

# Bird Banding:

What we can learn about Golden-cheeked Warbler populations from banding/resighting



Photo of a banded Golden-cheeked Warbler in flight, by volunteer Arman Moreno

**BCCP Coordinating Committee meeting  
Feb 19, 2021**

# WHAT IS BANDING?

- First scientific method used to track migrating animals
- Both passive and targeted methods of capture
- Small aluminum tag with unique ID number, multiple sizes
- In N. America, regulated by USGS Bird Banding Lab, banders must be permitted



# HISTORY OF BIRD BANDING

- **FERDINAND ALBERT I (1636 – 1687)**

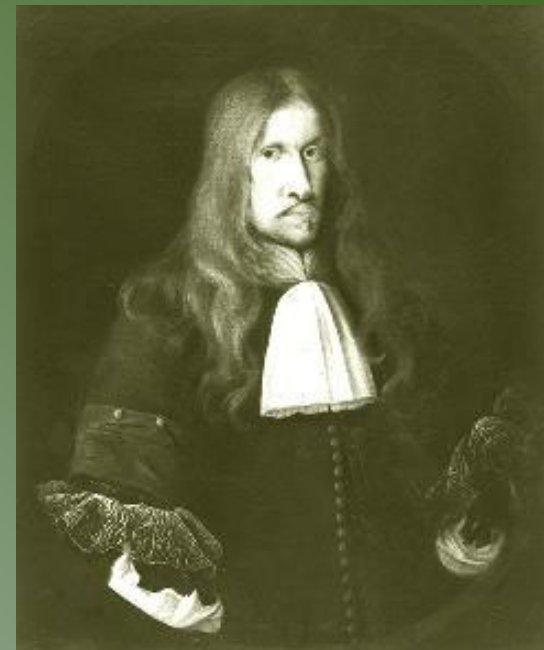
Duke of Brunswick-Lüneburg

- **FERDINAND (1721 – 1792)**

Duke of Brunswick

- **JOHN JAMES AUDUBON (1785 - 1851)**

- **ERNEST THOMPSON SETON (1860 – 1946)**



Ferdinand Albert I (1636 – 1687)

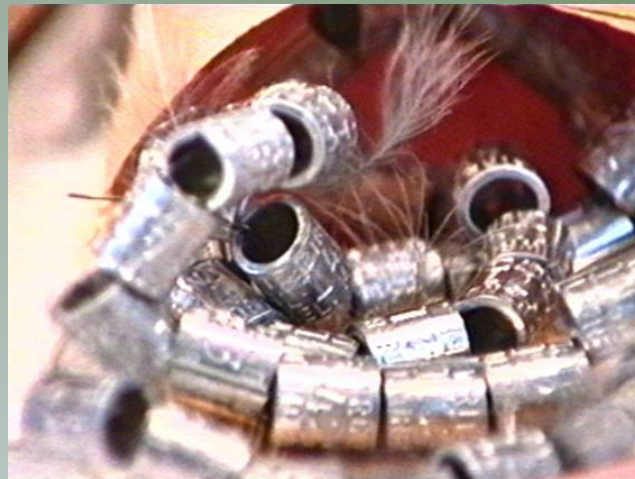




# HISTORY IN N. AMERICA

## FREDERICK LINCOLN (1892 – 1960)

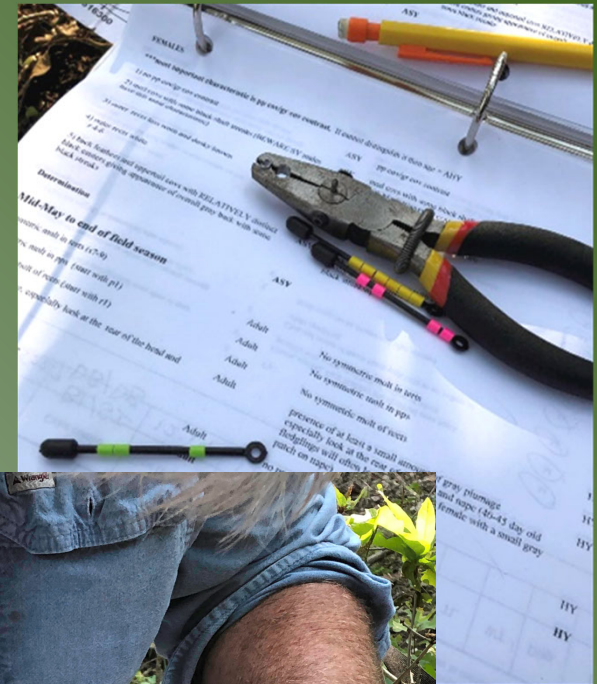
- Designed North American banding
- Migration pathways





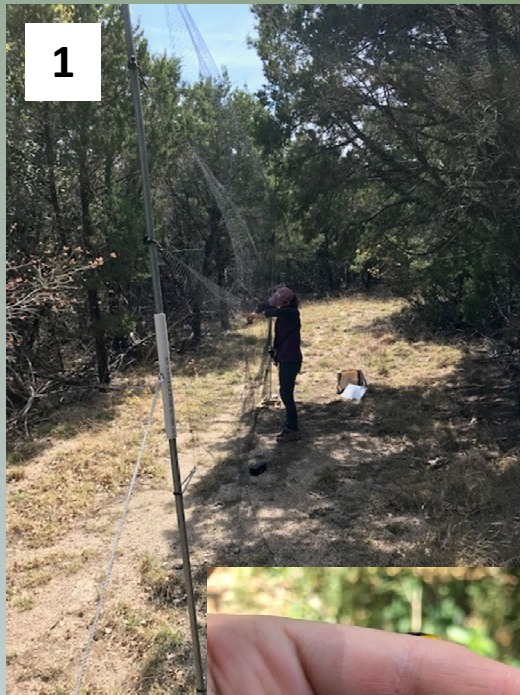
# PURPOSE

- Individual research: behavioral, parasites, energetics, toxicology, genetic, etc.
- Game bird monitoring
- Migration monitoring
- Population Monitoring
- Monitoring individuals (endangered species)
- Public education





# PROCESS

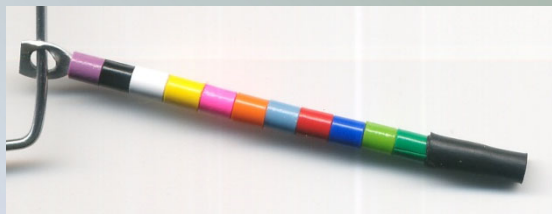




# AUXILIARY MARKERS

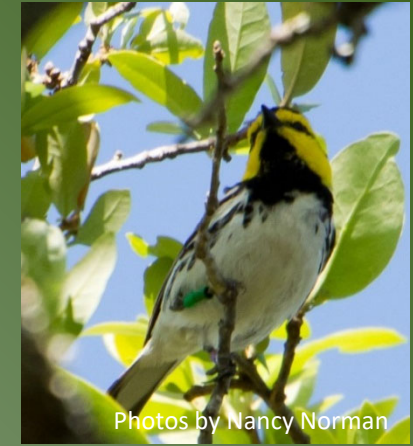
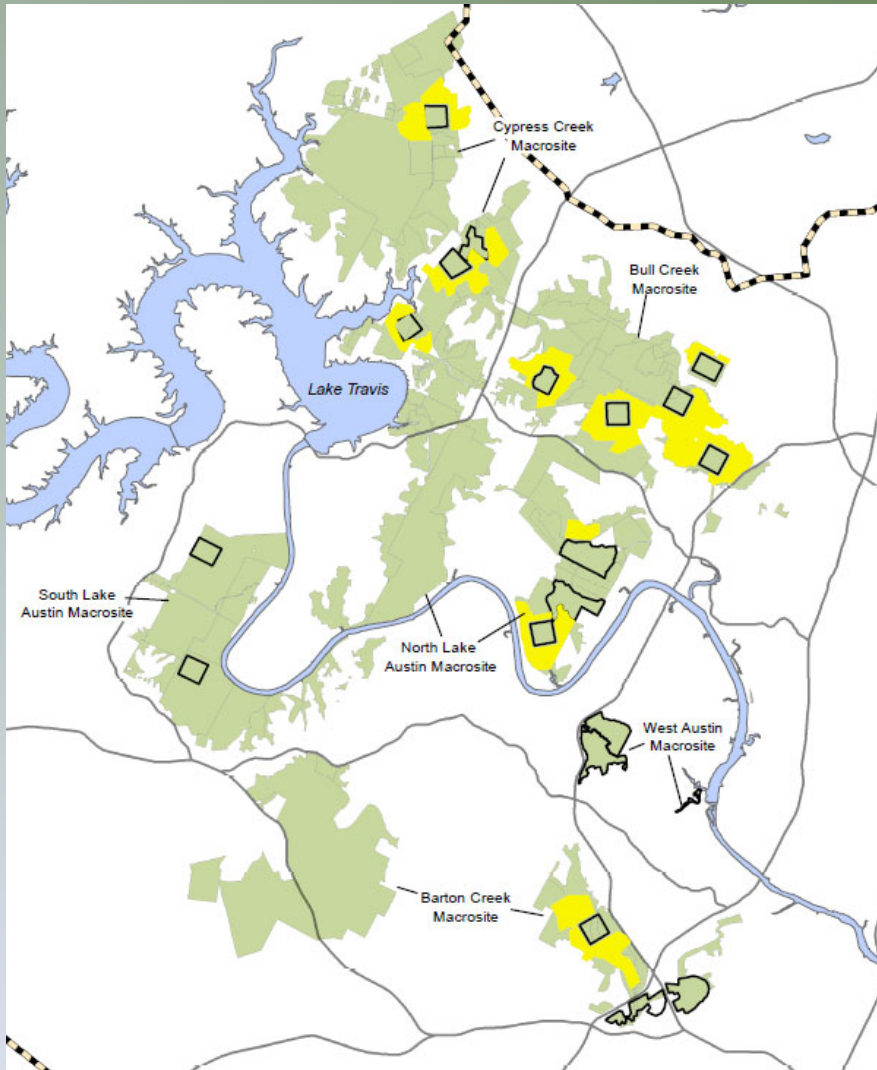
## GCWA Color-banding:

- Pilot study initiated 2009; entering 13<sup>th</sup> year of banding
- Total of 1,426 GCWA banded on BCP
- Average >70% of adult males are banded per plot
- Provides best data on number of territories, as well as survival and productivity





# METHODS: RESIGHTING



Photos by Nancy Norman

- Biologists search for banded birds within intensive monitoring plots
- ~40-60 volunteers/year search for banded GCWAs outside the intensive monitoring plots

# METHODS: INTENSIVE TERRITORY MONITORING

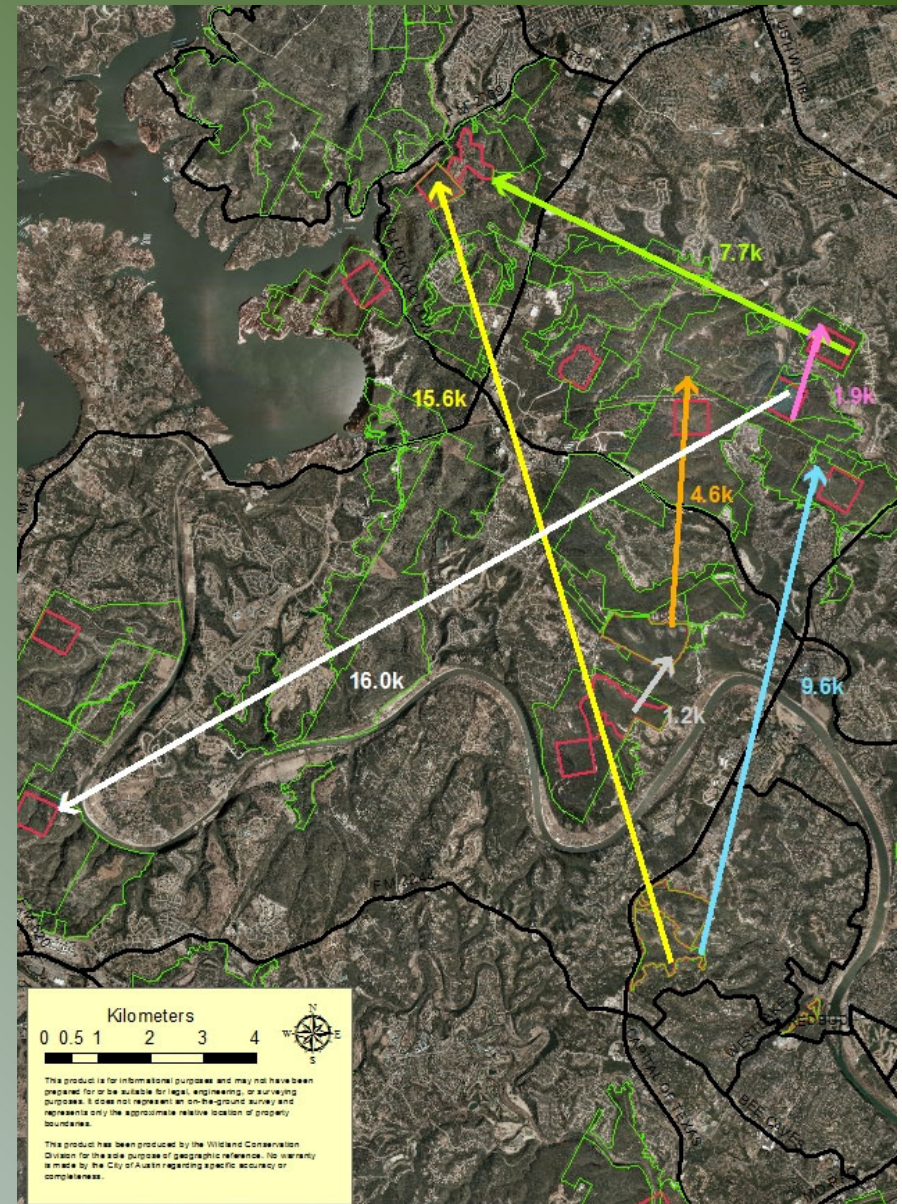
- 16-18 Monitoring Plots
  - 40-180 ha
  - Surveyed  $\geq 2$ x/week
  - March 15 – May 25, 2011-2020
- Typically, 2 biologists per plot
  - Average >130 hours/100 acres
- Color-banded adults (mostly males)
- Nest monitoring
  - ~100 nests/yr
- Productivity monitoring
  - Fledge searches through June





# DISPERSAL

- GCWAs are capable of dispersal, and we have documented GCWAs dispersing up to 16 km within the BCP and from Camp Bullis to BCP.
- However, >90% of the banded GCWAs that return are found in or near the same territory year after year.
- Most dispersal events are females and SY males moving from low quality and small habitat patches to higher quality and large patches.



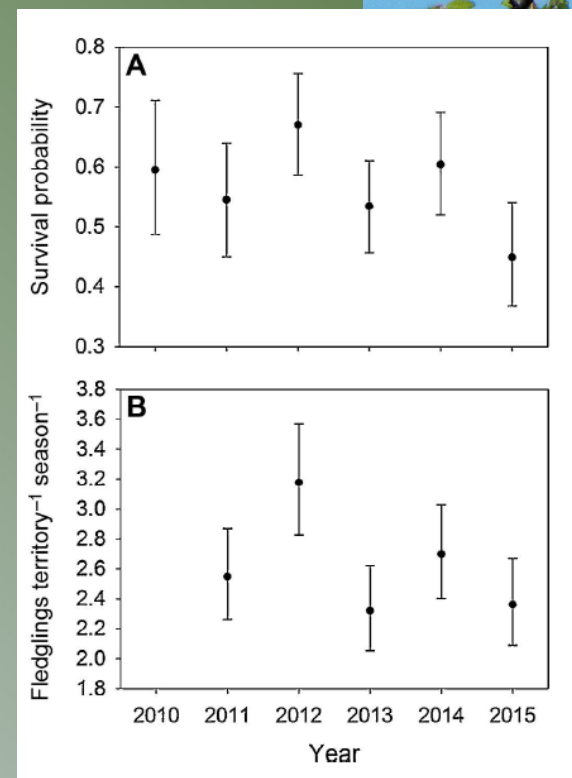


# LIFE SPAN/SURVIVAL

1426 males banded since 2009

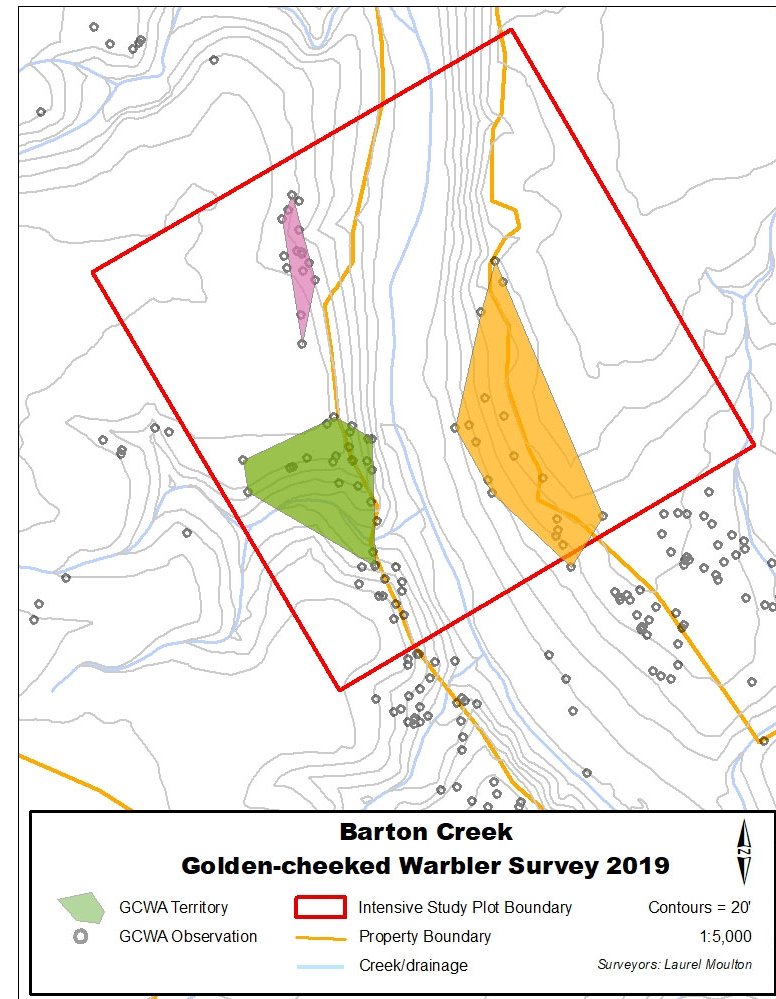
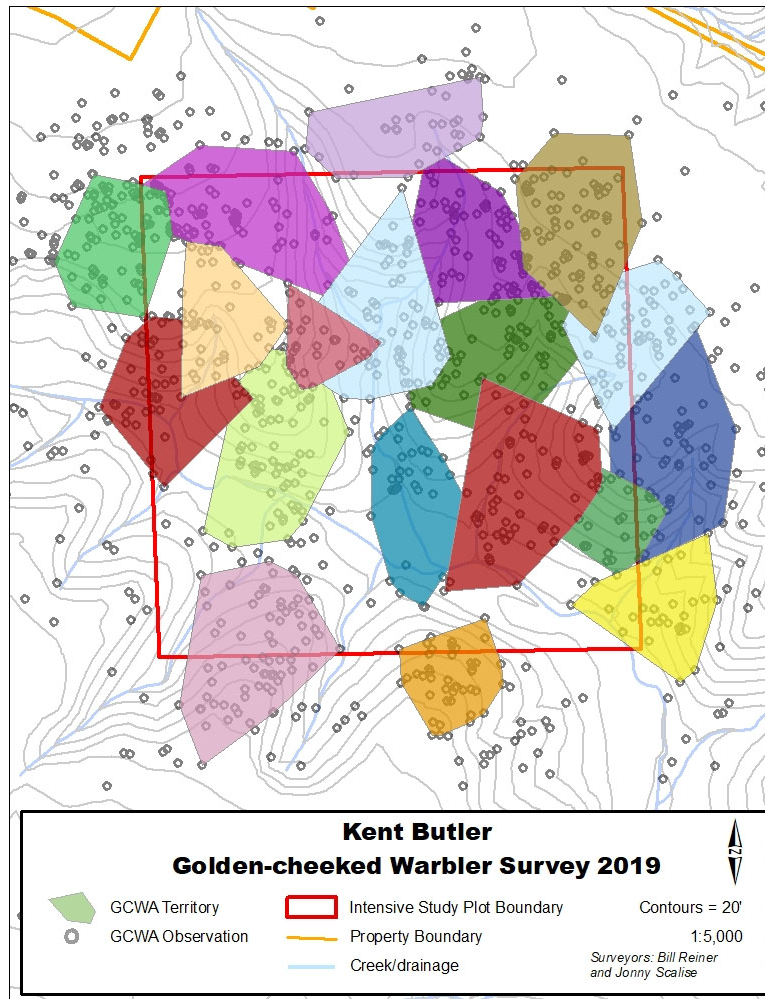
- Male return rates:  
BCP 35-56% (2010-2020)  
Fort Hood 37-56% (8 yrs)
- Oldest male on BCP:  $\geq 10$  yrs
- Survival = observed return rate + estimated dispersal
- After accounting for dispersal, survival appears constant across BCP
- Mean predicted survival across all years was  $0.57 \pm 0.06$  posterior SD
- Varied from 0.45 to 0.67

Reidy et al. 2018:



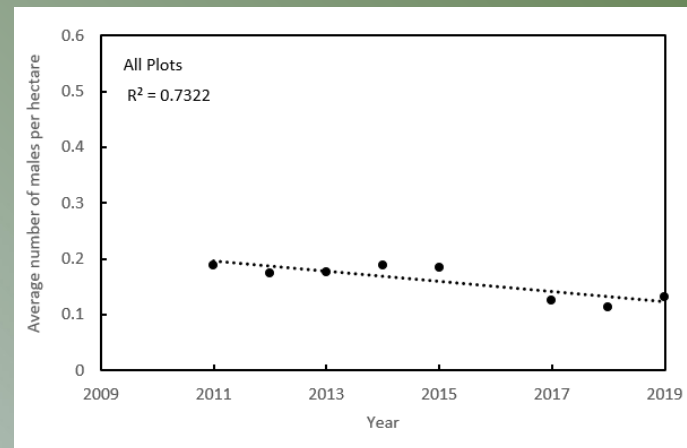
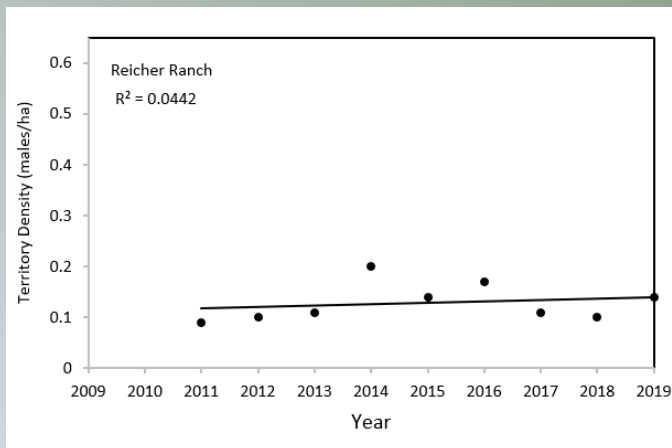
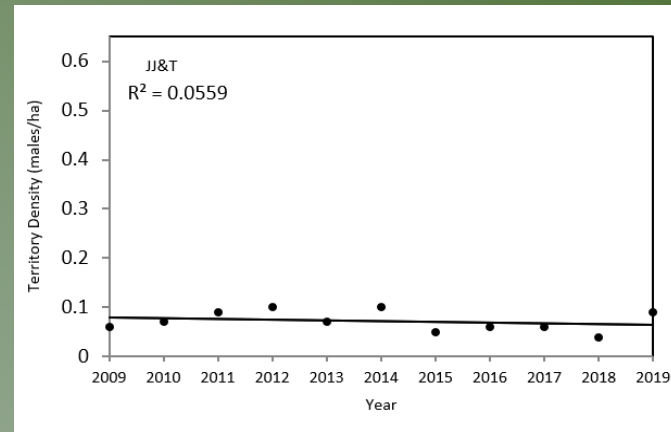
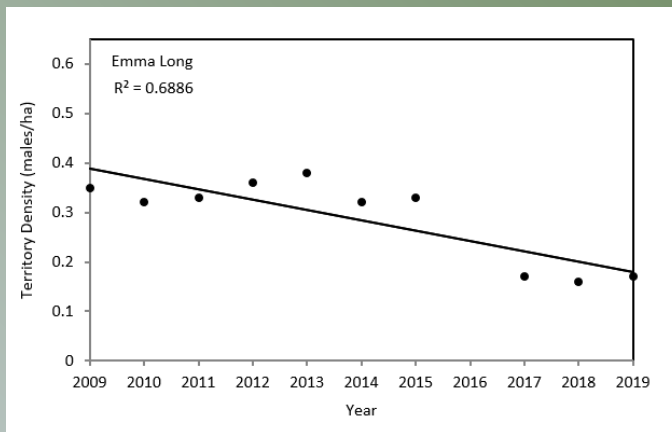
# POPULATION DENSITY

FROM COA GCWA Annual Report 2019:



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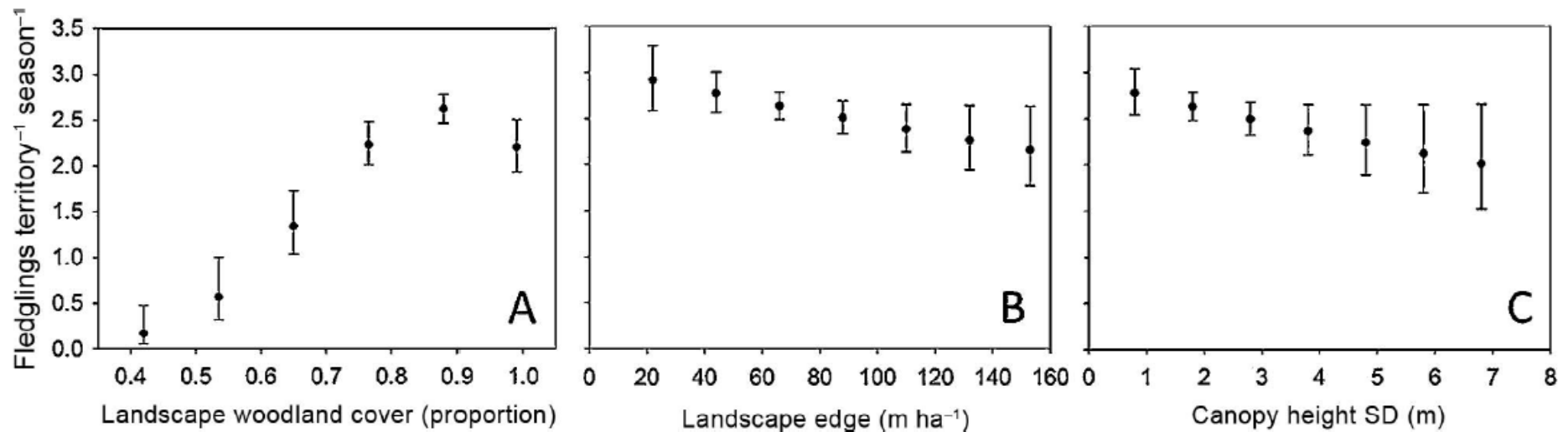


# PRODUCTIVITY

- Mean productivity is  $2.46 \pm 0.51$  fledglings/ territory
- Productivity is highest in Bull Creek and in more interior portions of BCP



Reidy et al. 2018:



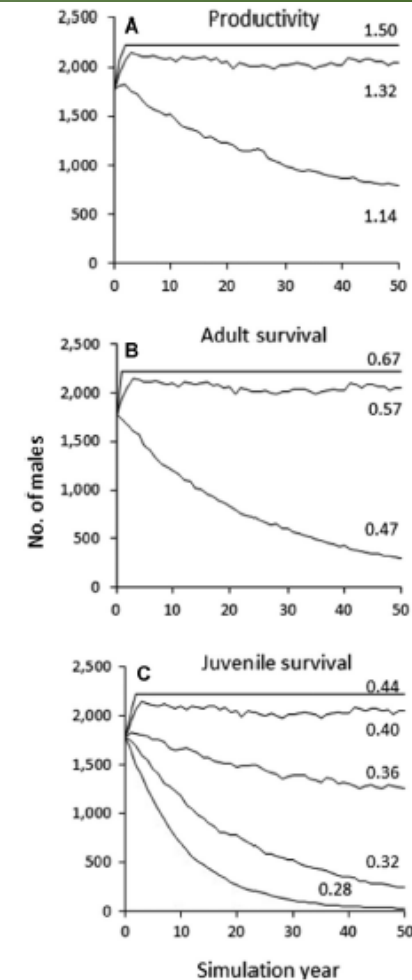
# POPULATION DYNAMICS

Starting abundance: 1779 males

Mean adult survival: 0.57

Mean productivity: 2.8 young/territory

Mean juvenile survival: **unknown**



**Figure 4.** Projected median abundance of male golden-cheeked warblers on the Balcones Canyonlands Preserve, Austin, Texas, USA, over 50 years with (A) varying productivity ( $m$ ) and adult and juvenile survival of 0.57 and 0.40, respectively, (B) varying adult survival ( $S_1/S_2$ ) and juvenile survival of 0.40 and productivity of 1.32 male fledglings/territory, and (C) varying juvenile survival ( $S_0$ ) and adult survival of 0.57 and productivity of 1.32 male fledglings/territory.

Reidy et al. 2020:

# GENETICS STUDIES



Conserv Genet  
DOI 10.1007/s10592-011-0235-8

## RESEARCH ARTICLE

### **Crumbling diversity: comparison of historical archived and contemporary natural populations indicate reduced genetic diversity and increasing genetic differentiation in the golden-cheeked warbler**

Giridhar Athrey • Denise L. Lindsay •  
Richard F. Lance • Paul L. Leberg





# COA BCP PUBLICATIONS

- Reidy, J.L., Thompson, F.R. and O'Donnell, L., 2020. Population Viability of Golden-cheeked Warblers in an Urbanizing Landscape. *Wildlife Society Bulletin*, 44(3), pp.502-511.
- O'Donnell, L., Farquhar, C.C., Hunt, J.W., Nesvacil, K., Reidy, J.L., Reiner Jr, W., Scalise, J.L. and Warren, C.C., 2019. Density influences accuracy of model-based estimates for a forest songbird. *Journal of Field Ornithology*, 90(1), pp.80-90.
- Reidy, J.L., Thompson III, F.R., Connette, G.M. and O'Donnell, L., 2018. Demographic rates of Golden-cheeked Warblers in an urbanizing woodland preserve. *The Condor: Ornithological Applications*, 120(2), pp.249-264.
- Reidy, J.L., Thompson III, F.R. and O'Donnell, L., 2017. Density and nest survival of golden-cheeked warblers: Spatial scale matters. *The Journal of Wildlife Management*, 81(4), pp.678-689.
- Reidy, J.L., Thompson, F.R., Amundson, C. and O'Donnell, L., 2016. Landscape and local effects on occupancy and densities of an endangered wood-warbler in an urbanizing landscape. *Landscape Ecology*, 31(2), pp.365-382.
- Reidy, J.L., O'Donnell, L. and Thompson III, F.R., 2015. Evaluation of a reproductive index for estimating songbird productivity: Case study of the golden-cheeked warbler. *Wildlife Society Bulletin*, 39(4), pp.721-731.
- Reidy, J.L., F.R. Thompson, C. Amundson, and L. O'Donnell. 2015. Landscape and local effects on occupancy and densities of an endangered wood-warbler in an urbanizing landscape. *Landscape Ecology* (DOI 10.1007/s10980-015-0250-0).

# ACKNOWLEDGMENTS



Photo by Volunteer Misa Soliz

- U.S. Forest Service
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- Travis Audubon Society
- The Nature Conservancy
- Many volunteers!!