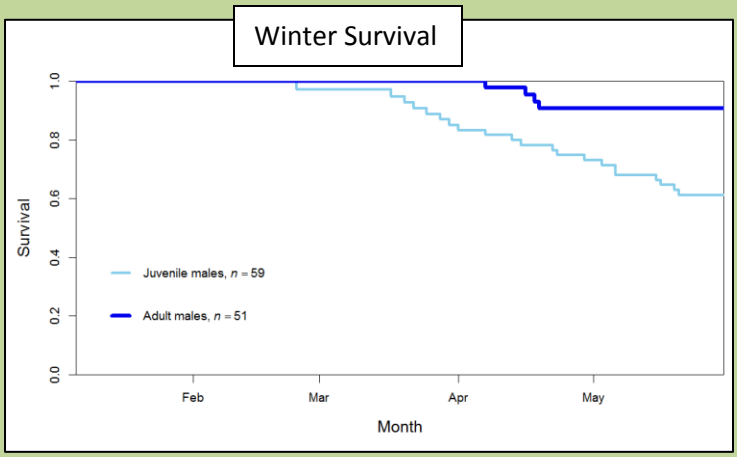


Figure 4. Winter survival[15] for juvenile (<18 months old) and adult (>18 months old) males from January 7th, 2013 through May 31st, 2013 in the northern forest.

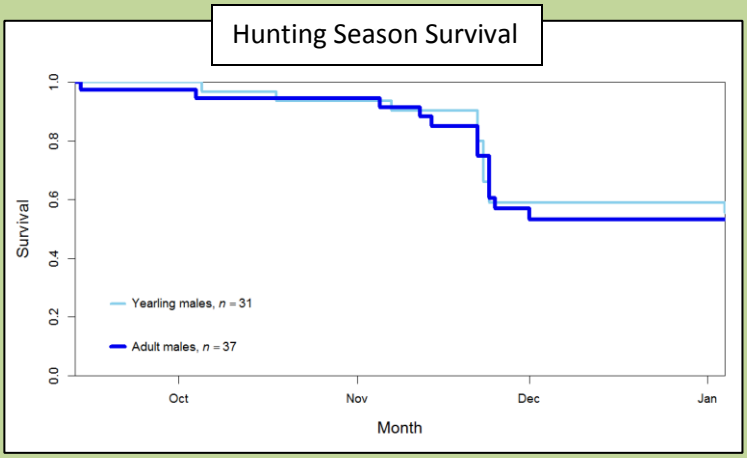


Figure 5. Hunting season survival[15] for yearling (<18 months old) and adult (>18 months old) males from September 14th, 2013 through January 5th, 2014 in the northern forest.

Northern forest 2013-2014

Capture

We captured 240 unique deer from January 8th, 2014 to April 2nd, 2014, including 98 males and 142 females (Figures 6, 7). We radiocollared 97 males, including 37 adults (>18 months old) and 60 juveniles (7–10 months old). We radiocollared 40 females, 7 adults (>18 months old) and 33 juveniles (7 -10 months old). We recaptured 120 deer, including 58 males, 60 females and 2 unknown. We captured 143 deer with netted cage traps, followed by 56 with drop traps, 34 with box traps and 7 with dart guns. We captured 124 deer on public land, 64 on industrial forest land, and 52 on private land.

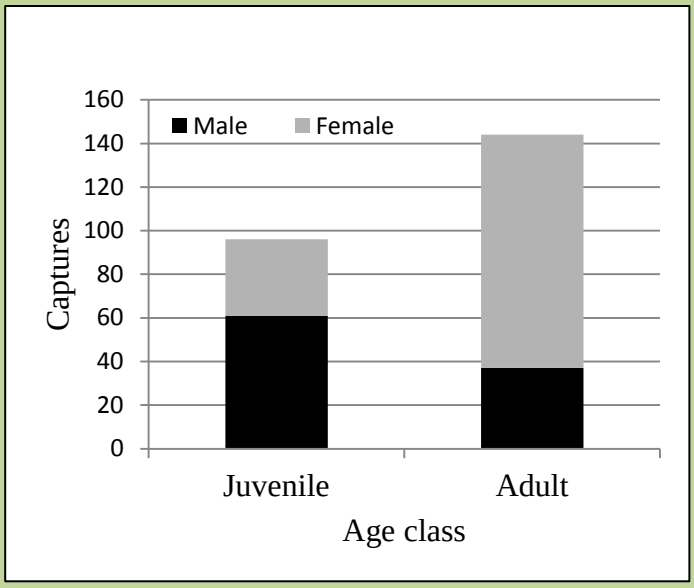


Figure 6. Juvenile (7–10 months old) and adult deer captures by sex in the northern forest, January 2014 through April 2014.

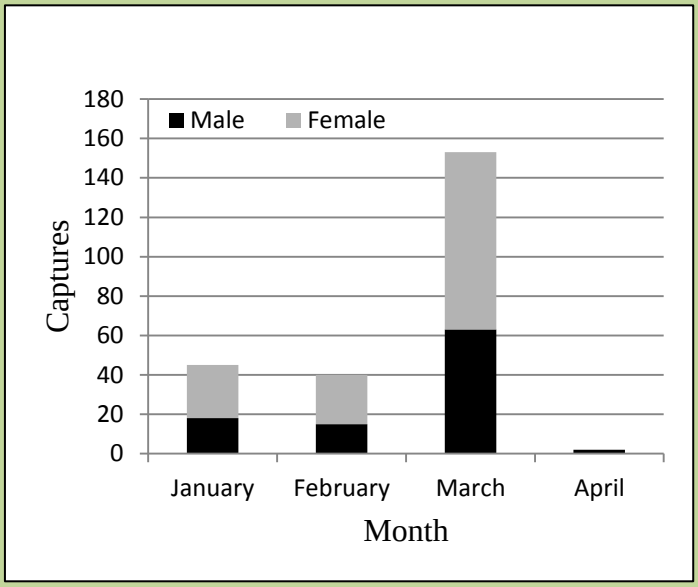


Figure 7. Male or female deer captures in the northern forest, January 2014 through April 2014.

Mortality

Six of 67 adult and 34 of 102 juvenile males died between January 6th, 2014 (end of hunting seasons) and May 31st, 2014, representing 89% and 48% survival (Figure 8) for these cohorts, respectively. For adult males, road kill (*n* = 2) was the greatest source of mortality, followed by bobcat predation (*n* = 1), coyote predation (*n* = 1) and wolf predation (*n* = 1) and starvation (*n* = 1). For deer collared as juveniles, coyote predation (*n* = 14) was the greatest source of mortality, followed by starvation (*n* = 6), wolf predation (*n* = 6), bobcat predation (*n* = 5), bear predation (*n* = 1), illegal harvest (*n* = 1) and road kill (*n* = 1).

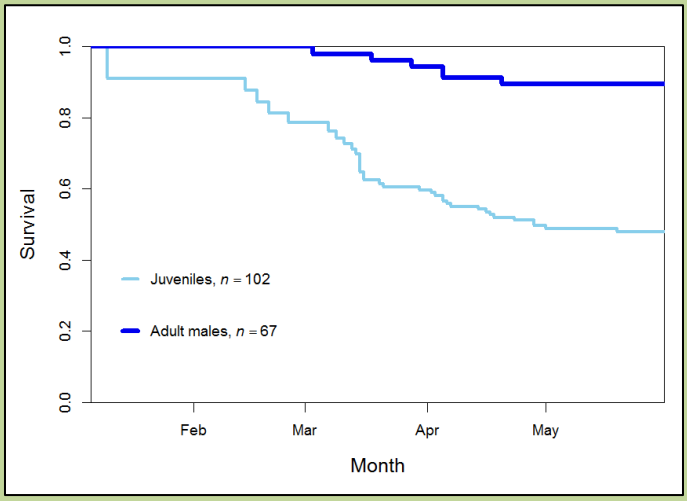


Figure 8. Winter survival[15] for juveniles (<18 months old) and adult (>18 months old) males from January 6th, 2014 through May 31st, 2014 in the northern forest.

Telemetry

We estimated 7,307 male locations as of March 31st, 2014, including a median of 25 locations/adult male (range = 1-98; *n* = 55) and a median of 27 (range = 1–67; *n* = 55) locations/male yearling.

Eastern farmland 2012-2013

Capture

We captured 144 unique deer from December 17th, 2012 through April 2nd, 2013, including 86 males and 58 females (Figures 9, 10). We radiocollared 83 males, including 29 adults (>18 months old) and 54 juveniles (≥ 7 months old). We recaptured 55 deer, including 27 males and 28 females. We captured 82 deer with drop nets followed by 55 with box traps, 4 with dart guns and 3 with netted cage traps. We captured 144 deer (100% of unique deer) on private land.

Figure 9. Juvenile (7–10 months old) and adult deer captures by sex in the eastern farmland, mid-December 2012 through April 2013.

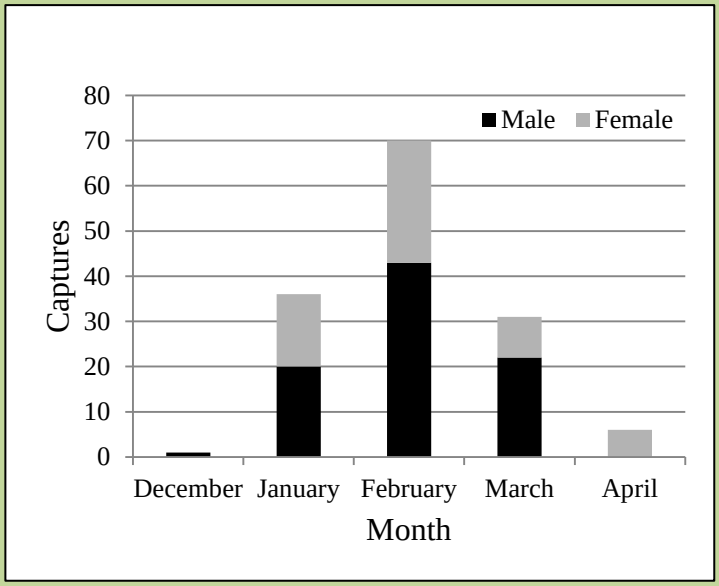


Figure 10. Male or female deer captures in the eastern farmland, mid-December 2012 through April 2013.

Mortality

Annual survival during 2013 for all radiocollared males was 38%. Twenty of 47 adult and 34 of 66 yearling (*i.e.*, juveniles during winter capture) males died during 2013, representing 41% and 36% survival (Figure 11) for these cohorts, respectively. For adult males, hunter harvest (n = 14; [5 firearm, 6 archery, 3 wounding]) was the greatest source of mortality, followed by poaching (n = 2), starvation (n = 2), other (n = 1) and unknown (n = 1). For deer collared as juveniles, hunter harvest (n = 17; [7 firearm, 4 archery, 6 wounding]) was the greatest source of mortality, followed by road kill (n = 9), starvation (n = 5), coyote predation (n =1), other (n =1), and unknown (n =1). Winter survival was 88% and 82% for adult and juvenile males, respectively (Figure 12). Hunting season survival was 49% and 45% for adult and yearling males, respectively (Figure 13). Eight adult and 15 yearling males were being monitored as of December 31st, 2013.

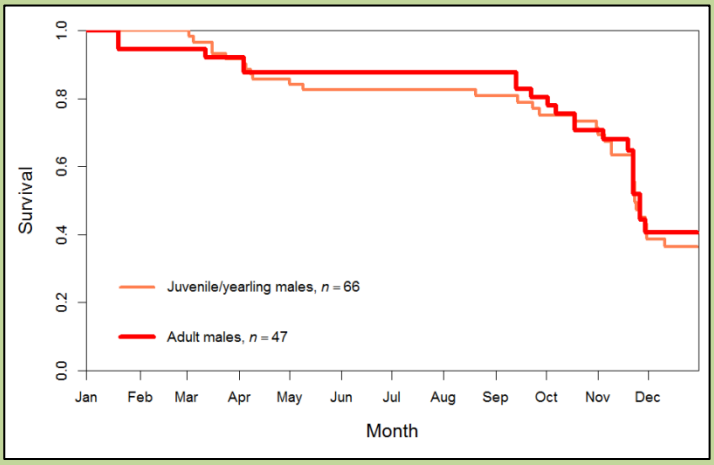


Figure 11. Annual survival[15] for juvenile/yearling (<18 months old) and adult (>18 months old) males from January 1st, 2013 through December 31st, 2013 in the eastern farmland.

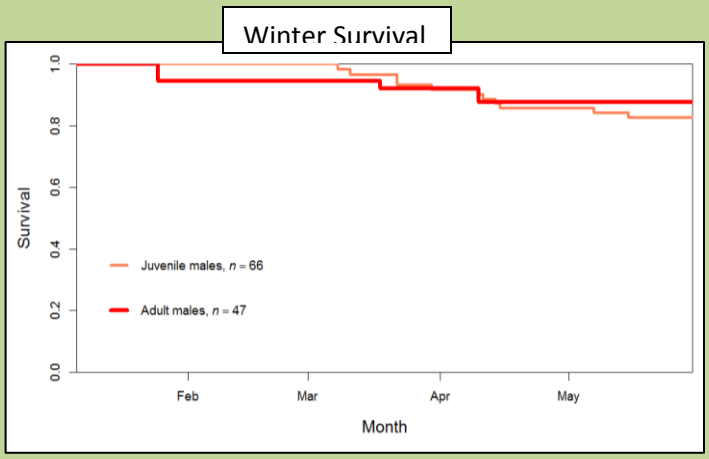


Figure 12. Winter survival[15] for juvenile (<18 months old) and adult (>18 months old) males from January 7th, 2013 through May 31st, 2013 in the eastern farmland.

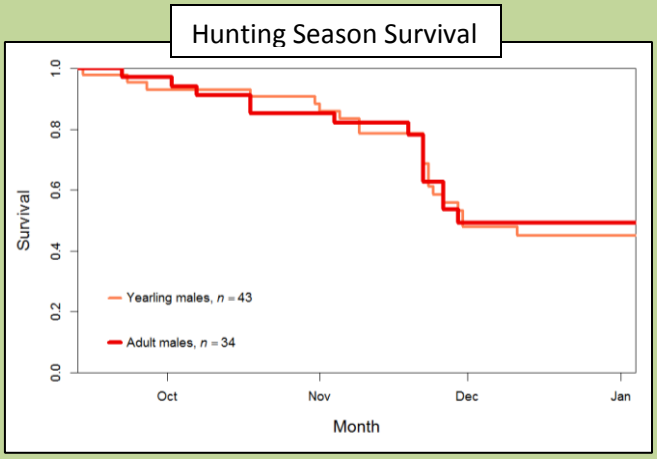


Figure 13. Hunting season survival[15] for yearling (<18 months old) and adult (>18 months old) males from September 14th, 2013 through January 5th, 2014 in the eastern farmland.

Telemetry

We estimated 6,310 male locations as of December 31st, 2013, including a median of 31 locations/adult male (range = 6–77; *n* = 24) and a median of 33 (range = 17–94; *n* = 38) locations/male yearling.

Eastern farmland 2013-2014

Capture

We captured 141 unique deer from December 14th, 2013 through April 7th, 2014, including 90 males and 51 females (Figures 14, 15). We radiocollared 89 males, including 38 adults (>18 months old) and 51 juveniles (≥ 7 months old). We radiocollared 33 females, including 4 adults females (>18 months old) and 29 juveniles. We recaptured 9 deer, including 6 males and 3 females. We captured 124 deer with drop nets followed by 15 with dart guns and 2 with box traps. We captured 141 (100% of unique deer) deer on private land.

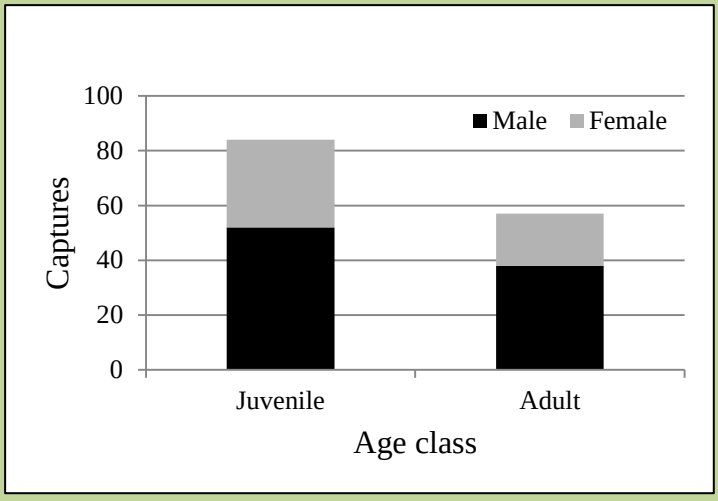


Figure 14. Juvenile (7–10 months old) and adult deer captures by sex in the eastern farmland, mid-December 2013 through April 2014.

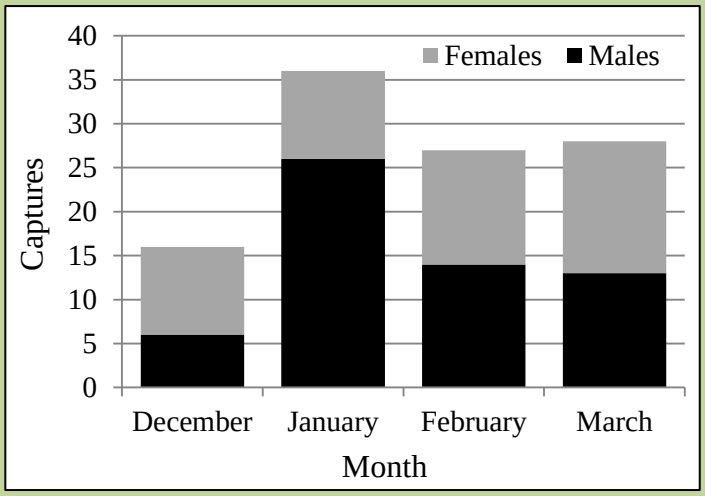


Figure 15. Male or female deer captures in the eastern farmland, mid-December 2013 through April 2014.

Mortality

Five of 61 adult and 12 of 104 juvenile males died between January 6th, 2014 and May 31st, 2014, representing 91% and 86% survival (Figure 16) for these cohorts, respectively. For male adults, road kill (*n* = 3) was the greatest source of mortality, followed by poaching (*n* = 1) and wounding (*n* = 1; Wildlife Damage Abatement and Claims Program). For deer collared as juveniles, starvation (*n* = 9) was the greatest source of mortality, followed by road kill (*n* = 2) and coyote predation (*n* =1). We are monitoring 31 adult and 43 yearling males as of July 31st, 2014.

Telemetry

We estimated 8,373 male locations as of April 7th, 2014, including a median of 24 locations/adult male (range = 6–77; *n* = 35) and a median of 26 (range = 1–94; *n* = 65) locations/yearling male.

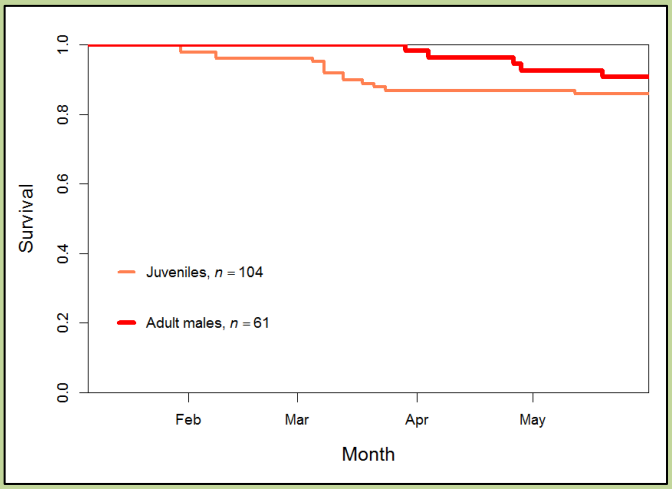


Figure 16. Winter survival[15] for juveniles (<18 months old) and adult (>18 months old) males from January 6th, 2014 through May 31st, 2014 in the eastern farmland.

FAWN SURVIVAL STUDY

Northern forest

Capture

We captured and radiocollared 29 neonate fawns between May 15th and June 8th, 2013, including 10 males and 19 females. Fawns were captured opportunistically, including several public reports of fawn sightings. We captured 13 fawns on private land, 10 on industrial forest land, and 6 on public land.

Mortality

Through December 31st, 16 mortalities of 29 radiocollared fawns occurred, representing 44.8% survival (6–7 months post capture) for this cohort. Most mortality occurred before August 31st (Figure 17) and predation was the greatest source of mortality (Table 1).

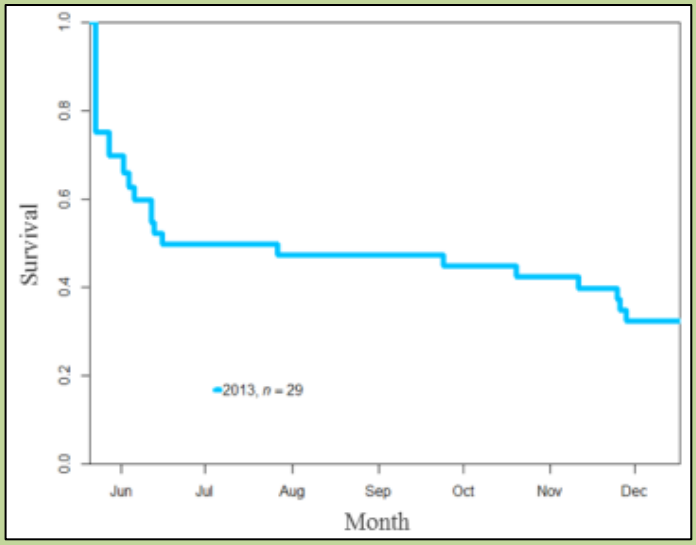


Figure 17. Survival[15] estimates of fawns captured (*n* = 29) as neonates from birth (mid-May 2013 through June 2013) to December 31st, 2013 in the northern forest.

Table 1. Mortality sources (May 2013 through December 2013) of radiocollared fawns captured (*n* = 29) as neonates mid-May–June 2013 in the northern forest.

Mortality Source	Males	Females
Bear	2	-
Bobcat	3	1
Coyote	-	2
Wolf	-	1
Unknown predator	1	1
Harvest	1	2
Poach	-	1
Road kill	-	1

Telemetry

We estimated 881 fawn locations as of December 31st, 2013 with a median of 14 locations/fawn (range = 1–45; *n* = 48).

Vegetation surveys

We completed 156 surveys of vegetation composition and structure, including 54 at fawns birth or bed sites, 53 at paired random sites and

49 at additional random sites. Researchers are currently analyzing these data.

Eastern farmland

Capture

We captured 53 neonates between May 20th and June 9th, 2013, including 24 males and 29 females. We radiocollared 45 fawns, including 21 males and 24 females, remaining fawns were ear tagged. Fawns were captured opportunistically, including several public reports of fawn sightings. We captured 52 fawns on private land and 1 on public land.

Mortality

Through December 31st, 19 radiocollared fawns died, representing 57.8% survival (6–7 months post capture) for this cohort. Most mortality occurred before August 31st (Figure 18) during which time starvation was the greatest source of mortality (Table 2).

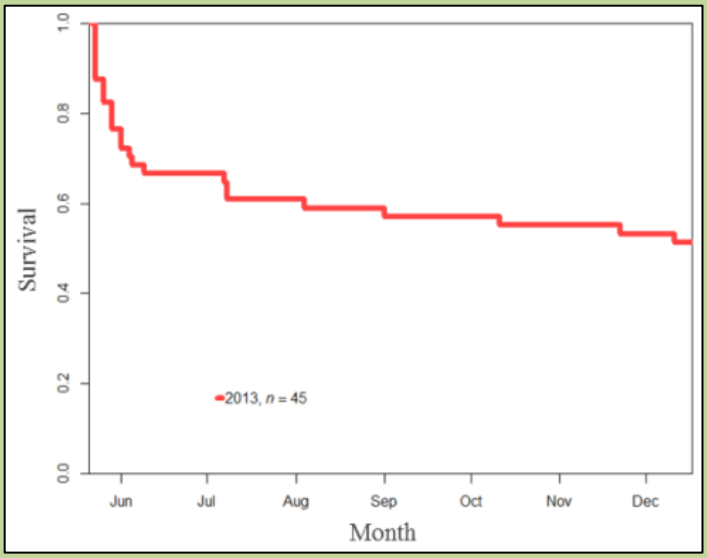


Figure 18. Survival[15] estimates of fawns captured (n = 45) as neonates from birth (mid-May 2013 through June 2013) to December 31st, 2013 in the eastern farmland.

Table 2. Mortality sources (May 2013 through December 2013) of radiocollared fawns (n = 45) captured as neonates mid-May–June 2013 in the eastern farmland.

Mortality Source	Males	Females
Bobcat	1	-
Coyote	-	2
Domestic dog	1	-
Disease	3	1
Starvation	3	6
Harvest	1	-
Unrecovered harvest	1	-

Telemetry

We have estimated 4,927 adult doe locations as of December 31st, 2013, including a median of 25 locations/adult doe (range = 1-104; n = 106. We have estimated 2,169 fawn locations as of December 31st, 2013, including a median of 16 locations/fawn (range = 1–69; n = 105).

Vegetation surveys

We completed 288 surveys of vegetation composition and structure, including 119 at fawns birth or bed sites, 119 at paired random sites and 50 at additional random sites. Researchers are currently analyzing these data.

MOVEMENTS

Northern forest

Thirty percent of male (10–18 months old) deer permanently dispersed (Figure 19; also see SUPPLEMENTS), with two major dispersal periods during ages 10–13 months old (12% dispersed) and 15–18 months old (24% of remaining yearlings dispersed) from late-March 2011 through November 2013. Although apparent dispersal may have been confounded with seasonal migration which

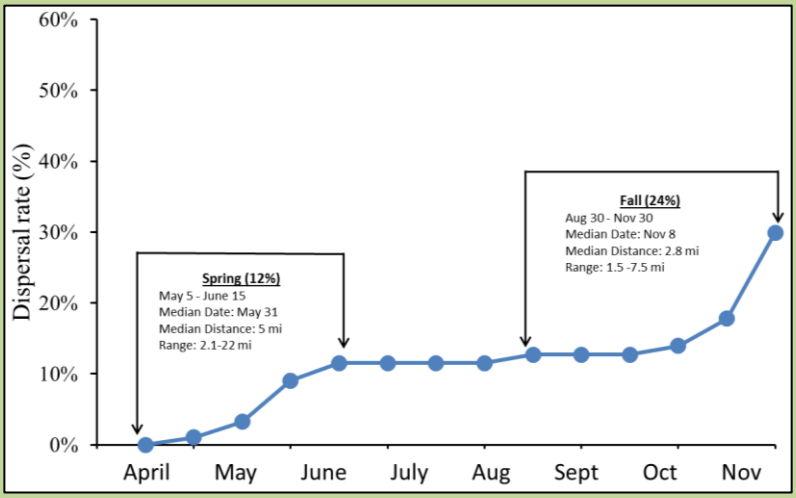


Figure 19. Timing and rate of permanent spring (n = 95) and fall (n = 74) dispersal for male deer (10–18 months old) in the northern forest study area, late-March 2011through November 2013.

occurs in northern Wisconsin, we found the migration rate from 53 radiocollared adult female deer to be minimal (11–15%) in northern Wisconsin. Additionally, the timing of migration from winter to summer home ranges and vice versa typically occurred during different periods of the year (March and December-January).

Eastern farmland

Fifty-five percent of males (10–18 months old) permanently dispersed, (Figure 20; also see SUPPLEMENTS), with two major dispersal periods during ages 10–13 months old (25% dispersed) and 15–18 months old (37% of remaining yearlings dispersed) from late-March 2011 through November 2013. We found very little evidence for seasonal migration in the eastern farmland study area.

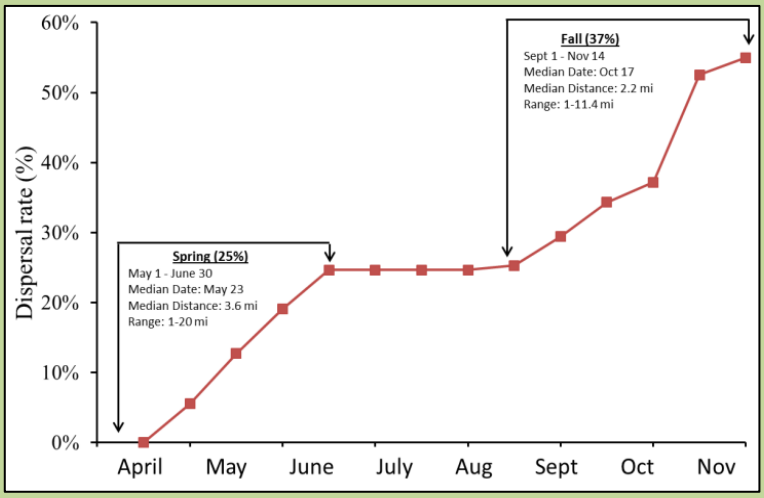


Figure 20. Timing and rate of permanent spring (n = 127) and fall (n = 101) dispersal for male deer (10–18 months old) in the eastern farmland study area, late-March 2011through November 2013.

PUBLIC OUTREACH

From January 2011–March 2014, well over 1,000 unique volunteers helped with deer research, including volunteers from Wisconsin, Minnesota, Illinois, Michigan, and Indiana. Further, over 800 landowners have participated, many of which have granted us property access to capture and monitor study animals. Since its launch in April 2010, our website has been continually updated and assisted in communicating our research design and preliminary results and volunteer opportunities for the public. The web address is: http://dnr.wi.gov/topic/wildlifehabitat/research/whitetaileddeer.html.

Additions to the website include photos of our capture techniques, deer movement maps, trail camera photos of radiocollared deer, and volunteer sign up form. We also distributed maps with capture, telemetry, and harvest location data to hunters that harvested ear tagged or radiocollared deer during the 2013–2014 deer season. We developed a tri-fold project pamphlet and newsletter for public distribution across the northern forest and eastern farmland study areas. We have done numerous presentations, television programs/interviews, and radio shows, and many articles (e.g. newspaper and web pages) have been written about the project. We have provided periodic research updates to partners and interested public. The deer mortality research was featured in a segment of the Deer Hunt 2013 television show. In cooperation with the DNR office of Communications, we developed a 16-page series of articles that were packaged into an insert within the October 2013 Wisconsin Natural Resources Magazine. Additionally, we printed 12,000 copies of the insert, and have been distributing them at sport shows, DNR locations, and to individuals interested in the project.

UPCOMING RESEARCH ACTIVITIES

Deer monitoring

We will continue to monitor for survival and movements of radiocollared deer, on a weekly basis, through the 2014 deer hunting season. Two technicians per study area are conducting telemetry. Additionally, technicians will be deploying trail cameras over 2 periods this fall. The goal of this effort is to determine whether it is feasible to obtain camera-based estimates of hunting season survival of bucks.

Public outreach

We will be updating our deer research website with preliminary results, photos, and maps. Additionally, we will continue to work with the media to keep the public informed of our preliminary results and will continue providing newsletters to interested individuals.

Timelines

The buck mortality study is designed for five years (2010-11 through 2014-15) within the northern forest and eastern farmland study areas in order to better understand potential effects of temporal and spatial (*e.g.*, habitat) variation on buck mortality. Quantifying effects of various time-dependent (*e.g.*, weather) and time-independent (*e.g.*, habitat, deer density, hunter density, road density, parcel size, etc.) factors across multiple deer management units, will provide insight for improving accuracy and precision of deer population estimation in Wisconsin. Field work (*e.g.*, deer trapping) is scheduled to occur through the winter of 2014 and deer will be monitored until death or until their radiocollars are dropped or fail.

The fawn recruitment study was designed for three years (2011 through 2013) within the northern forest and eastern farmland study areas to provide estimates of potential impacts and relative magnitude of habitat, winter severity, and predator effects on fawn survival across forested and agricultural landscapes in Wisconsin. Detailed annual reports, final project reports, published manuscripts, and biweekly updates throughout the capture seasons will be produced during these studies. Results of this work will be provided to numerous stakeholders, including (but not limited to) external partners and collaborators, media, Wisconsin citizens, DNR staff, policy makers, and as presentations during scientific meetings and outreach efforts across Wisconsin over the duration of these projects.

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Frank Boll – In Wisconsin / Wisconsin Public Television

2013 and 2014 Crew Leaders, Assistant Crew Leaders and Project Technicians

Katie Allen (asst. crew leader)
Christine Anhalt
Nate Bieber
Ellen Bledsoe
Jacob Boone
Lorelei Carroll
Jessica Gable
Jesse Godbold
Aaron Groves
Logan Hahn (asst. crew leader)
Cala Hakseth
Shaun Hilgart
Daniel Jahn
Aaron Johnson (crew leader)
Katie Luukkonen
Amanda McDonald
Adam Mohr
Marcus Mueller (crew leader)
Andy Orlando
Brittany Peterson (crew leader)
Jon Prokott (asst. crew leader)
Jes Rees (asst. crew leader)
Amanda Rudie
April Strzelczyk
Andrew Voigt
Sarah Wendt
Erin Wood

SUPPLEMENTS

DNR FILE

Releasing a juvenile buck from a netted cage (Clover) trap.

DNR FILE

Deer captured in netted cage (Clover) trap.

DNR FILE

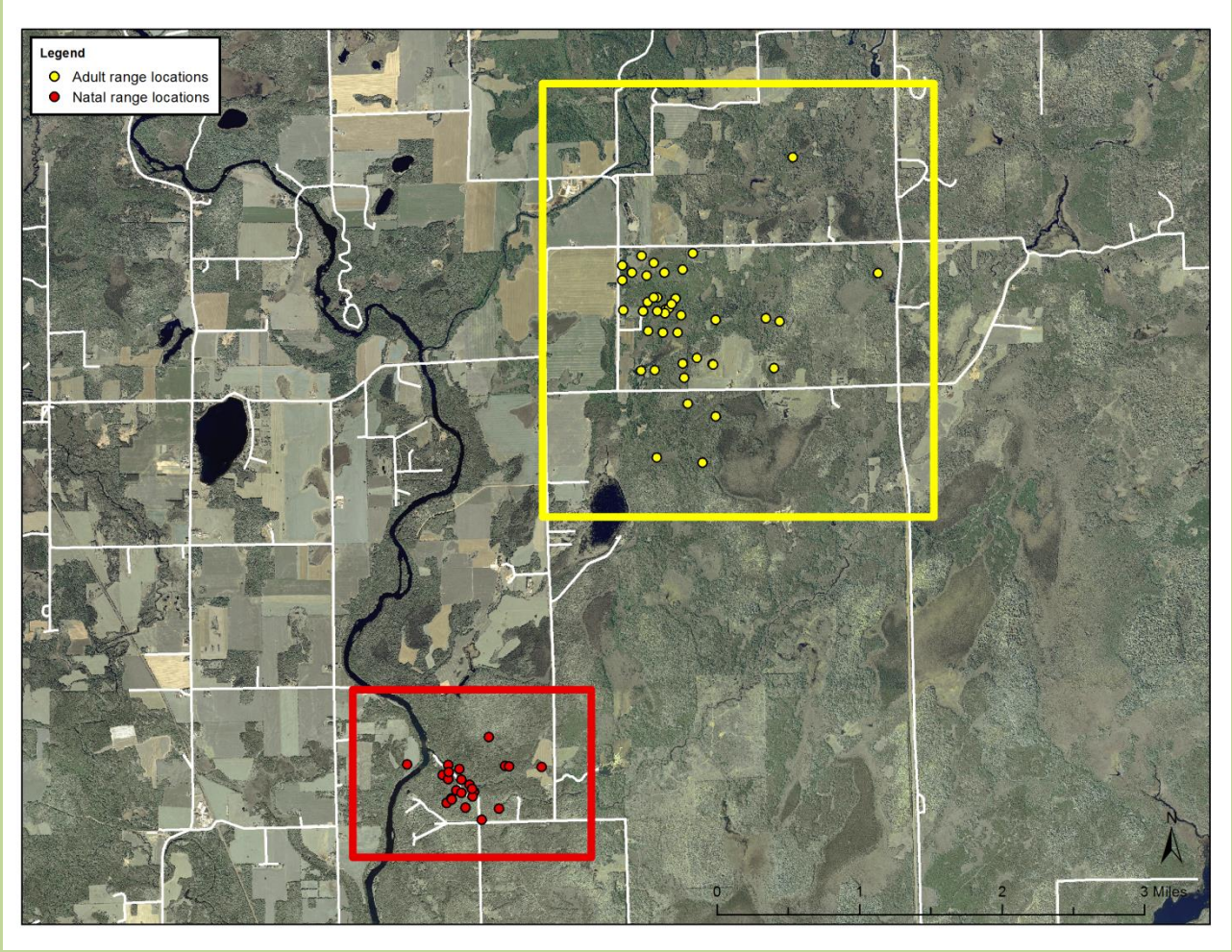
Deer underneath a drop net in the northern forest study area.

BOBBY SCHMITZ

2013 rifle season radiocollared buck harvest.

DNR FILE

Adult female with metal ear tags (in dashed oval).



Locations during 2011 and 2012 of a buck captured as a 10-month old, on March 29, 2011. He permanently dispersed 3.5 miles northeast on October 26, 2011. He was harvested with a compound bow during the archery season on December 27, 2012.

CITIZEN SUBMITTED PHOTOS

(submit your photos of tagged deer at http://dnr.wi.gov/topic/wildlifehabitat/research/whitetaileddeer.html)

This buck was photographed with a game camera in Sawyer County. He was captured as a juvenile on January 7, 2013 in a box trap on Managed Forest Law property and harvested during the firearm season as a 5 point (2 x 3). Thank you to Bruce Glocke for submitting the photo.

WISCONSIN DEPT. OF NATURAL RESOURCES

Wisconsin Deer Research Studies

Annual Report, 2013–2014

WILDLIFE RESTORATION