Aerial Infrared Deer Survey

Shelter Island, NY

Three deer walking through a deciduous forest.

Submitted to:

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Aerial Infrared Deer Survey – Shelter Island, March 2007

Vision Air Research, Inc. was retained to conduct a survey for white-tailed deer for Shelter Island, NY, Police Department. This survey project included the entire island. The goal of the forward-looking infrared (FLIR) survey was to enumerate the deer detected.

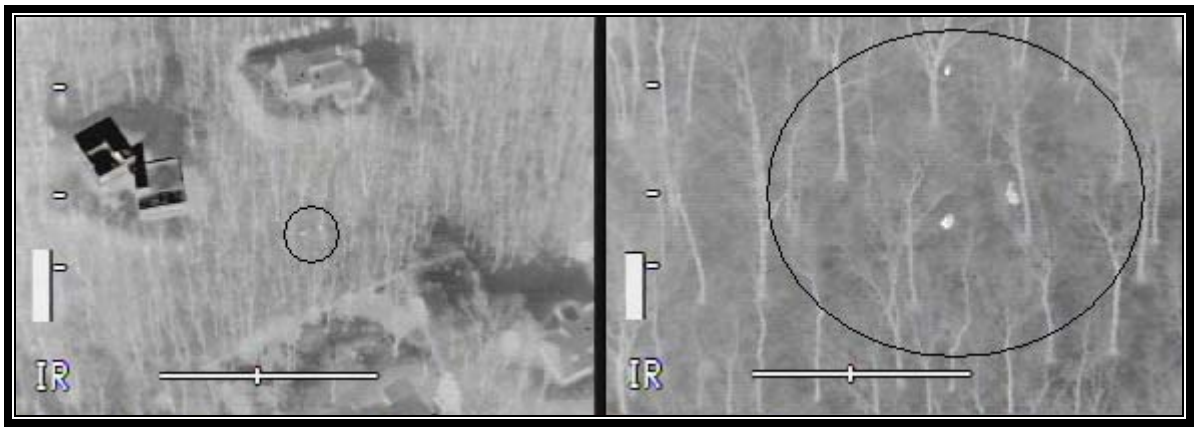
Methods

The survey used the same methods, techniques, equipment, and sensor operator as used by Vision Air Research to conduct the December 2005 survey. The survey was conducted in the night of March 13, 2007, commencing after 7 pm. The survey was conducted under good conditions for infrared wildlife surveys and flight safety.

The survey was conducted using transects which ran northwest – southeast and were spaced 700 ft apart. Flight altitude was 1,000 ft above ground level of the highest point on the property. The sensor look angle was held at roughly 45 ^{o} elevation or down look angle. A slight side-to-side sweep was used. This sweep increased detection by increasing look angles.

The portion of the flight within the study area was recorded on videotape. The pilot and sensor operator communicated to verify the location of the boundaries to turn the tape off and on. The sensor operator turned the tape off at the transect end and commenced recording at the start of the transect. Deer were located by observing their level of emitted infrared energy versus background levels. We have the ability to switch fields of view to zoom in and confirm subject as needed (Figure 1).

Figure 1. Three deer were bedded between homes on Shelter Island, NY in March 2007 during the infrared survey conducted by Vision Air Research, Boise, ID. The left infrared image is taken with the wide field of view while the right image is taken by switching to the narrow field of view.



The tapes were reviewed by playing the tape backward and forward and in slow motion to identify deer and map their location. Duplicates or repeat deer between transects were identified and eliminated as needed. Individual deer groups were mapped to their location on the ground. The base layer for mapping was orthophoto quadrangles which provide vegetation cover type. This photography was more than one year old, therefore, it was expected that some cover types may have changed. Since deer move approximate location of the deer should not confound development of deer management objectives.

Equipment

We used a PolyTech Kelvin 350 II (Sweden) mounted on the left wing of a Cessna 206 "Stationair" (Figure 2). The sensor gimbal allows 330 ^{o} of azimuth and 90 ^{o} of elevation allowing us to look in all directions except directly behind the airplane. The infrared sensor installed in the gimbal is the high resolution Agema Thermovision 1000, which is a long wave system (8-12 micron).

It has 800 by 400 pixels providing good resolution with the ability to determine animals by their morphology or body shape. The thermal delta is less than 1 ^{o} C, which means it can detect objects with less than 1 ^{o} C different than the background. There are 2 fields of view (FOV): wide (20 ^{o}) and narrow (5 ^{o}). At 1,000 ft. above ground level looking straight down using the wide FOV the footprint or area covered by the sensor is 360 ft. x 234 ft. while the narrow FOV provides a footprint 90 ft. x 59 ft.

The sensor operator / wildlife biologist sat in the rear seat and watched a high resolution 15 in. monitor to aim and focus sensor. We recorded the infrared on mini-digital videotape (Mini DV). Thermography data and look angles (i.e., azimuth and elevation) data were overlaid on the screen.

Figure 2. Polytech Kelvin 350 II gimbal with infrared sensor (upper, larger lense) and natural color video camera (lower, smaller lense) use for the aerial infrared deer survey.

Results

There were 360 deer in 108 groups found in March 2007. There were 570 deer in 189 groups found in November 2005. Figure 3 shows the deer distribution in November 2005 and March 2007. A map of deer distribution and group sizes was provided for 2005 under previous contract. The 2007 deer group distribution and relative group size is provided as a pdf file and forwarded to the Police Department under this contract.

The visibility or ability to detect a deer through the vegetation ranged from 40 – 100 %. The background noise such as puddles, rocks and some vegetation can confound detection of deer. In addition, the overstory vegetation can mask or hid the deer groups in dense conifer types. Our previous research indicates an 82 - 87 % detection rate is expected in deciduous forest cover types, 100 % in open meadows and agricultural fields, and 30 – 60 % in conifer cover types.

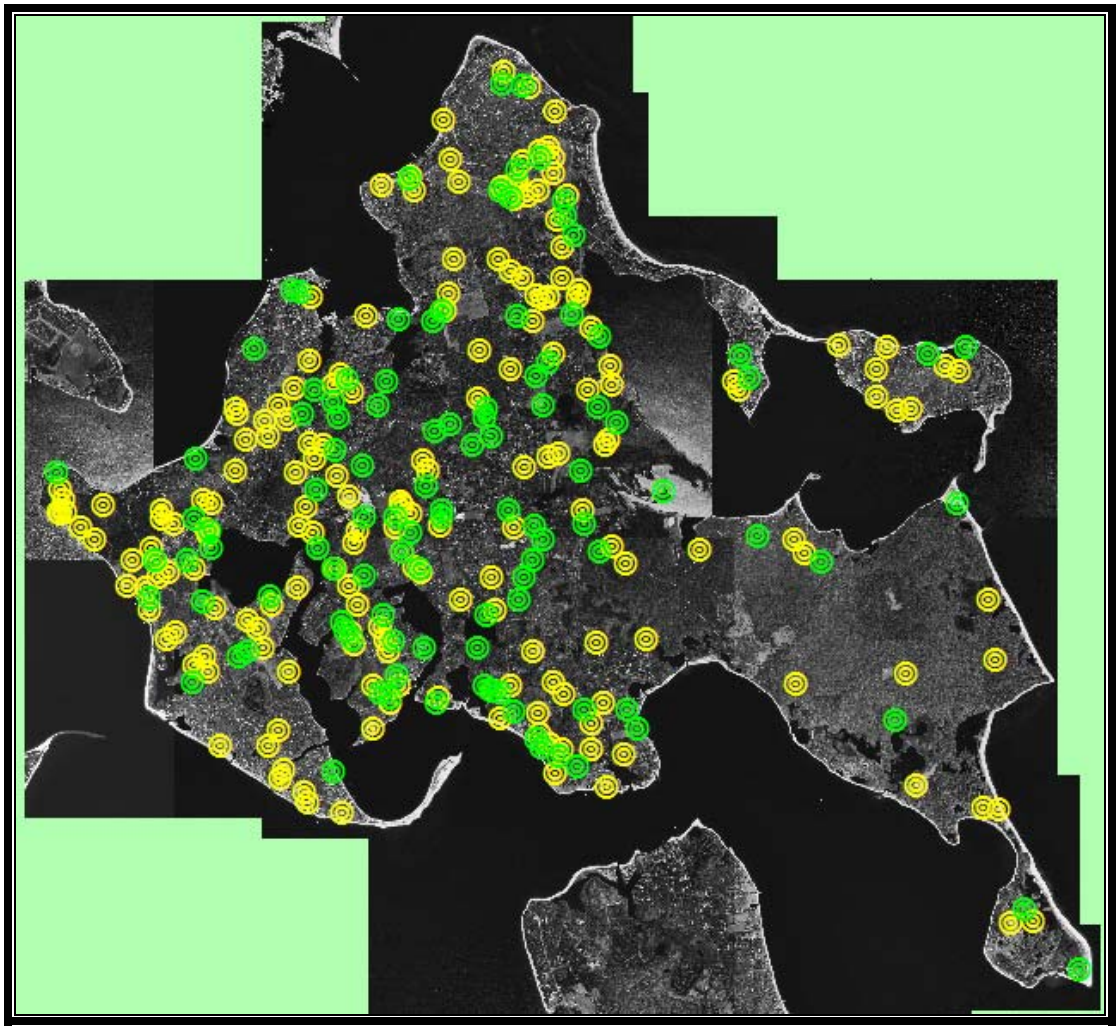



Figure 3. Deer group distribution for November 2005 is noted as yellow targets and March 2007 distribution is noted as green targets. Both surveys were conducted using aerial infrared (forward – looking infrared or FLIR) by Vision Air Research, Boise ID.