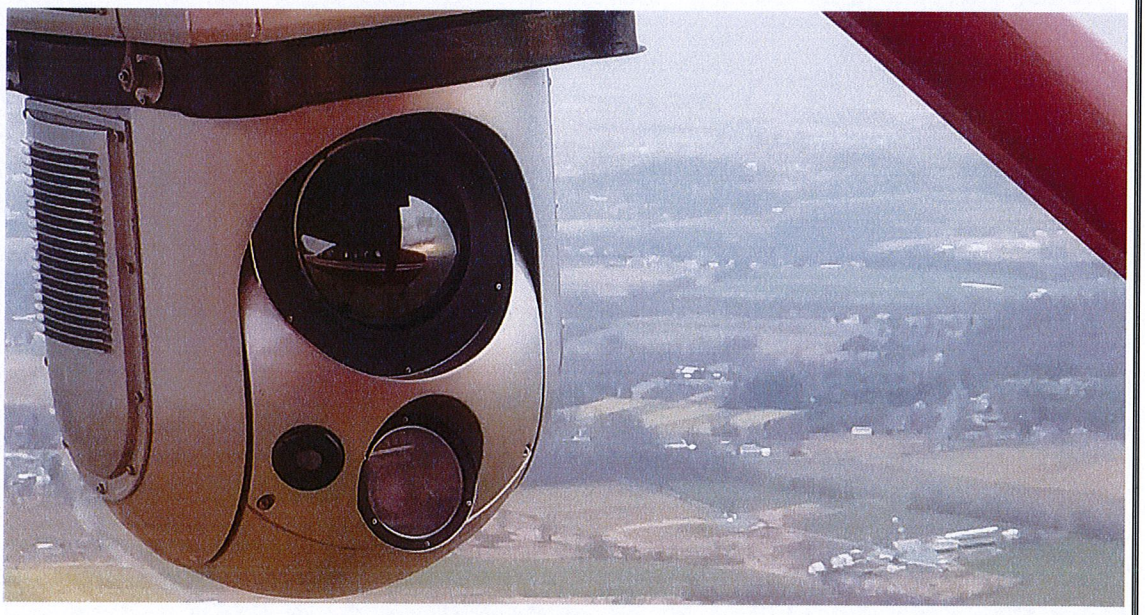
Aerial Deer Survey – Watchung, NJ

Final Report



Submitted to:

Tom Atkins, Borough Administrator
Borough of Watchung
15 Mountain Boulevard
Watchung, NJ 07069
Via email: tatkins@watchungnj.gov

Submitted by:

Vision Air Research, Inc.
904 East Washington Street
Boise, Idaho 83712
(208) 841-9566
TIN: 82-0527663
Susan Bernatas, President / Certified Wildlife Biologist

April 28, 2017

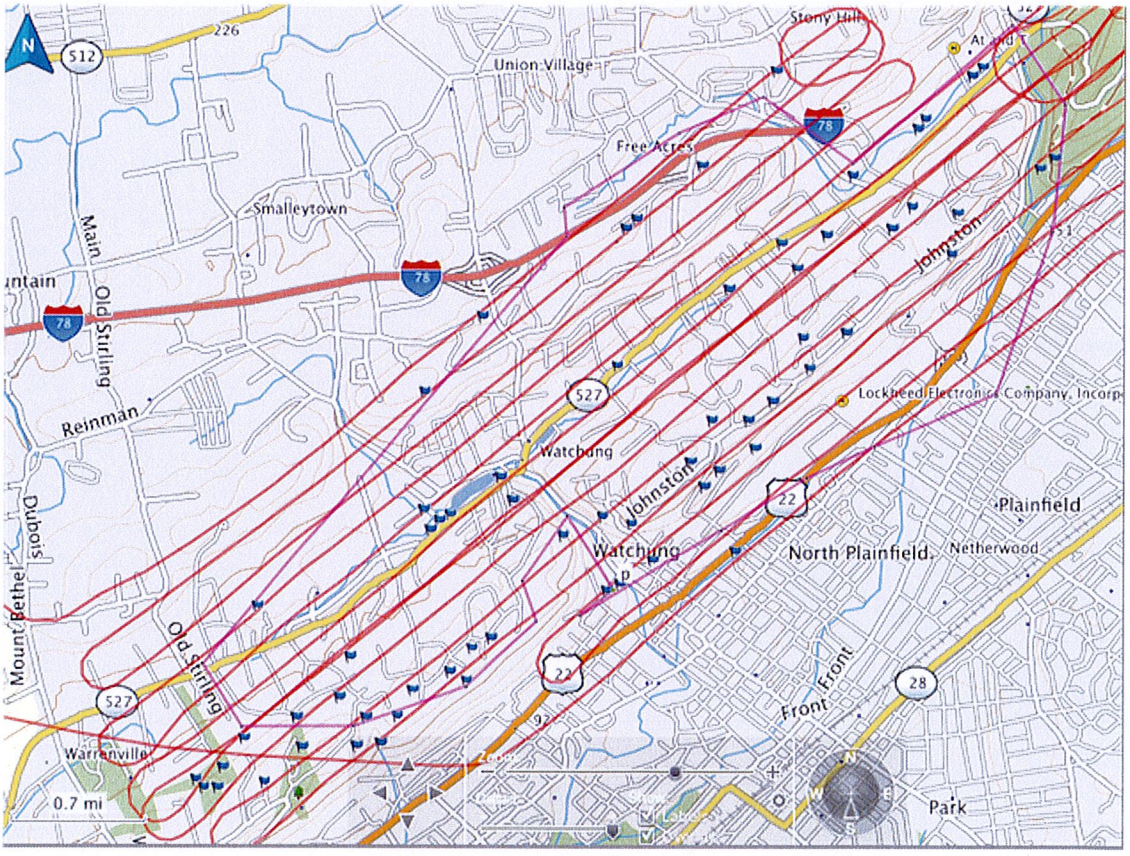
Final Report

Vision Air Research was retained to conduct an aerial infrared deer survey of the Borough of Watchung, Somerset County, New Jersey. The goal of the thermal infrared imaging aerial surveys was to provided distribution and abundance of white-tailed deer within the Borough.

METHODS

The perimeter of Watchung was identified using the area depicted in Google Maps and was verified as correct with the Borough of Watchung staff prior to conducting the survey. An array of transects was established across the project area trending northeast to southwest along the project length. Elevations ranged from about 300 ft mean sea level at the east end to about 500 ft. MSL on the top ridge. We flew at 1,000 ft above ground level (AGL). Parallel transects were established across the Borough spaced 800 ft apart (Figure 1).

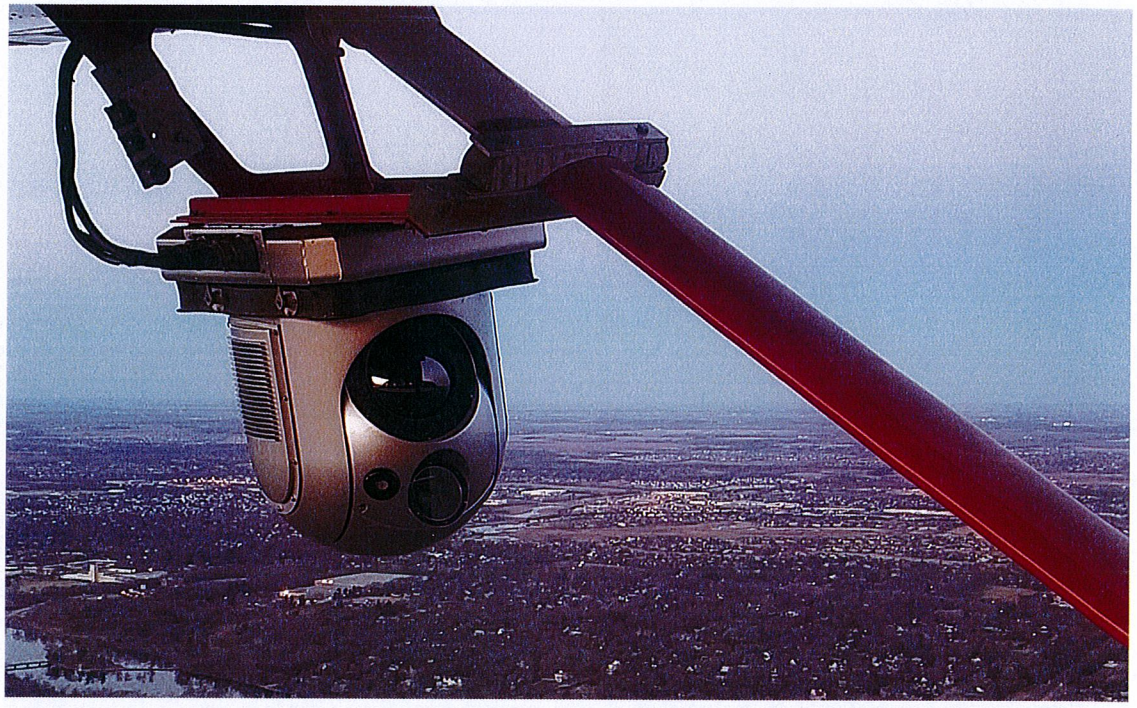
Figure 1. Transects established for the infrared deer surveys conducted by Vision Air Research on February 2017. The flight tracks, in red, were flown along transects established across the Borough of Watchung.



This survey was conducted February 11, 2017 between 1400 – 1700 hrs. Temperature and dew point were 14 ° C / 4 ° C (57 ° F / 39 ° F), respectively. Skies were clear at the start of the survey period; a broken cloud layer formed at 10,000 ft AGL by survey completion. Winds were light through out the survey session.

We used the PolyTech, Kelvin 350 II, which includes the Thermovision 1000 infrared radiometer and a SONY video camera (Figure 2). The sensor can detect a thermal delta of 0.1 C and has an array of 800 by 400.

Figure 2. Forward – looking infrared (FLIR) mounted on the wing strut.



We developed a transect arrays for the project area to provide complete coverage based on terrain, vegetation cover type and animal behavior. Cover types included deciduous forests, mixed forests, open fields, meadows, stores, construction sites, parking lots, and residential areas. Digital infrared video was collected of all survey flights to an on-board computer. The GPS data (e.g., latitude and longitude) and sensor information (e.g., elevation and azimuth) were displayed as a video overlay. The sensor was connected to a professional quality monitor for use by the sensor operator / wildlife biologist during the flight. After the survey, we map the deer groups to their location on the ground. Deer position location is approximate.

RESULTS

A total of 165 deer were located within 65 groups (Appendix A). Group sizes ranged from 1 to 4 individuals. The sensor looked in front of the airplane therefore at the end of the transect the sensor is observing area outside the project area. Since deer move these deer

groups are worth noting. This is especially true given the phenological progression during this survey. Although the survey was conducted in mid – February, which would be, considered winter in many years this year it was pushing the start of spring. This winter was particularly mild both in terms of temperature and snow cover. While freezing temperatures are not required for an infrared survey, the start of green up (grass growing) can influence the locations deer congregate. The trees were not starting bud break that would have shut down the survey for the season. We only conduct surveys when weather conditions are good for infrared data collection and safety considerations. Finding perfect weather conditions and replicable conditions in the northeast, particularly in the winter is ideal but not realistic.

Calculating precise detection rates for Watchung, NJ was out of the scope of work for this project. Previous efforts can elucidated potential detection rates however. The research projects I've conducted to determine detection rates have been based on know target subjects, where one or more individuals in a group having a radio-collar. The location of the target subject (i.e., radio-collared animal) was monitored by a second aircrew in another airplane or via ground based crews to avoid any detection bias and verify location and movement of these subjects. These controls allowed me to determine if the individual or groups that were detected were the subject animals as this is crucial to understanding the hit or miss rate of variables used to assess detection rate. And, this allows an understanding of what variables influence detection rate. Knowing if you are detecting your subject allows you to determine if the subject was missed and understand the variables that can lead to missed groups. Being able to keep track of the subject group allows confirmation that the group / individual was missed or had moved out of the survey area. If they had moved out of the survey area, then they would not be considered available, and therefore no longer part of the sample. As such, they could not be included in a hit / miss ratio. In areas where no collared animals were available, previously detected animal were used as targeted in subsequent replicates. This is similar to a mark - recapture methods for determining detection.

These efforts have revealed a consistency as to which variable influence detection. The vegetation cover type is the primary variable to confound detection rates. Infrared cannot detect or "see" through canopy cover. As such, evergreen species can thwart detection. Ranches and tree boles can also influence detection based on the size of the animal (Figure 3). Conifer deceases detection rates because IR doesn't see through anything. But the use of infrared does provide increased contrast for greater detection of deer compared to human vision. Detection rate for open areas such as parks and meadows can be 100 % (Figure 4). Deciduous forests were found to have a detection rate of 86 %, and conifer ranged from 50 – 80 % or and is strongly correlated to canopy closure. Cloud cover can enhance detection. Ambient temperature does not include detection unless it changes the subject animal's behavior or habitat use making the animal unavailable for detection.

The multiple look angles provided by a FLIR create more opportunity to detect animals. The oblique camera angle and the ability to aim and focus the sensor can assist in increasing detection. Video capture instead of still images provides a dynamic view of the landscape. All wildlife surveys are a snapshot in time. Surveys can provide a good index

or baseline for density and distribution of deer within a community. Replicates or repeat surveys increase confidence in survey data by reducing variability.

Figure 3. Two deer located within a mixed forest cover type in the Bourough of Watchung, NJ during the infrared survey conducted by Vision Air Research on February 11, 2017.

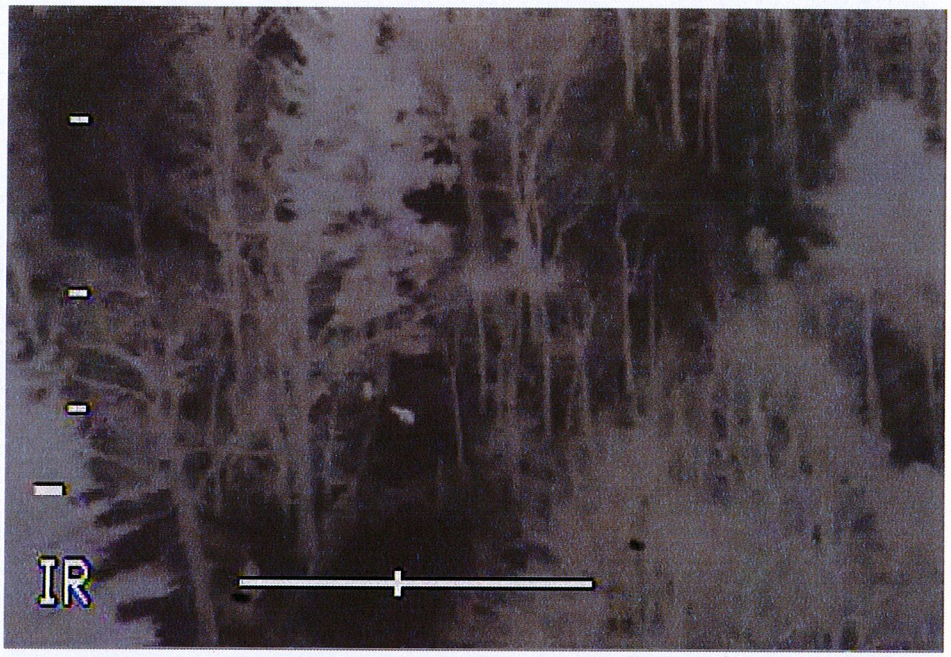
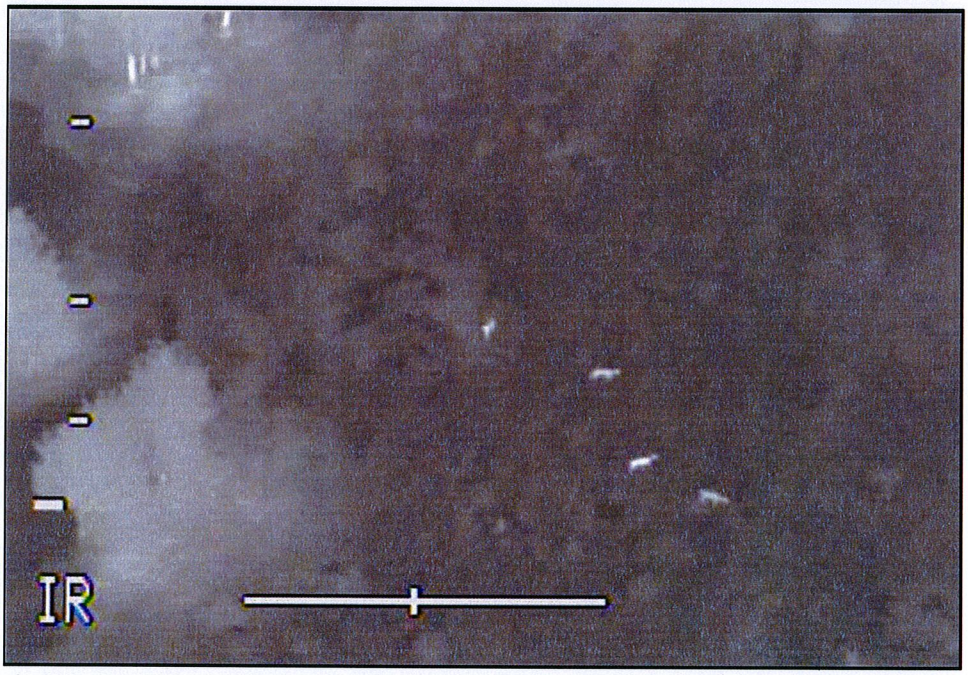


Figure 4. Deer located in an open meadow have a near 100 % detection rate.



Appendix A : Deer Groups located within the Borough of Watchung, New Jersey during the Aerial infrared Deer Survey conducted February 11, 2017 by Vision Air Research. Pink line represents an approximate perimeter of the Borough. Red represents the airplane flight tracks. Blue flags represent the approximate location of the deer groups.


N
78
78
Watchung
North Plainfield
22
28
Plainfield
0.7 mi
Zoom:
Detail
Show:
Labels

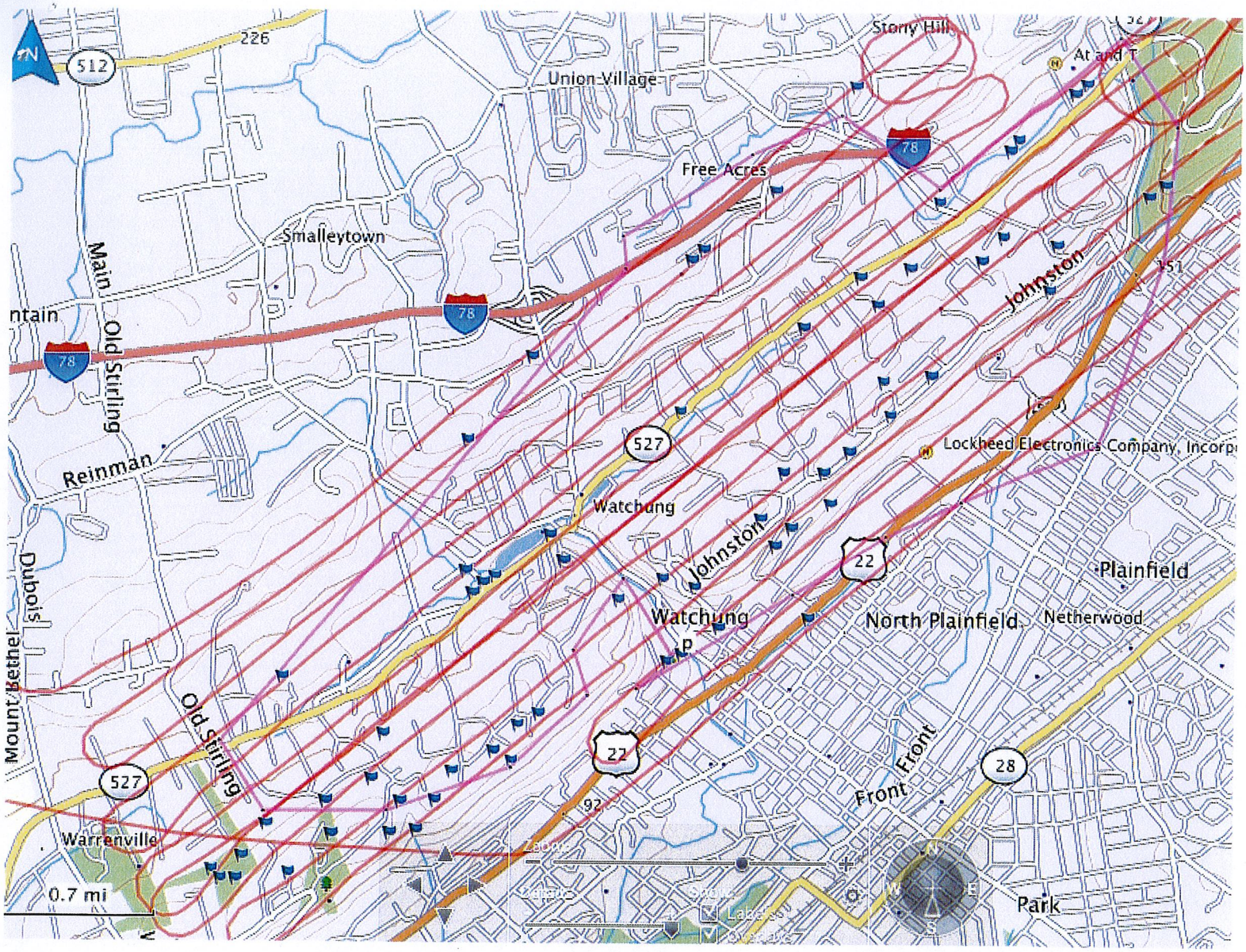

N
512
226
Union Village
Starry Hill
At and T
78
Free Acres
Smalleytown
Main
Old Stirling
ntain
78
78
Johnston
527
Reinman
Lockheed Electronics Company, Incorp
Watchung
Johnston
22
Plainfield
Watchung
North Plainfield
Netherwood
Dubois
Mount Bethel
Old Stirling
527
27
Front
Front
28
92
Warrenville
0.7 mi
Park

Figure 4. Deer located in an open meadow have a near 100 % detection rate.

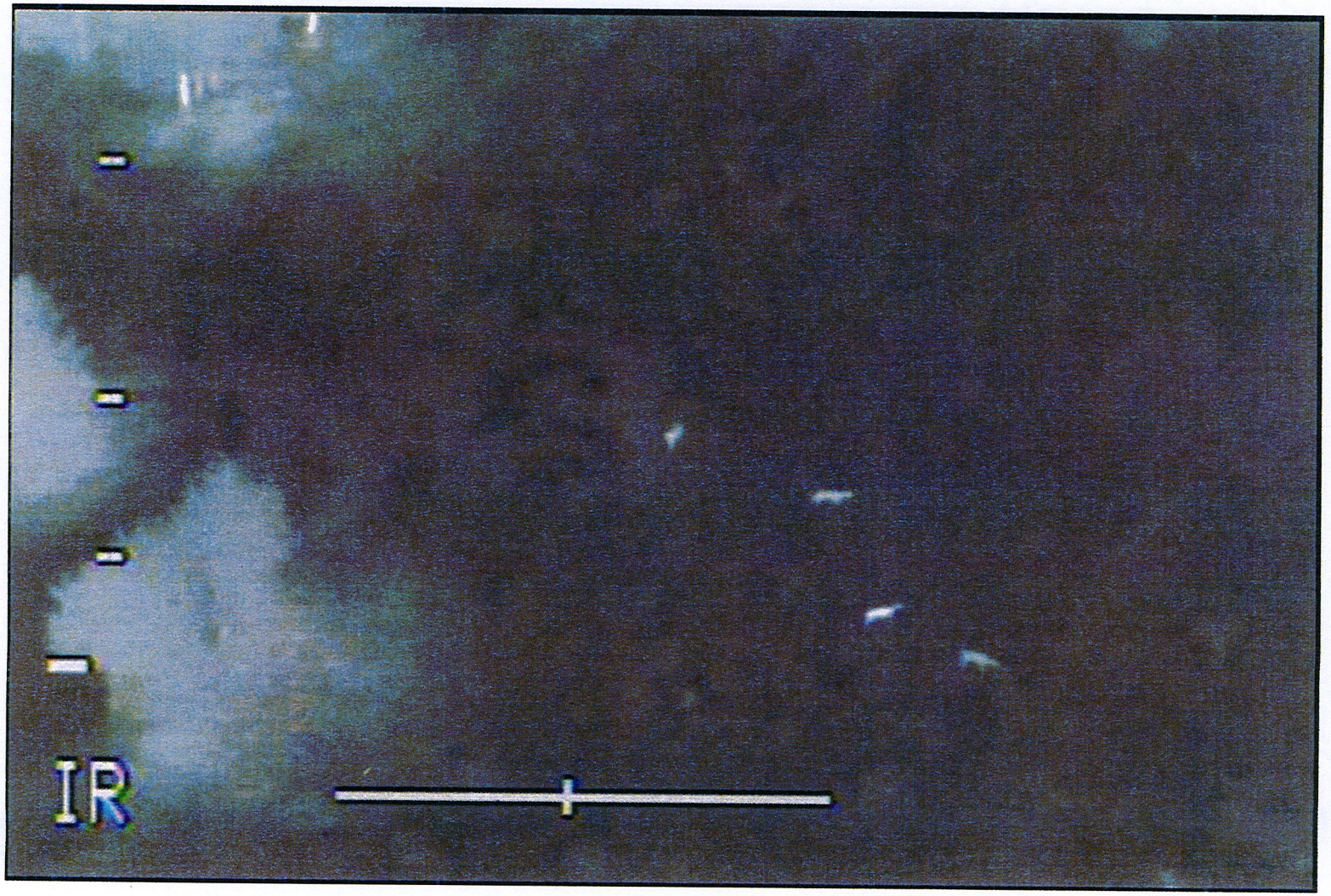
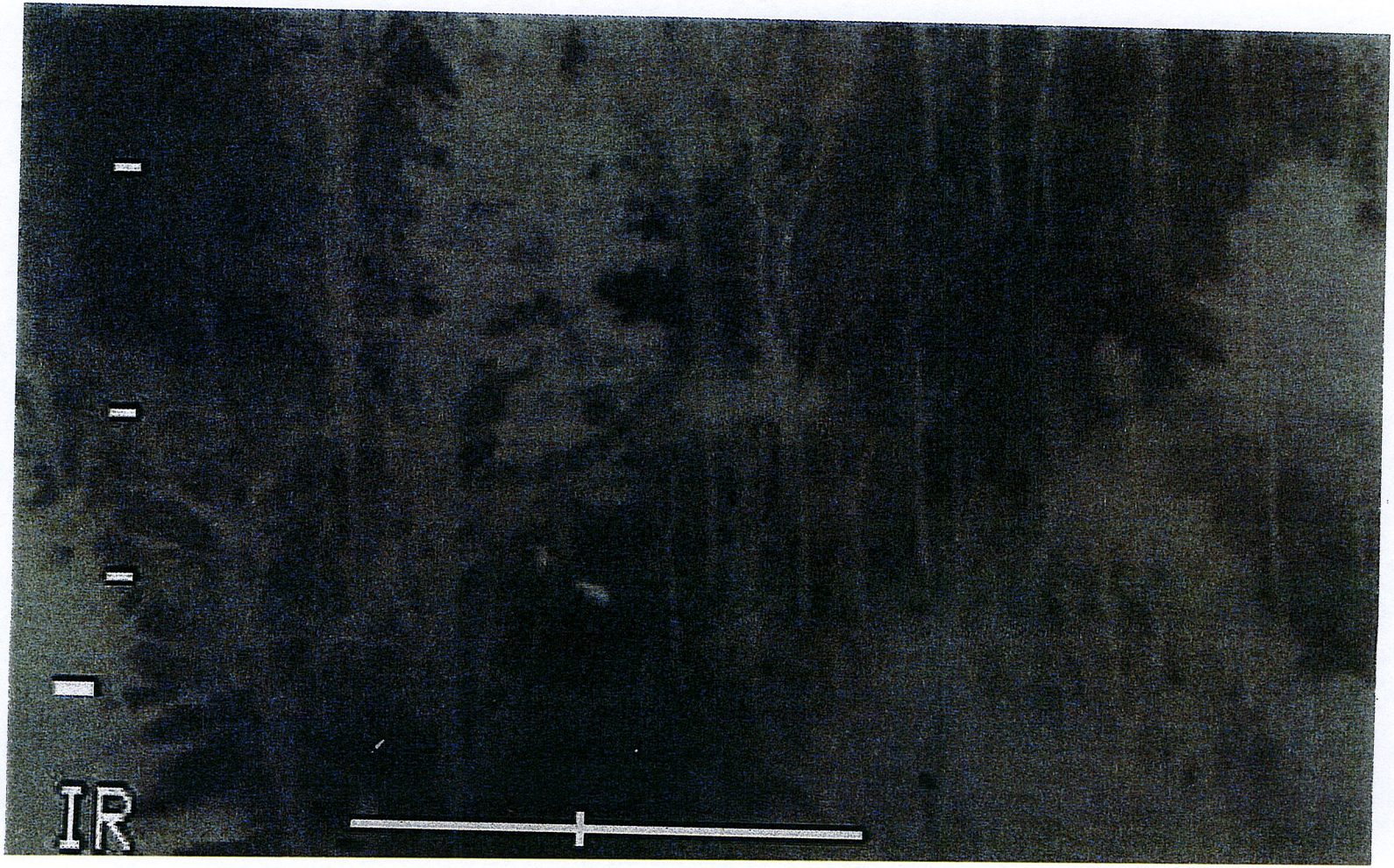
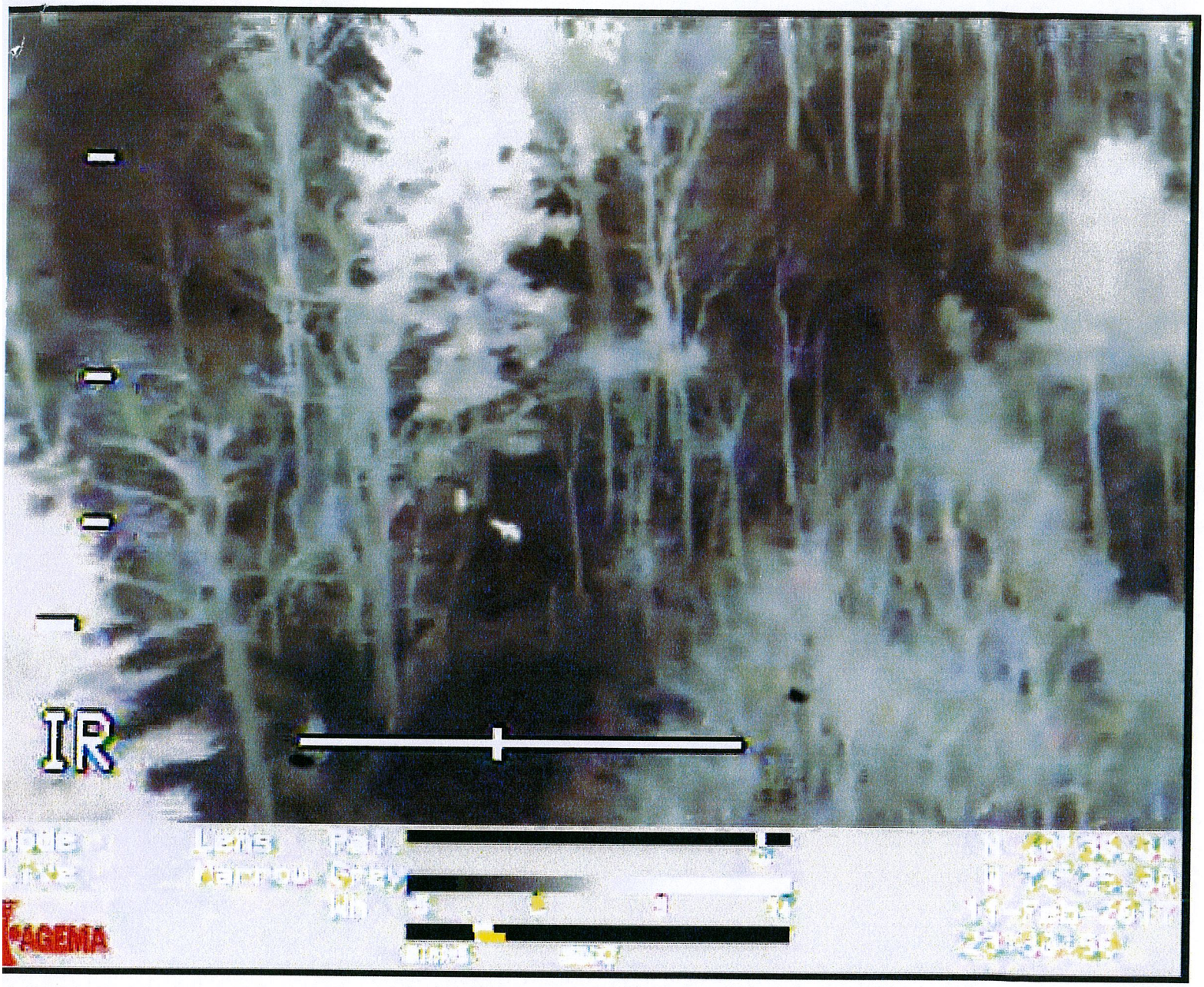


Figure 3. Two deer located within a mixed forest cover type in the Bourough of Watchung, NJ during the infrared survey conducted by Vision Air Research on February 11, 2017.




IR
PAGEMA