FEMALE WILD TURKEY ECOLOGY
ON A MIDWEST
RECLAIMED SURFACE MINE

Kenneth S. Delahunt,
Ryan Tebo, Jack Nawrot,
and Clay Nielsen
Cooperative Wildlife Research Laboratory
and
Departments of Zoology and Forestry
Southern Illinois University Carbondale
Study Site:
CONSOL Energy Burning Star 5
8,500 acres
Rowcrop 75%
Forest / grassland 25%
Diverse Wildlife Habitat

Wetlands
Diverse Wildlife Habitat

Grasslands
Barn Owl

Marsh Hawk
Trumpeter Swan
IDNR CONSOL Energy - Burning Star 5 Wildlife Area

Jackson County, Illinois

Submitted
18 March 2010

(Copyrighted images provided by D. Brewer)
Turkey Research

Majority of research in dense forested areas

Minimal research in areas interspersed with agriculture and open grasslands

Few studies on reclaimed surface mine sites
Objectives

Hen, nest, and brood survival rates

Factors limiting hen and nest survival
Objectives

Hen breeding home range
Brooding home range
Brood habitat selection
Methods
Capture and Handling

Rocket netting (Winter 2008 – 2010; 2011-13)

<table>
<thead>
<tr>
<th>Weight</th>
<th>100 g transmitters w/ mortality sensors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td></td>
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</tbody>
</table>
Radiotelemetry Triangulation

>3 compass bearings/bird
>5 locations/week
Breeding Home Range

Home range

>30 locations

Program Locate III
ArcGIS (Hawths tools)
95 & 50% fixed kernel
Brooding Home Range

Home range
4 - week period
>10 locations

Program Locate III
ArcGIS (Hawths tools)
95, 50% fixed kernel
Habitat* Selection

Habitat use

4-week period

2 locations /week

Habitat assessment at each location (5 sample points)

*Brood Nest
Nest Site Habitat

Cover type

Dominant species

Nest visibility
Davis disk

Veg. height

Veg. density
Poor ≤ 5%
Sparse 5-25%
Moderate 25-75%
Good > 75%

Canopy cover

Litter depth

= Sampling location
Land Use Measurements

Elevation

Slope
- Level (< 5°)
- Slight slope (5-20°)
- Steep slope (> 20°)

Distance measurements
- Water source
- Road
- Ag. edge
- Forest cover
Nest Sites and Random Sites

Nest vs. Random

1:1 ratio

ArcGIS - Hawth's tools

Delete points
  Active agriculture
  Gravel roads
  Water
Nest Site Selection and Success

Nest Site vs. Random Site

Successful Nest vs. Failed nest

ANOVA  Logistic Regression
Nesting Variables

**Land use**
- Slope
- Elevation
- Distance to:
  - Agriculture edge
  - Forest cover
  - Permanent water
  - Road edge

**Microhabitat**
- 1 m nest visibility
- Nest vegetation density
- 1 m vegetation density
- Cover pole
- Cover type
- Season
Hen and Nest Survival

Cause of mortality
- Carcass characteristics
- Pattern of crushed eggs
- Tracks/ and or scat

Mortality categories
- Predation (spp.)
- Human caused
- Weather
- Unknown
Results
2008 - 2011

64 Hens*
   (11 Juveniles)

100 Nests
   (Radio hens)

106 Nests

106 Random sites

23 Broods

* 44 (2012 2013)
Hen Survival – 74%

Causes of mortality (n=21)  %

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td>Coyote</td>
<td>42.8</td>
</tr>
<tr>
<td>Bobcat</td>
<td>42.8</td>
</tr>
<tr>
<td>Owl</td>
<td>9.5</td>
</tr>
<tr>
<td>River Otter</td>
<td>4.8</td>
</tr>
</tbody>
</table>
Hen Survival

Seasonal* survival

Nesting 68 - 74%
Winter 86%
Brood Survival

Total hatched: 260 (93%)

4 weeks post hatch: 66 (25.4%)
Nest Fate

Nest mortality (77/100)

Mortality Factors %

- Coyotes: 40.3
- Raccoons: 27.3
- Striped skunk: 9.1
- Flood/weather: 7.8
- Unknown: 6.4
- Human: 3.9
- Bobcat: 1.3
- Crow: 1.3
- Opossum: 1.3
- Weasel: 1.3
Nest Survival (23%)

Successful vs. Failed nests

Habitat
Overhead Cover
Trees/shrubs
Grasses -

Land use
Distance to forest cover
Distance to road edge

Logistic Regression
## Vegetation Composition

| Vegetation Type       | Successful % | Failed % | p-value
|-----------------------|--------------|----------|-----------
| Forbs/ Legumes        | 78.3         | 80.5     | 0.0473    |
| Grasses               | 56.5         | 71.4     | 0.0606    |
| Briars / Vines        | 73.9         | 64.9     |           |
| Trees/ Shrubs         | 56.5         | 35.1     |           |
Successful vs. Failed Nests

Cover pole average

\( P = 0.0277 \)
Nest Site Selection

Nest Site vs. Random Site

Habitat

Land use
## Vegetation Composition

<table>
<thead>
<tr>
<th></th>
<th>Nest</th>
<th>Random</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Forbs/ Legumes</td>
<td>80</td>
<td>Forbs/ Legumes</td>
<td>78</td>
<td></td>
</tr>
<tr>
<td>Grasses</td>
<td>69</td>
<td>Grasses</td>
<td>77</td>
<td></td>
</tr>
<tr>
<td>Briars / Vines</td>
<td>68</td>
<td>Briars / Vines</td>
<td>16</td>
<td></td>
</tr>
<tr>
<td>Trees / Shrubs</td>
<td>41</td>
<td>Trees / Shrubs</td>
<td>42</td>
<td></td>
</tr>
</tbody>
</table>

< 0.0001
Nest Site vs. Random Site

Mean visibility at 1 m
(P < 0.0001)

- Nest: 22.5%
- Random Sites: 64.3%

Vegetation density
(P <= 0.0001)

- Nest: 66.2%
- Random Sites: 52.7%
Nest Site vs. Random Site

**Cover pole average**

\( (P < 0.0001) \)

<table>
<thead>
<tr>
<th>Vegetation Obstruction (cm)</th>
<th>Nest</th>
<th>Random Sites</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>136</td>
<td>79</td>
</tr>
</tbody>
</table>

**Mean vegetation density 1 m**

\( (P < 0.0001) \)

<table>
<thead>
<tr>
<th>Vegetation Density (%)</th>
<th>Nest</th>
<th>Random Sites</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>70.9</td>
<td>51.4</td>
</tr>
</tbody>
</table>
Nest Site vs. Random Site

Distance to Agriculture

\( P = 0.0004 \)

Distance to Forest

\( P < 0.0001 \)
Breeding Home Range

95% Range
1121 ac

50% Core area
226 ac
Brooding Home Range

15 Brooding home ranges

95% Range
244.1 ac

50% Core
68.9 ac
## Brooding Habitat Selection

167 Brooding sites, 149 Random Brooding sites

<table>
<thead>
<tr>
<th>Cover</th>
<th>Brooding</th>
<th>Expected</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Forest</td>
<td>90.4</td>
<td>17.4</td>
<td>&lt; 0.0001</td>
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<tr>
<td>Grassland</td>
<td>7.8</td>
<td>38.3</td>
<td>&lt; 0.0001</td>
</tr>
<tr>
<td>Shrubland</td>
<td>1.2</td>
<td>10.1</td>
<td>0.0001</td>
</tr>
<tr>
<td>Agriculture</td>
<td>0.6</td>
<td>34.2</td>
<td>&lt; 0.0001</td>
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## Brooding Habitat Selection

<table>
<thead>
<tr>
<th>Habitat Categories</th>
<th>Brooding</th>
<th>Expected</th>
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<tbody>
<tr>
<td>Vegetation density (25-50%)</td>
<td>41.3</td>
<td>14.8</td>
</tr>
<tr>
<td>Vegetation height (26-50 cm)</td>
<td>45.5</td>
<td>34.9</td>
</tr>
<tr>
<td>Litter depth (0-4 cm)</td>
<td>91.6</td>
<td>51.7</td>
</tr>
<tr>
<td>Canopy cover (50-75%)</td>
<td>43.7</td>
<td>9.4</td>
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</table>
### Brooding Habitat Selection

<table>
<thead>
<tr>
<th>Week</th>
<th>Forest</th>
<th>Grassland</th>
<th>Shrub</th>
<th>Ag</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Upland</td>
<td>Bottomland</td>
<td>Total</td>
<td></td>
</tr>
<tr>
<td>1 (n=20)</td>
<td>52.5</td>
<td>47.5</td>
<td><strong>100</strong></td>
<td>0</td>
</tr>
<tr>
<td>2 (n=17)</td>
<td>39.4</td>
<td>45.4</td>
<td><strong>84.8</strong></td>
<td>12.2</td>
</tr>
<tr>
<td>3 (n=16)</td>
<td>59.4</td>
<td>31.2</td>
<td><strong>90.6</strong></td>
<td>6.3</td>
</tr>
<tr>
<td>4 (n=15)</td>
<td>60.0</td>
<td>23.3</td>
<td><strong>83.3</strong></td>
<td>16.7</td>
</tr>
</tbody>
</table>
Hen Survival (%)

- Illinois: 70.5
- Iowa: 69.5
- Mississippi: 49.7 - 63.8
- Missouri: 43.5
Nest Survival (%)

- New York: 23.2
- Missouri: 30.6
- Mississippi: 27.9
- Illinois: 23.2
Brood Survival (%)

Iowa

Missouri  25.4  40

New York

Alabama  30.2

Illinois  25.4

Massachusetts  23
Hen Survival

Closed roads

Limited access

↑ Hen survival

↓ Hen poaching

↓ Hunting
Brood and Nest Survival

Closed roads
Limited access

↓ Brood and nest survival

↓ Predator poaching

↓ Hunting/trapping

↓ Predator road mortality
Management

Allow predator trapping and hunting

“Predator Proof” Habitat
“Edge Effect”

Rowcrop Reclamation
Nesting Habitat
Linear
Nesting “Edge Effect”

Rowcrop Reclamation

Nesting Habitat - Limited
Brood Habitat Enhancement

Not managed

↑ Litter depth
↓ Foraging efficiency
↓ Poult mobility

Late Old Field
Habitat Management

Early successional cover management

Prescribed Fire*

↓ Litter depth
↑ Seeds and Insects
↑ Foraging efficiency
↑ Available habitat

*2012 2013
Acknowledgements

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