

Results of White-Tailed Deer Surveys in Northwest Bergen County, NJ, in 2025-2026

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Summary

RVCC-CES conducted surveys to document the local abundance and densities of white-tailed deer at twelve municipalities in the northwest portion of Bergen County, NJ, from December 22, 2025, to April 3, 2026. A total of 4,463 deer were observed in the 76.1 mi² survey area resulting in an average deer density of 59 deer/mi². A detailed discussion of survey methods and results is provided below, along with an interpretation of results in relation to deer impacts and management.

Methods

We conducted infrared surveys for white-tailed deer (*Odocoileus virginianus*) by drone or sUAS (small unmanned aerial systems) to obtain estimates of local deer population size at northwest Bergen County, NJ. We used an Autel EVO II Dual drone with FLIR 640 Thermal Sensor, which was flown at night when greater contrast between ground and deer body temperatures enabled enhanced visibility. All flights were conducted with an FAA-certified pilot aided by a visual observer trained and certified for night-time operations. Each mission was flown in public airspace (Class G) at ≤400 feet above ground level, in compliance with federal regulations.

Surveys were conducted from December 22, 2025 to April 3, 2026 (**Table 1, Figure 1**). This period is within a seasonal window that provides the most conservative estimates of annual deer densities; i.e., after the fall/winter season when deer numbers are driven to their lowest numbers in the year from hunting, vehicle collisions, harsh winter conditions, and prior to the birth of fawns in May.

Preflight planning included identification of suitable launch points, flight hazards, access, and airspace regulations via aerial photography, aeronautical maps, and field visits to each site. Sufficient launch points were identified to ensure that all areas were adequately covered based on the range limitations of the drone.

Flights were conducted in transects to ensure proper coverage of the entire survey area (**Figure 2**). Transects were spaced an average of 500 feet apart in forested and residential areas and were wider in open fields where the field of view was unobstructed by structures such as buildings and trees. All observations of deer and search areas were recorded and mapped in real-time using the Autel Explorer and ArcCollector App. When deer were spotted, the drone was kept in a hover position until an accurate count was obtained. If necessary, the drone was moved to a lower position (≥200') and/or different angles to get a better vantage for accurate counting or positive identification. This procedure was repeated until the entire study area was surveyed. Densities from the drone surveys were later calculated by dividing the total deer found by the search area covered by the drone.

Municipalities with an area below 6 mi² were covered within one survey night. Otherwise for larger tracts of land (>6 mi²), areas that likely served as partial barriers to deer movement (e.g., rivers, railroads, highways) were used as survey boundaries. Due to weather constraints, not every large municipality (>6 mi²) was surveyed across consecutive nights.

We implemented several additional quality control measures to obtain the most accurate population census possible. First, if deer were found close to an already surveyed location, the drone was flown back to the vicinity of the initial observation to see if they were still present. If absent from the original location, then the second observed herd was not counted to avoid double-counting (i.e., to account for the fact that the first herd observed may have moved to the new position). Secondly, when deer herds were noted to be moving in a certain direction during the observation, then the area of habitat that they were moving towards was surveyed next in order to ensure that deer were not double-counted. Lastly, if observed objects could not be positively identified, the data was excluded from our analysis. These controls ensured that the results were as robust and conservative as possible.

Figure 1. Survey area coverage by night across twelve municipalities in Bergen County, New Jersey, in 2025-2026

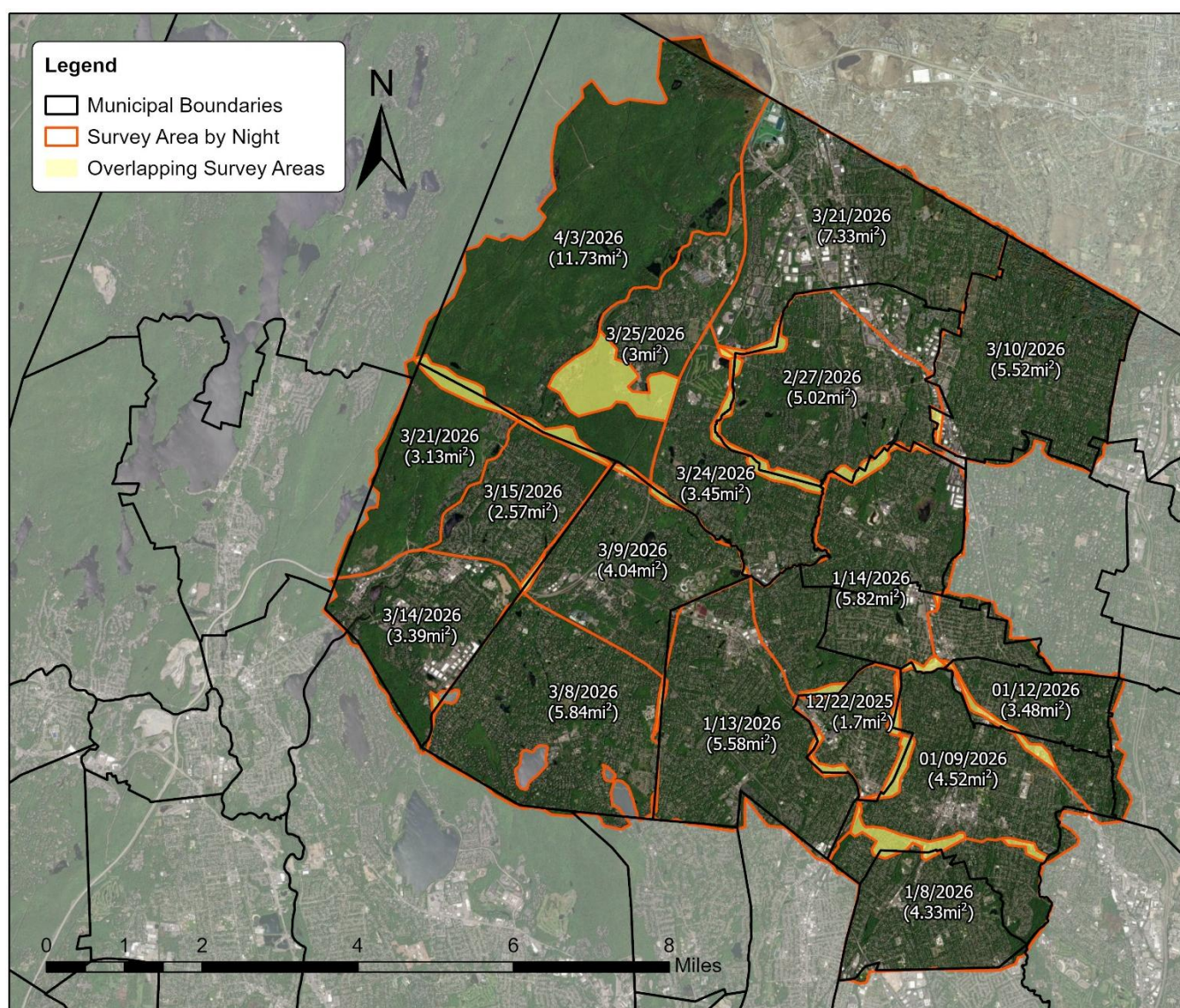
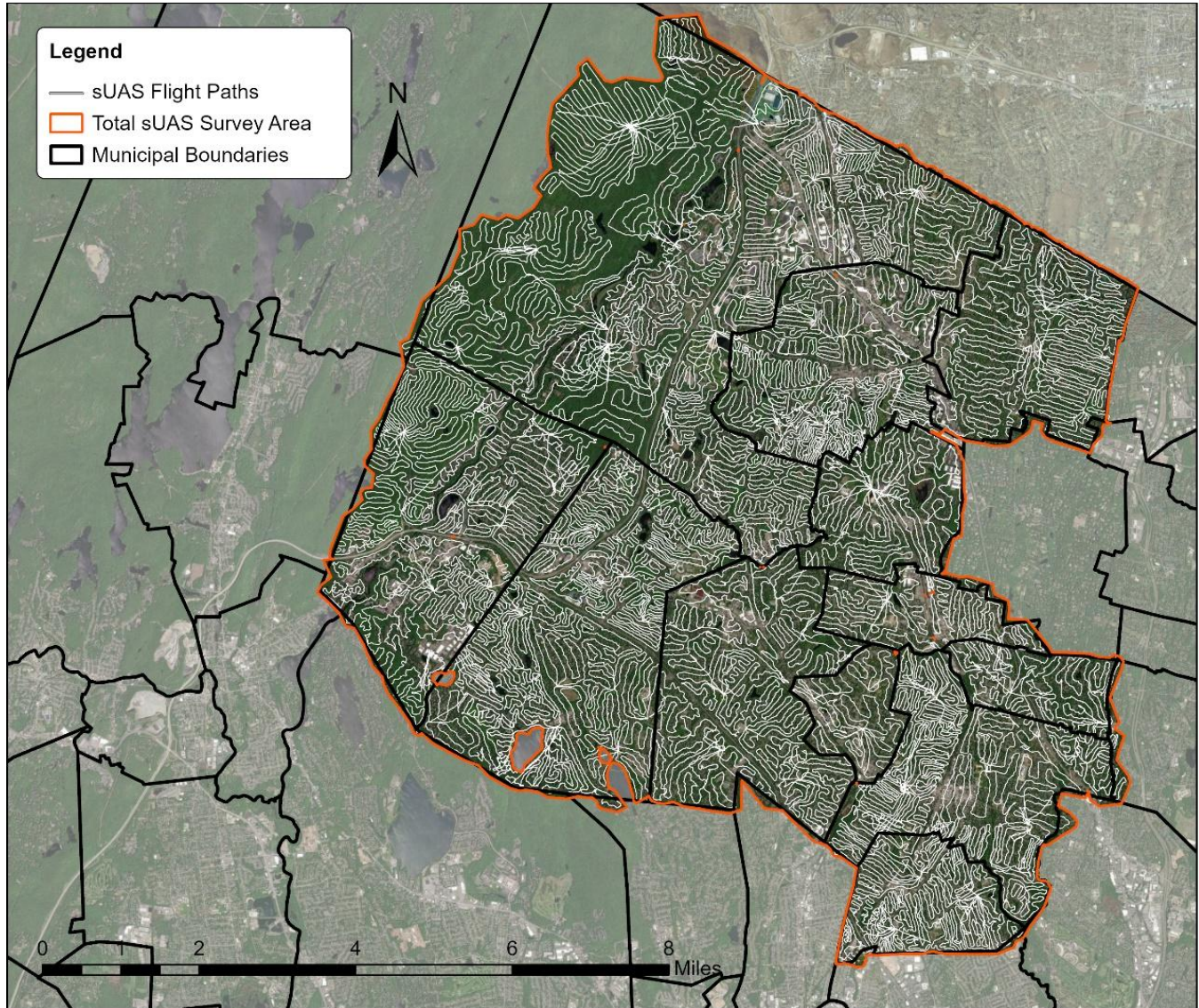


Figure 2. Survey area coverage and sUAS flight paths across twelve municipalities in Bergen County, NJ, in 2025-2026



Results and Discussion

A total of 4,463 deer were observed in the 76.08 mi² Bergen County survey area from December 2025 to April 2026, resulting in a total density of 59 deer/mi² (**Table 2, Figure 3-4**). The densities for each night of surveying ranged from 33 deer/mi² on March 22, 2026 in the northwest survey area of Oakland, NJ which was mostly forested and included high elevation gradients, to the highest deer density of 138 deer/mi², which was observed on March 15, 2026 in the northeast survey area of Oakland (**Table 1, Figure 1**). Overall densities by municipality varied from 40 deer/mi² in Glen Rock to 89 deer/mi² in Upper Saddle River (**Table 2**). Five additional municipalities had an average deer density above 60 deer/mi², including Allendale (68 deer/mi²), Franklin Lakes (62 deer/mi²), Midland Park (67 deer/mi²), Oakland (70 deer/mi²), and Wyckoff (65 deer/mi²) (**Table 2**). The remaining five municipalities ranged between 40-59 deer/mi²,

including Ho-Ho-Kus (51 deer/mi²), Mahwah (49 deer/mi²), Ramsey (53 deer/mi²), Ridgewood (49 deer/mi²), and Waldwick (59 deer/mi²) (**Table 2**).

Table 1. Deer densities observed by survey night in northwest Bergen County, NJ, in 2025-2026

Date	Area (mi ²)	# of Deer Observed	Density (deer/mi ²)
12/22/2025	1.70	137	81
1/8/2026	4.33	210	48
1/9/2026	4.52	186	41
1/12/2026	3.48	150	43
1/13/2026	5.58	363	65
1/14/2026	5.82	427	73
2/27/2026	5.02	273	54
3/8/2026	5.84	342	59
3/9/2026	4.04	260	64
3/10/2026	5.52	473	86
3/14/2026	3.39	194	57
3/15/2026	2.57	354	138
3/21/2026	7.33	438	60
3/21/2026	3.13	104	33
3/24/2026	3.45	237	69
3/25/2026	3.00	219	73
4/3/2026	11.73	327	28

Table 2. Deer densities observed by municipality in northwest Bergen County, NJ, in 2025-2026

Date	Area (mi ²)	# of Deer Observed	Density (deer/ mi ²)
Glen Rock Borough	2.72	110	40
Allendale Borough	3.12	212	68
Franklin Lakes Borough	9.88	613	62
Ho-Ho-Kus Borough	1.75	89	51
Mahwah Township*	22.90	1119	49
Midland Park Borough	1.58	106	67
Oakland Borough	8.77	611	70
Ramsey Borough	5.57	294	53
Ridgewood Village	5.80	287	49
Upper Saddle River Borough	5.27	467	89
Waldwick Borough	2.07	123	59
Wyckoff Township	6.65	432	65
Total Survey Area	76.08	4463	59

*NOTE: Only the drone survey area completed within Mahwah Township (87% of total area) was used to calculate the density for this location; all other municipalities had full survey coverage. Average deer counts were used for any areas with overlapping surveys.

Deer observations were spatially plotted in ArcMap, and density ranges within each survey area were determined using a kernel density tool, which creates heat maps of local densities based on the densities of points within a predetermined search radius. Heat maps can be useful to visualize where deer densities are greater and can help with implementing management (**Figure 2**). Deer movement patterns or home range sizes are dependent on various factors including sex, food availability, weather conditions, hunting pressures, land cover (forested, suburban, urban, exurban, rural, etc.), breeding patterns and other factors (Etter et al. 2018, Innes 2013, Kilpatrick et al. 2001, Williams et al. 2008). Studies on home range sizes of whitetail deer show major variation throughout their range, from between 0.14 – 11.7 square miles (Innes 2013). However, in the Mid-Atlantic and New England regions, deer home ranges tend to be much smaller, including approximately 1.0 mi² in agricultural and heavily forested land covers (Sparrowe and Springer 1970, Tierson et al. 1985), 0.4 mi² in exurban areas (Storm et al. 2007), and 0.17 mi² in suburban areas (Kilpatrick and Spohr 2000).

Deer densities were estimated to reflect a range of home range sizes from 0.4 mi² to 1.0 mi². Both outputs were used to interpret the localized densities within the survey areas (**Table 2 and Figure 2**). It should be noted that some localized densities may be underestimated as some deer within the population may have smaller, more localized home range sizes. Conversely, populations with ranges greater than 1 mi² would result in greater densities than indicated in the lower-density areas on the map. Taking both home ranges into consideration, most municipalities surveyed had a majority of their survey area fall within high deer density ranges (20-50 deer/mi² or 50-100 deer/mi²) (**Table 3**). All municipalities had the majority of their land area occupied by deer densities higher than 20 deer/mi², regardless of the range size used.

To interpret these results, it is important to understand the social and environmental impacts of different deer densities. Biologists estimate precolonial deer densities to be approximately 8-11 deer/mi² (McCabe and McCabe 1997). Negative impacts of deer browse on preferred browse species and forest structure tend to occur at densities above 8 – 10 deer/mi² (Almendinger et al. 2020, deCalesta and Stout 1997; Alverson et al. 1988; Frelich and Lorimer 1985; Behrend et al. 1970). Additional indirect or “cascade” effects on food webs and other ecosystem properties tend to occur at densities above 15-20/mi² (McWilliams et al. 2018, Russell et al. 2017, Chips et al. 2015, Nuttle et al. 2011, Horsley et al. 2003, Drake et al. 2002, de Calesta 1994). These densities, therefore, provide useful benchmarks for deer management to achieve ecological goals, with ~10 deer/mi² being the optimal target for supporting the greatest biodiversity and ecosystem structure and function.

The effects of overabundant deer are not limited to natural areas, however, but to human populations as well, costing millions of dollars a year from deer-vehicle collisions, damage to agricultural crops and landscaping, and impacts of Lyme’s disease and other tick-borne diseases (Patton et al. 2018, Conover 2011). Increased deer-vehicle collisions are associated with higher deer density, among other factors (Kelly and Ray 2019ab), and deer management practices that have successfully reduced deer populations have resulted in significant decreases in deer-vehicle collisions in New Jersey and other areas (Williams et al. 2013). Effective deer management is, therefore, likely to yield significant benefits not only for environmental integrity but for social and economic goals as well (Kelly 2019).

With these ecological and social goals in mind, the total densities observed at Bergen County were on average 5.9x greater than those needed to maintain ecosystem health and public safety (≤ 10 deer/mi²), and none of the areas surveyed contained deer densities at ecologically sustainable levels (**Table 2**). Unfortunately, the higher densities observed are typical for many preserves and municipalities in neighboring central and northern NJ (**Figure 5**), where a combination of forest fragmentation and/or suboptimal hunting programs regularly allow for deer densities greater than

50 – 100 deer/mi² (Kelly and Ray unpublished data). The only exceptions are areas with aggressive deer management (hunting or exclosures) and/or where large areas of intact forests remain in the state. Duke Farms, for example, has been able to maintain their deer populations at an average of 10 deer/mi² within their square-mile exclosure and 36 deer/mi² outside the exclosure, where deer hunting is aggressive but less effective due to surrounding land uses (Almendinger et al. 2020). Mahlon Dickerson Reservation in the NJ Highlands also currently has lower deer densities of 21 deer/mi², due to the combination of deer management and the large areas of mature, intact forest in the surrounding landscape, which provide less supplemental food resources or refugia from hunting for deer (Kelly and Ray 2020).

Table 3. The % of total survey area occupied by five deer density classes within each municipality based on 1.0 mi² (top) and 0.4 mi² (bottom) home range sizes

	0-10 deer/mi²	10-20 deer/mi²	20-50 deer/mi²	50-100 deer/mi²	>100 deer/mi²
Allendale Borough	0%	1.6%	35.5%	40.1%	22.6%
Franklin Lakes Borough	0%	0.9%	45.6%	44.8%	8.4%
Glen Rock Borough	14.4%	26.3%	33.5%	19.4%	6.2%
Ho-Ho-Kus Borough	0.1%	4.4%	57.6%	37.7%	0%
Mahwah Township*	16.9%	17.3%	21.9%	34.4%	9.3%
Midland Park Borough	0%	0%	22%	68.8%	9.1%
Oakland Borough	7.4%	8%	28.7%	31.9%	23.7%
Ramsey Borough	1.6%	12.2%	39.1%	32.6%	14.3%
Ridgewood Village	3.6%	15.9%	36.2%	39.6%	4.5%
Upper Saddle River	0%	0.9%	16%	55.7%	27.2%
Waldwick Borough	0.3%	4.8%	36.3%	56.3%	1.9%
Wyckoff Township	0%	1%	26.8%	64.8%	7.1%

	0-10 deer/mi²	10-20 deer/mi²	20-50 deer/mi²	50-100 deer/mi²	>100 deer/mi²
Allendale Borough	6.7%	9.4%	20%	40.8%	22.8%
Franklin Lakes Borough	3.7%	7.8%	36.8%	36.2%	15.2%
Glen Rock Borough	32.6%	12%	23.3%	23.5%	8.4%
Ho-Ho-Kus Borough	9.8%	13.4%	33.8%	36.2%	6.5%
Mahwah Township*	24.7%	13.2%	23.8%	24.1%	14%
Midland Park Borough	0.1%	2.2%	33.3%	42.4%	21.7%
Oakland Borough	12.6%	9.8%	26.1%	24.5%	26.7%
Ramsey Borough	14.3%	13.2%	25.6%	30.1%	16.5%
Ridgewood Village	13%	13.9%	34.6%	27.8%	10.5%
Upper Saddle River	0.7%	1.4%	24.6%	42%	31.1%
Waldwick Borough	4.9%	8.5%	33.2%	35.7%	17.5%
Wyckoff Township	2.2%	5.3%	29.6%	49%	13.6%

**NOTE: Only the drone survey area completed within Mahwah Township (87% of total area) was used to calculate the density for this location; all other municipalities had full survey coverage. Average deer counts were used for any areas with overlapping surveys.*

General concerns about the ecological impacts of excessive deer densities are supported by several recent studies in NJ, which reported negative impacts that current deer densities are having on forest conditions in the central and northern parts of the state. One study found 70-85% declines in understory plant communities when compared to historic studies in 1948-1973, when statewide deer densities averaged <10 deer/mi² (Kelly 2019). The numbers of young trees at browse height, in particular, were closely associated with local deer densities, and the removal of deer by aggressive hunting and exclosures allowed the forests to return to historic levels of tree regeneration after 10-20 years (Kelly 2019). Other elements of understory plant communities respond well to exclosures and intensive hunting as well, including native grasses, herbs, and the ratio of native to non-native species (Almendinger et al. 2020). These results are consistent with other studies of deer impacts in the broader region by the U.S. Forest Service, which found the mid-Atlantic (including NJ) to have the highest levels of deer browse in the northern states, with 79% of forests experiencing moderate to severe levels of browse (McWilliams et al. 2018).

This data suggests that intensification of deer management is needed throughout Bergen County to improve ecosystem integrity in the future. In setting harvest goals for deer management, it is important to remember that the deer densities observed in this study occurred at the lowest point in the year for deer population sizes (i.e., after winter mortality and prior to birthing). The densities are likely to be much higher during the growing season and by the time of fall hunting. In order to estimate deer populations at those times, the reproductive and mortality rates must be taken into account. Reproductive rates are generally 2-3 fawns/doe per year in this area (estimated by counting prenatal fawns within does harvested during the hunting season), with 1.9 fawns/doe being the average in the Midwest (Green et al. 2017) and 2.25 fawns/doe reported locally in neighboring NJ (Juette pers. comm. 2018). The effective deer densities from late May through September are therefore likely to be ≥50-100% higher than the densities observed during this survey period, as mortality from vehicle collisions and freezing temperatures are not typically significant until October or later (Kelly and Ray unpublished data). Lastly, we recommend repeated surveys on the order of every 3-5 years in combination with harvest data, deer vehicle collision data, and forest monitoring plots (ideally including exclosures) in order to gauge the effectiveness of any hunting programs being implemented in the future. In cases where hunting is not possible, using deer exclosures fences (at least 8 feet tall) around habitats of native trees and shrubs can protect vulnerable species against deer browse pressures.

Figure 3. Areas of twelve Bergen County municipalities occupied by different deer density classes in 2025-2026 based on 1.0 mi² home range sizes. Average deer points were used where survey areas overlap. Deer density estimates were generated in ArcGIS Pro using the kernel density tool.

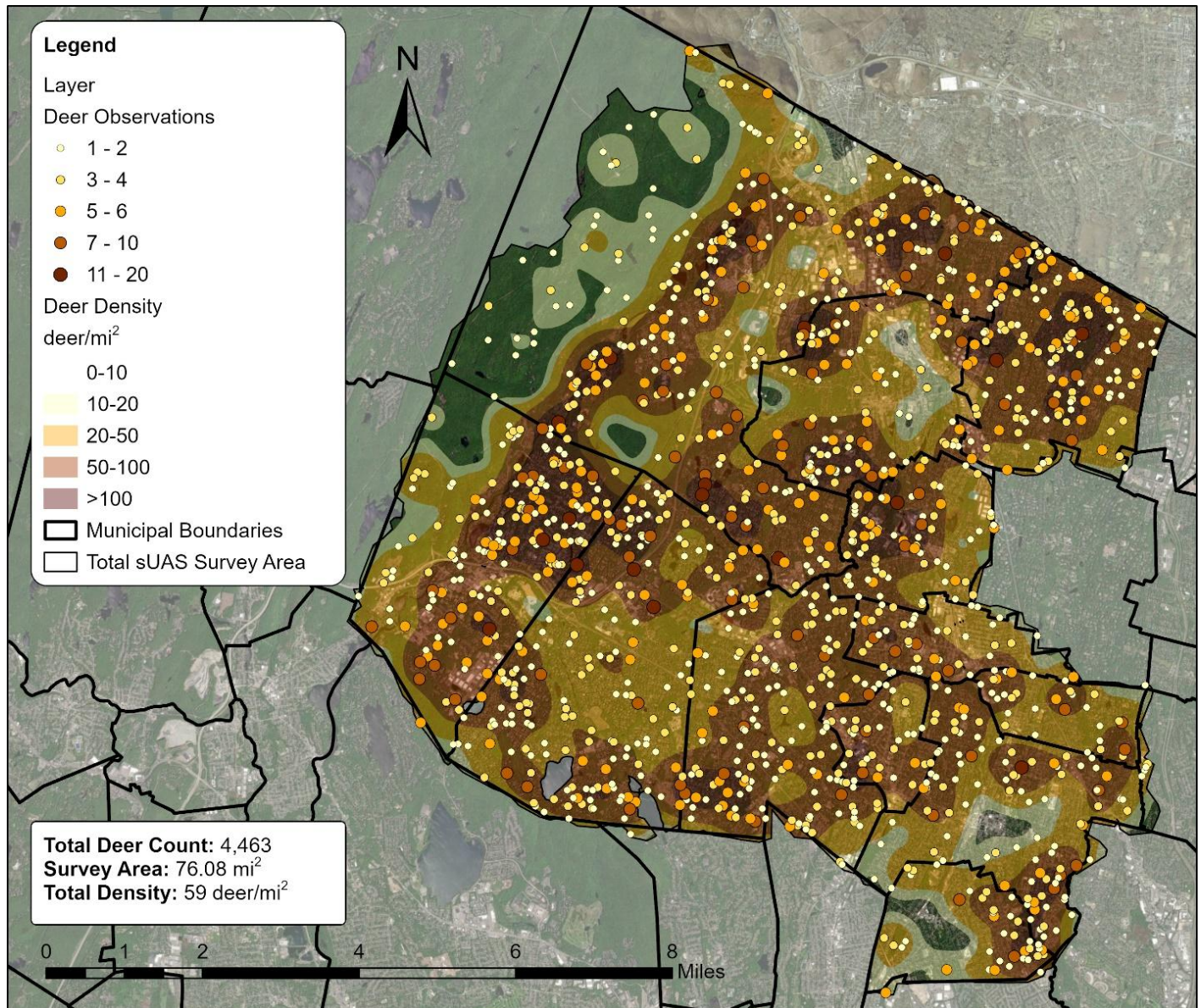


Figure 4. Areas of twelve Bergen County municipalities occupied by different deer density classes in 2025-2026 based on 0.4 mi² home range sizes. Average deer points were used where survey areas overlap. Deer density estimates were generated in ArcGIS Pro using the kernel density tool.

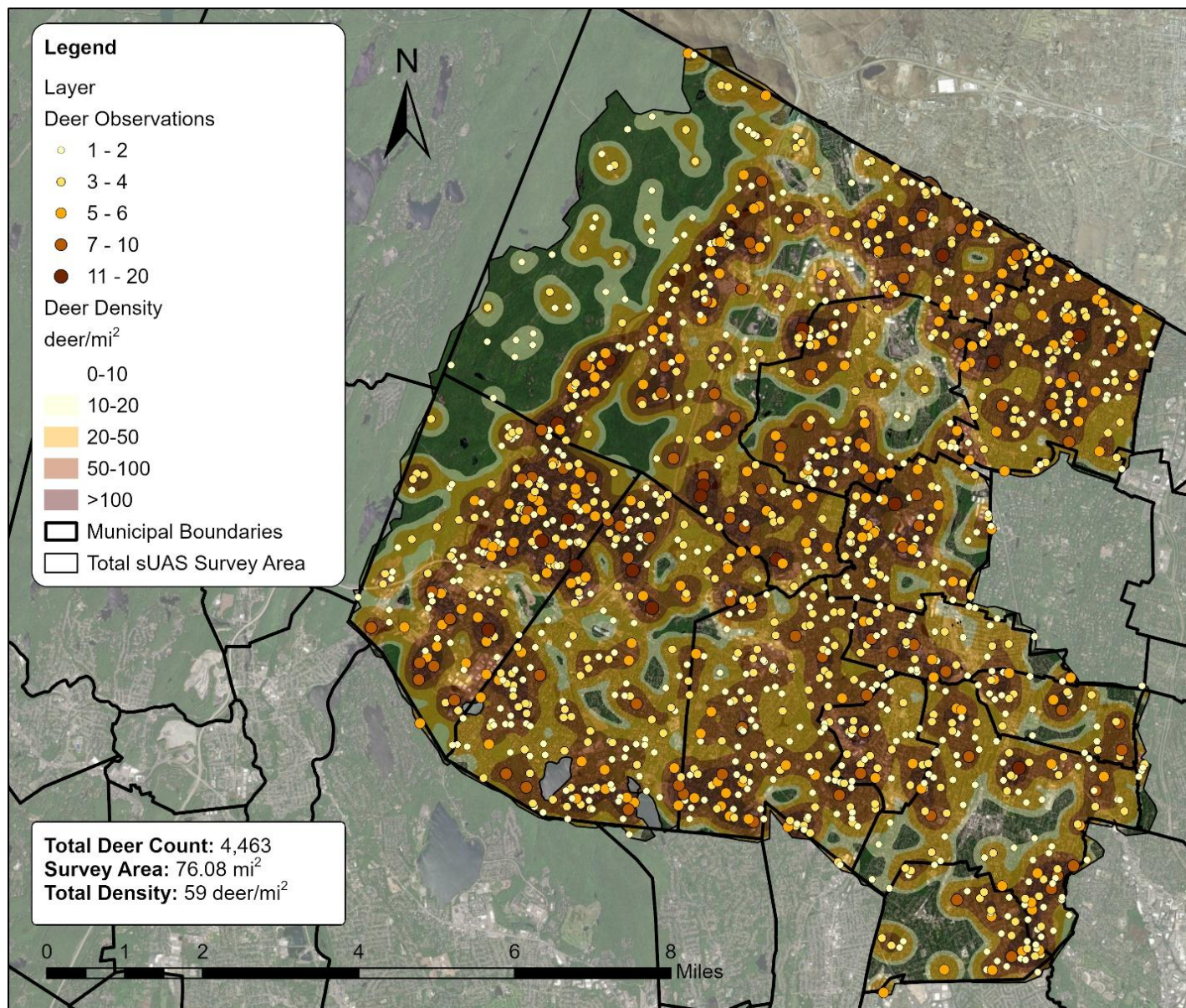
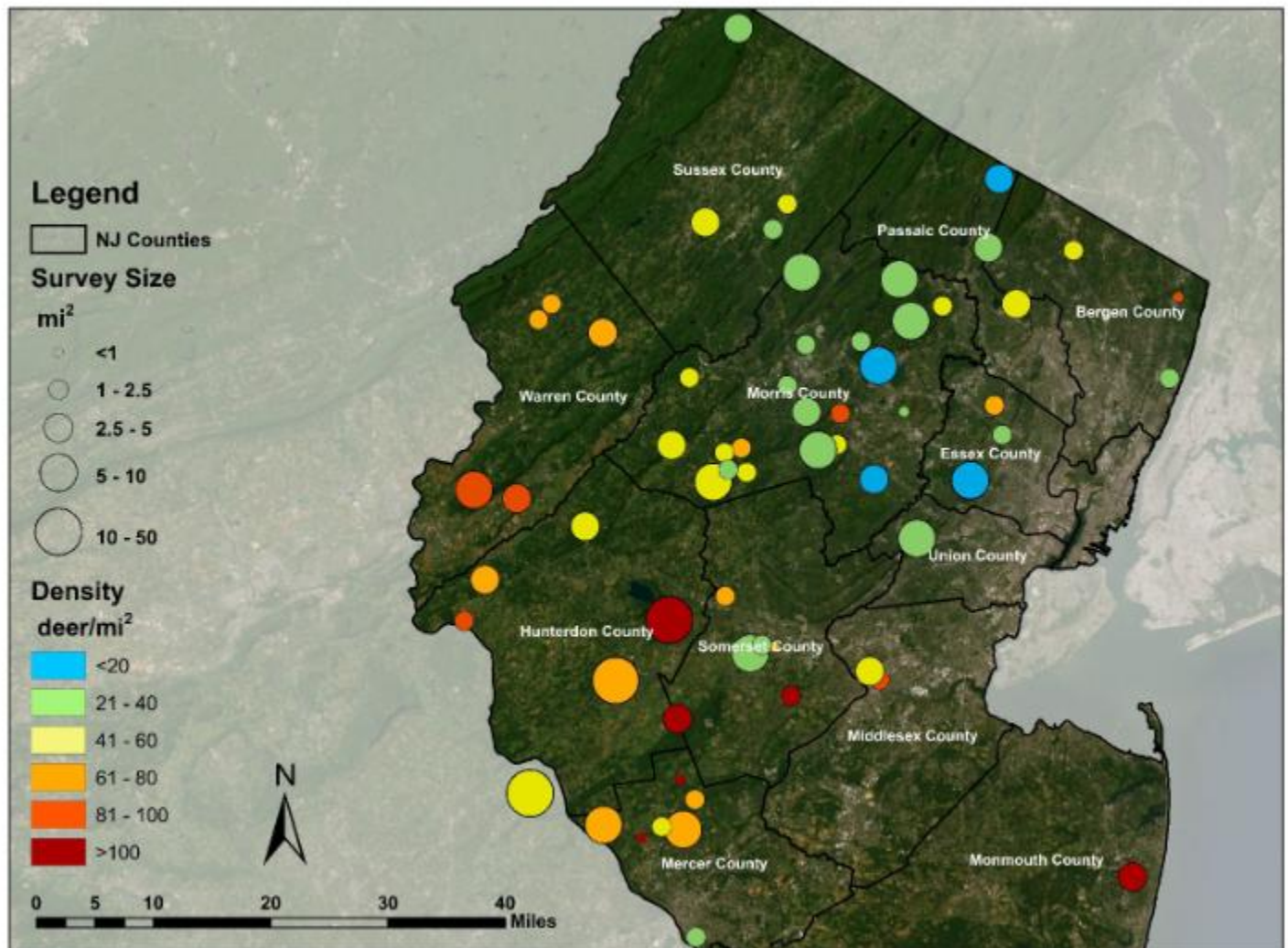


Figure 5. Results of RVCC infrared sUAS surveys of white-tailed deer in northern NJ in 2019-2023



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