

**The Post-fledging Period & Population Growth Rate of Golden-winged Warblers in the North Cumberland WMA, Tennessee**



Justin Lehman, M.S. Candidate  
University of Tennessee  
Department of Forestry, Wildlife, and Fisheries  
March 26, 2014 - PBB Room 160 - 12:20pm

---

---

---

---

---


---

---

---

**Outline**

- Introduction
- Research Objectives
- Study Areas
- Proposed Methods



---

---

---

---

---


---

---

---

**Introduction - Justification**

- Golden-winged Warbler (GWWA) decline (Sauer et al. 2011)
  - -2.6%/year rangewide
  - -8.5%/year Appalachians
- Habitat Loss, Hybridization, Brood Parasitism (Buehler et al. 2007)



---

---

---

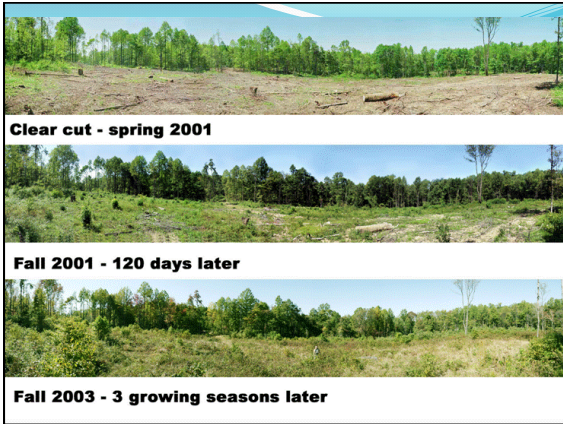
---

---

---

---

---



---

---

---

---

---

---

---

---

### Introduction - Hybridization

**BREEDING RANGE:**

- Blue-winged
- Golden-winged
- Hybrid
- Range
- Overlap

---

---

---

---

---

---

---

---

### Introduction - Ecology

Golden-winged Warbler  
*Vermivora chrysoptera*

**Winter (non-breeding)**  
**Migration**

- **Non-breeding:**
  - C. and S. America
- **Nesting:**
  - Early Successional Habitat
  - 4-6 eggs (Mean = 5)
  - ~25 days (Ehrlich et al. 1988)
- **Post-fledging:**
  - Mature forest? (Streby et al. In revision)

Map by Cornell Lab of Ornithology  
Range data by NatureServe

---

---

---

---

---

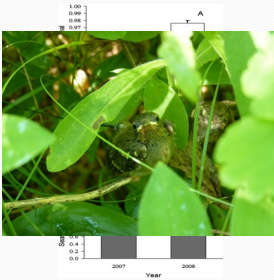
---

---

---

### Introduction – Post-fledging

- Post-fledging stage is important
  - Habitat
  - Ovenbird seasonal productivity (Streby and Anderson 2011)
  - Brood splitting in MN (Peterson et al. In Review)
- Survival often neglected, constant, or by intensive banding
- Radio-transmitters!




---

---

---

---


---

---

---

---

### Introduction – Population Growth



- GWWA population growth
  - BBS Data or without empirical juvenile survival estimates
- Important for source/sink populations
- Is management working?
- Parameter(s) most affecting change

---

---

---

---


---

---

---

---

### Introduction - Collaboration



- Conservation Effects Assessment Project (USDA/NRCS)
- IUP, WVU, ASU, UTK
- Quantify Management Effects on GWWAs

---

---

---

---

---

---

---

---

## Research Objectives

- Study GWWA post-fledging stage in the Cumberland Mountains.
  - Survival estimate
  - Daily movement and brood splitting?
  - Habitat association
- Estimate population growth (or decline) of GWWAs in TN and Appalachian Range

---

---

---

---

---

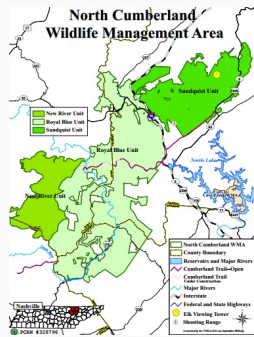
---

---

---

## Study Sites

- North Cumberland WMA
- 2,000-3,000 ft
- 3 Reclaimed Surface Mine Sites
- 3 Timber Harvest Sites
- WV, NC, PA, TN



---

---

---

---

---

---

---

---

## Methods – Data Collection

- 2014 and 2015 summers
- Collaboration
  - 2009-2015 nest survival, male return rates, PA post-fledging
  - Point counts, nesting habitat characteristics, territories, feather samples, etc.



---

---

---

---

---

---

---

---

### Methods – Post-fledging



- Find and monitor nests
- Day 7/8 nestlings
- Figure-8 harness (Rappole and Tipton 1991)

---

---

---

---

---

---

---

---

### Methods – Post-fledging

- Radio-track daily
- Alive?
- GPS location
- Canopy cover
- Basal area
- Vegetation Density
- Parental Care
- Juvenile Activity



---

---

---

---

---

---

---

---

### Methods – Post-fledging



- Survival
  - MARK Known Fate
- Daily Movement
  - ArcGIS
- Habitat
  - Compositional Analysis

---

---

---

---


---

---

---

---

### Methods – Population Growth



- ***P<sub>1a</sub>***
  - Return Rates
  - Breeding season survival
- **F**
  - Brood size
  - Nest Survival
- ***P<sub>1j</sub>***
  - Juvenile survival!

---

---

---

---

---


---

---

---

### Methods – Population Growth

- Adult survival (***P<sub>1a</sub>***)
  - High site fidelity (Will 1986)
  - Capture-
  - Mark-
  - Recapture
    - Resight on study sites



---

---

---

---

---

---

---

---

### Methods – Population Growth



- Fecundity (F) (Etterson at al. 2011)
  - Nest search May-June
    - Brood size
  - Monitor Nests
    - Nest survival (MARK)
  - Renests?

---

---

---

---

---

---

---

---

## Methods – Population Growth

- Leslie Matrix
- Annual growth rate ( $\lambda$ )
  - Adult survival ( $P_a$ )
  - Fecundity ( $F$ )
  - Juvenile Survival ( $P_j$ )




---

---

---

---

---

---

---

---

## Acknowledgments

- Dr. Buehler and past/present graduate students
- USDA/NRCS for funding (CEAP Grant)
- GWWA CEAP Grant collaborators
- Dr. Henry Streby
- D.J. McNeil and Dr. Jeff Larkin

---

---

---

---

---

---

---

---

## Photo Credits

- [http://www.tringa.org/image/8935\\_Golden-winged\\_Warbler\\_05-05-2012\\_09](http://www.tringa.org/image/8935_Golden-winged_Warbler_05-05-2012_09)
- Golden-winged Warbler Working Group (Range Map)
- [http://www.burntridgetreefarm.com/clear\\_cut.htm](http://www.burntridgetreefarm.com/clear_cut.htm)
- <http://edbookphoto.photoshelter.com/image/100000X1petpyAw>
- [http://www.tringa.org/image/8934\\_Blue-winged\\_Warbler\\_04-23-2011\\_2](http://www.tringa.org/image/8934_Blue-winged_Warbler_04-23-2011_2)
- [http://www.briansmallphoto.com/brewsters\\_warbler.html](http://www.briansmallphoto.com/brewsters_warbler.html)
- [http://www.lilbirds.com/gallery2/v/warblers/golden\\_winged\\_warbler/golden-winged\\_warbler\\_2.jpg.html](http://www.lilbirds.com/gallery2/v/warblers/golden_winged_warbler/golden-winged_warbler_2.jpg.html)
- <http://www2.ca.uky.edu/forestry/maehrelk.php>
- <http://www.junglewalk.com/shop/Products/Golden-winged-Warbler-Magnet-4165.htm#Uy8mEfldViY>
- <http://www.mprnews.org/story/2011/06/16/gold-winged-warbler#gallery>
- <http://edburress.blogspot.com/2011/06/bwva-x-gwwa-nestlings.html>
- <http://www.allaboutbirds.org/Page.aspx?pid=2629>
- [http://www.bearriverranch.com/an\\_Snake\\_Black\\_Rat.html](http://www.bearriverranch.com/an_Snake_Black_Rat.html)
- <http://birds.audubon.org/birds/golden-winged-warbler>
- <http://www.lincolnpitcher.com/airswot-2013.html>

---

---

---

---

---

---

---

---

## Literature Cited

- Buehler, D. A., A. M. Roth, R. Vallender, T. C. Will, J. L. Confor, R. A. Canterbury, S. B. Swarthout, K. V. Rosenberg, and L. P. Bulluck. 2007. Status and conservation priorities of Golden-winged Warbler (*Vermivora chrysoptera*) in North America. *Auk* 124:1439–1447.
- Confor, J. L., K. W. Barnes, and E. C. Alvey. 2010. GOLDEN-AND BLUE-WINGED WARBLERS: DISTRIBUTION, NESTING SUCCESS, AND GENETIC DIFFERENCES IN TWO HABITATS. *The Wilson Journal of Ornithology* 122:277–278.
- Ehrlich, P., D. S. Dobkin, and D. Wheye. 1988. *Birders's Handbook*. Simon and Schuster.
- Etersou, M. A., S. N. Ellis-Felege, D. Evers, G. Gauthier, J. A. Grzybowski, B. J. Mattsson, L. R. Nagy, B. J. Olsen, C. M. Pease, M. F. van der Burg, and A. Fortson. 2011. Modeling fecundity in birds: Conceptual overview, current models, and considerations for future developments. *Ecological Modelling* 222:2178–2190.
- Peterson, S.M., H.M. Streby, and D.E. Andersen. In revision. Management implications of brood division in golden-winged warblers. *Studies in Avian Biology*.
- Rappole, J. H., and A. R. Tipton. 1991. New Harness Design for Attachment of Radio Transmitters to Small Passerines (Nuevo Diseño de Arnés para Atar Transmisores a Passeriformes Pequeños). *Journal of Field Ornithology* 62:335-337.
- Sauer, J. R., J. E. Hines, J. E. Fallon, K. L. Pardieck, D. J. Ziclikowski, Jr., and W. A. Link. 2012. *The North American Breeding Bird Survey, Results and Analysis 1966–2011. Version 07.03.2011 USGS Patuxent Wildlife Research Center, Laurel, MD.*
- Streby, H.M., S.M. Peterson, and D.E. Andersen. In revision. Golden-winged warbler fledgling habitat use and survival in the Western Great Lakes region. *Studies in Avian Biology*.
- Streby, H.M. and D.E. Andersen. 2011. Seasonal productivity in a population of migratory songbirds: why nest data are not enough. *Ecosphere* 2(7):1–15.
- Vallender, R., R. Robertson, V. Friesen, and I. Lovette. 2007. Complex hybridization dynamics between golden-winged and blue-winged warblers (*Vermivora chrysoptera* and *Vermivora pinus*) revealed by AFLP, microsatellite, mtDNA markers. *Molecular Ecology* 16:2017–2029.
- Will, T. 1986. Behavioral ecology of species replacement: blue-winged and golden-winged warblers in Michigan. University of Michigan. Ann Arbor, Michigan. Ph. D dissertation.

---



---



---



---



---



---



---



---

## Questions?




---



---



---



---



---



---



---



---