Iowa Ornithologists' Union

# IOU News

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# Spatial Analysis of Ring-necked Pheasant GPS Tracking Data: A Pilot Project

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DEPARTMENT OF BIOLOGICAL SCIENCES
UPPER IOWA UNIVERSITY
Established in 1857®
Faculty Advisor: Dr. Aaron Haines

## Introduction

The use of Global Positioning System (GPS) telemetry, as opposed to traditional VHF telemetry, to monitor the spatial movements of wildlife has been increasing in popularity for the last two decades (Hebblewhite and Haydon 2010). Benefits of GPS telemetry include increased precision and reduced sampling bias in location estimation, increased ability to monitor wide-ranging species and increased insights into climate-movement and habitat selection. However, studies using GPS telemetry are often associated with lower sample sizes due to the high costs of using this technology (Hebblewhite and Haydon 2010).

**FIGURE 1. Ring-necked pheasant in Fayette County, Iowa.**

Our objective was to use GPS telemetry to evaluate the spatial movements of ring-necked pheasants (Phasianus colchicus) (Figure 1) during the winter season and evaluate the impacts of winter weather on pheasant movements. To date we have not identified any studies that have monitored pheasant movements using GPS telemetry.

## Materials & Methods

For this pilot project we chose to use the Quantum 4000 enhanced GPS unit from Telemetry Solutions®. This technology is new and is still in the testing stage but will soon be ready for research applications. The Quantum 4000 enhanced GPS unit can weigh between 30-40 grams for gallinaceous birds, so we only placed

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it on larger rooster pheasants (>2kg). We developed a necklace or 'poncho' collar design to harness this unit onto the birds. This collar design has been successfully used with other game birds (Amstrup 1980). Ring-necked pheasants were captured using a walk-in style trap baited with whole corn (Figure 2).

**FIGURE 2. Pheasants being captured in a walk-in trap.**

The GPS collar was scheduled to take a location every 20 minutes and we only recorded data with a 3D location quality (i.e., a minimum of three satellites triangulated on the collars position). GPS locations were able to be downloaded remotely using a remote download station connected to a laptop computer (Figure 3). We used the SW Telemetry Solutions program to download pheasant location data from the GPS collar and we were able to convert the data into shapefiles for spatial analysis.

During this study we captured and monitored 3 ring-necked pheasants using GPS telemetry. However, we only obtained enough data from one bird for quantitative

**FIGURE 3. Undergraduate researcher using VHF telemetry to locate ring-necked pheasants in order to remotely download GPS spatial locations from a pheasant GPS collar.**

analysis. We obtained home range size estimates for this one bird using the 95% minimum convex polygon, 95% fixed kernel and 95% harmonic mean home range estimators. All home range calculations were conducted using the BIOTAS spatial analysis software (Ecological Software Solutions 1998-2010). Pheasant daily movements were calculated in ArcGIS by summing distances between pheasant daytime locations.

Hourly weather data was obtained from weather-warehouse (www.weather-warehouse.com), which included data on temperature, dew point, precipitation, visibility, cloud cover, wind speed, and humidity. To analyze the impacts of winter data on pheasant activity, we classified the bird as either active or inactive during the day based on its movement patterns. We used Microsoft Excel to conduct T-tests to compare mean values of each weather variable between periods of pheasant daily activity and inactivity. We compared the ring-necked pheasant's night roosting habitat locations to random habitat points found within its home range. Habitat variables that were compared for analysis included canopy cover, ground cover, and vegetation height. In addition, if a roost tree was present at a site the height and diameter breast height of the tree was recorded. Mann-Whitney non-parametric tests were used to compare the mean habitat measurements between pheasant roost sites and random sites. Statistical significance for all statistical tests was based on a $P < 0.05$.

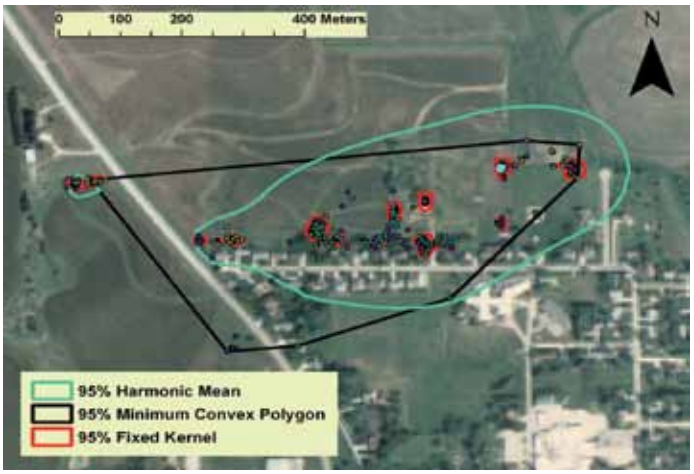


**FIGURE 4. Home range size estimates of a ring-necked pheasant monitored in Fayette County, Iowa.**

**FIGURE 5. Roost site habitats selected by a ring-necked pheasant in Fayette County, Iowa.**

## Results

We monitored our GPS collared ring-necked pheasant for 18 days and downloaded a total of 1,212 locations. Our pheasant had an 18-day home range size of 18 ha using the minimum convex polygon, 17 ha using the harmonic mean and only 0.80 ha using the fixed kernel (Figure 4). We found that our pheasant's average daily movement was 583 ± 291 meters.

We found that our pheasant was active during periods of significantly lower daily visibility, dense cloud cover, light wind and high humidity ($P < 0.05$). In addition, we found that our pheasant preferred to roost in areas that had significantly greater canopy cover. We found that 5 of the 8 pheasant roost sites had greater than 95% canopy cover (Figure 5) and these sites were used 15 out of the 18 nights we monitored the bird.

**Literature Cited**

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# ❄ 2011-2012 Christmas Bird Counts ❄

| Date | Count | Compiler | Contact |
|---|---|---|---|
| 12-17 | Mason City | Rita Goranson | retag@mchsi.com |
| 12-17 | Spirit Lake | Lee Schoenewe | lschoe@smunet.net |
| 12-17 | Grinnell | Bob Van Ersvelde | 641-236-6600 or 641-990-0626 |
| 12-17 | Ames | Shane Patterson | shane7896@yahoo.com |
| 12-17 | Cedar Rapids | James Durbin | durbinjames@imonmail.com |
| 12-17 | Sioux City | Jerry Probst | probstsuebee@aol.com |
| 12-17 | Dallas County | Tom Lawson | tom.lawson@mchsi.com |
| 12-17 | Red Rock | Aaron Brees | abrees@hotmail.com |
| 12-17 | Shenandoah | Keith Dyche | kadd27@hotmail.com |
| 12-17 | Burlington | Chuck Fuller | cfuller989@aol.com |
| 12-17 | Dubuque | Charles Winterwood | cwinterwood@yahoo.com |
| 12-17 | Rathbun | Ray Cummins | raymond.madeline@gmail.com |
| 12-17 | Bremer County | Francis Moore | superfoot99@msn.com |
| 12-18 | Waterloo-Cedar Falls | Francis Moore | superfoot99@msn.com |
| 12-18 | Davenport | Kelly McKay | KellyJMcKay@aol.com |
| 12-18 | Ida County | Don Poggensee | donpog@netllc.net |
| 12-18 | Desoto | Jerry Toll | geritol48@cox.net |
| 12-18 | Saylorville | Stephen Dinsmore | cootjr@iastate.edu |
| 12-18 | Iowa City | Chris Edwards | credwards@aol.com |
| 12-19 | Jamaica | Ray Cummins | raymond.madeline@gmail.com |
| 12-19 | Yellow River | Larry Reis | naturalist@neitel.net |
| 12-19 | Keokuk | John Cecil | |
| 12-20 | Clinton | Kelly McKay | KellyJMcKay@aol.com |
| 12-21 | Eldora | Mark Proescholdt | 641-496-5219 |
| 12-21 | Buchanan County | Danny Akers | birdmandan1231@hotmail.com |
| 12-22 | Princeton/Cordova | Kelly McKay | KellyJMcKay@aol.com |
| 12-23 | NW Clayton County | Danny Akers | birdmandan1231@hotmail.com |
| 12-23 | Des Moines | Dennis Thompson | cgthompson@mchsi.com |
| 12-26 | Decorah | Larry Reis | naturalist@neitel.net |
| 12-26 | Muscatine | Kelly McKay | KellyJMcKay@aol.com |
| 12-31 | Humboldt County | Jacob Newton | newtja84@gmail.com |
| 12-31 | Boone County | Mark Widrlechner | Mpwskd@aol.com |
| 12-31 | Neal Smith NWR | Karen Viste-Sparkman | karen_vistesparkman@fws.gov |
| 1-1 | Worth County | Curt Nelson | 641-696-5600 |
| 1-2 | SE Clayton County | Danny Akers | birdmandan1231@hotmail.com |
| 1-4 | Andalusia | Kelly McKay | KellyJMcKay@aol.com |

# 2011 IOU Bird Listing Report Form

Please return this form within a week or so of the new year in order for your totals to be included in the next compilation. Of course, **all categories are optional**. Contributed totals should be accurate as of December 31, 2011, and should adhere to the standards of the official Iowa State List (accidentals and casuals should have Records Committee acceptance).
Return to: Paul Hertzel, 1432 East State Street, Mason City, IA 50401 or send email to: *phertzel@ rconnect.com*

Name:_____

E-mail or postal address:_____

County of residence:_____

Iowa State Life List Total:_____ Personally Found by Me in Iowa: _____

Iowa 2010 Annual List Total:_____ ( Total species seen in Iowa during 2011 ) Yardlist Total:_____

| Regional or Statewide **Big Day*** Totals: | Region | Date | Species | Names of Participants |
|---|---|---|---|---|
| *Example:* | *Dickinson Co* | *16 May 11* | *131* | *Ed Thelen, Lee Schoenewe* |

*Record totals should be accompanied by the species list.

**COUNTY LIST TOTALS**

_____Adair County
_____Adams County
_____Allamakee County
_____Appanoose County
_____Audubon County
_____Benton County
_____Blackhawk County
_____Boone County
_____Bremer County
_____Buchanan County
_____Buena Vista County
_____Butler County
_____Calhoun County
_____Carroll County
_____Cass County
_____Cedar County
_____Cerro Gordo County
_____Cherokee County
_____Chickasaw County
_____Clarke County
_____Clay County
_____Clayton County
_____Clinton County
_____Crawford County
_____Dallas County
_____Davis County
_____Decatur County
_____Delaware County
_____Des Moines County
_____Dickinson County
_____Dubuque County
_____Emmet County
_____Fayette County
_____Floyd County
_____Franklin County
_____Fremont County
_____Greene County
_____Grundy County
_____Guthrie County
_____Hamilton County
_____Hancock County
_____Hardin County
_____Harrison County
_____Henry County
_____Howard County
_____Humboldt County
_____Ida County
_____Iowa County
_____Jackson County
_____Jasper County
_____Jefferson County
_____Johnson County
_____Jones County
_____Keokuk County
_____Kossuth County
_____Lee County
_____Linn County
_____Louisa County
_____Lucas County
_____Lyon County
_____Madison County
_____Mahaska County
_____Marion County
_____Marshall County
_____Mills County
_____Mitchell County
_____Monona County
_____Monroe County
_____Montgomery Co
_____Muscatine County
_____O'Brien County
_____Osceola County
_____Page County
_____Palo Alto County
_____Plymouth County
_____Pocahontas County
_____Polk County
_____Pottawattamie Co
_____Poweshiek County
_____Ringgold County
_____Sac County
_____Scott County
_____Shelby County
_____Sioux County
_____Story County
_____Tama County
_____Taylor County
_____Union County
_____Van Buren County
_____Wapello County
_____Warren County
_____Washington County
_____Wayne County
_____Webster County
_____Winnebago County
_____Winneshiek County
_____Woodbury County
_____Worth County
_____Wright County

County **Total Ticks** _____

# Tracking Pheasants with Satellites, A Pilot Project

*By Dr. Aaron Haines*

For over 60 years biologists have been tracking wildlife, such as the ring-necked pheasants (Phasianus colchicus), with radio-telemetry using a Very High Frequency (i.e., VHF) signal. Tracking information provides insights on how large an area a pheasant uses, the types of habitat they prefer and when they are most active. During the last 15 years, the use of Global Positioning System (GPS) telemetry using satellites to monitor animals in the field has grown in popularity. The use of GPS provides more precise information in regards to animal location (within 5 meters), and location data can be stored and downloaded remotely, thus preventing any animal movement bias caused by a biologist's presence in the field.

The main limitation to the use of GPS is its cost and its heavier weight due to larger batteries. The heavy weight of a GPS unit has been the greatest constraint in using this technology to monitor game birds in the field, and to our knowledge this technology had not yet been used to monitor the movements of ring-necked pheasants. However, as technology progresses, GPS units have become lighter. Recently, Telemetry Solutions™ developed a 30-40 gram GPS unit specially designed for game birds.

Being an Assistant Professor at Upper Iowa University with a focus on conservation management, I had a great interest in testing these new GPS units to monitor ring-necked pheasants in the field. In Iowa, especially in Northeast Iowa, the number of ring-necked pheasants has been declining. A lot of this can be attributed to increased clean farming practices which leaves little habitat for birds, however the last few winters in Iowa have produced greater amounts of ice and snow which have also negatively impacted pheasant populations.

During the winter of 2010-2011, myself and 3 undergraduate researchers, Derek Steele, Mark Brown, and Kiel Middleswart, wanted to test this relatively new GPS technology. Thanks to a teaching with technology grant provided by Upper Iowa University and funds provided by the Fayette Chapter of Pheasants Forever, we got our chance. The GPS collar we tested was called the Quantum Feather-Lite© unit. It allows for remote download of GPS locations while the collar is still on a bird in the field. The collar was also fitted with standard VHF technology, allowing us to find the bird to remotely download GPS data.

Our goals were to 1) see if a rooster can handle carrying the GPS unit, 2) see what habitat these birds use during the winter, 3) see if we can get good location data during cold temperatures and 4) see how winter weather impacts the daily activity of pheasants. We first fitted this new GPS collar on a pen-raised rooster which was released at a local wildlife reserve. The bird easily burst into flight with no noticeable limitation caused by the GPS collar and we were able to get good spatial data. Based on the success with a pen-raised bird, we began trapping efforts for wild birds. We had trapping success for a relatively large rooster located just north of the town of West Union, Iowa. The bird used suburban backyards and agricultural fields during the winter season. We monitored this bird for a total of 18 days before night-trapping the bird to get our expensive collar back (≈$2,000/each).

We were happy with the results. We found that our bird had a preference to roost off the ground in evergreen cover during the winter. We were also able to get numerous locations of the bird and determine when it was active during the day. We found that our bird was most active during the early mornings and late afternoons, also our bird preferred to be active during overcast conditions with low visibility and little wind during the day. We figured that on a white winter landscape the pheasant would be more active during periods of low visibility to avoid being seen by predators, also if the bird was flushed, low-wind conditions would be preferable for more controlled flights and less energy expenditure.

We did notice a couple of limitations with the technology. During very cold conditions (< -15 F°) the GPS battery life was greatly diminished. In addition, we found that we had to get relatively close to the bird (within 50-100 meters) to download GPS locations. Despite these mild set-backs, we believe there is a future for pheasant research and GPS technology. As GPS units get lighter and batteries get stronger, capabilities become more of a reality for tracking birds in the field via satellite. Daily movement information, identification of important roost sites, and influence of weather may just be the beginning into what insights this technology can provide. More information can help us determine how these birds survive in the wild.

# Jennett Heritage Area Dedicated

The 171 acre Jennett Heritage Area was formally dedicated on September 8, 2011. Iowa Ornithologists' Union along with 130 other individuals and organizations helped make this Story County's newest park. Located 3.5 miles south of U.S. 30 at Nevada on County Road S14, it contains prairie, wetlands, ponds, two streams and an unlimited potential for growth as a recreation and wildlife area.



Two large boulders have been placed adjacent to the parking lot with a list of major donors including the Iowa Ornithologists' Union. Be sure to examine the park sign, it was made from recycled plastic containers and should last for years to come.

## BOOK NOTICE

### The Return of Iowa's Bald Eagles by Ty Smedes. 2011.

The Iowan Books, Des Moines, IA. 257 pp.
$24.95 plus postage.

Many members of the IOU are familiar with the photography of Ty Smedes. In this book, he showcases many of his eagle photographs to help discuss the return of Bald Eagles to Iowa. The book is illustrated with more than 200 color photographs of Bald Eagles showing them at the nest, catching prey, interacting with other eagles, and in numerous other situations. The book covers the history of eagles in Iowa and its return as a breeding species, their basic biology, the current status of Bald Eagles in the state, current threats to their populations, Bald Eagles in winter, and Bald Eagle days. Besides his great photographs, author Smedes provides many personal stories of his experiences with eagles. The text and photos are supplemented with several maps and tables that help explain the remarkable return of this species to Iowa. The book ends with a gallery featuring more than 100 images, most of them of Bald Eagles in flight.

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