

A Personal History of 40 years of RCW Research and Management in the North Carolina Sandhills

Jeff Walters

North Carolina Sandhills Partnership
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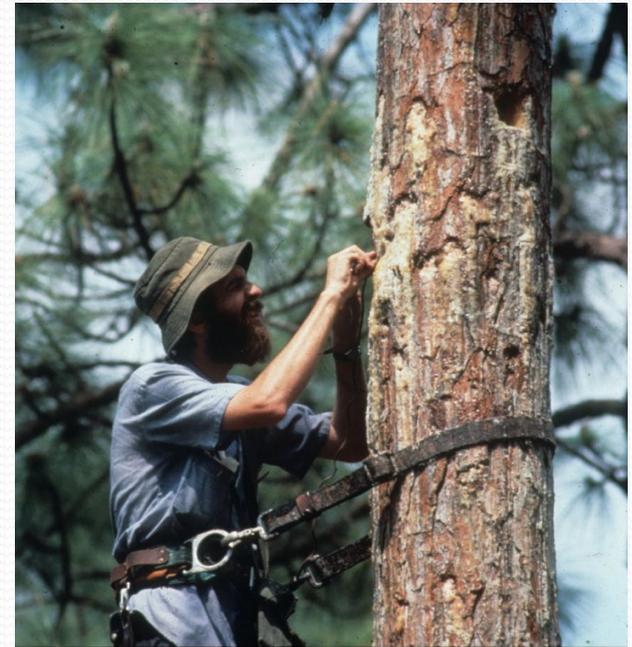


Photo by Derrick Hamrick

Features of the long-term RCW study

Unmatched in scale among studies of comparable intensity and duration

- Duration
 - Initiated by Jay Carter, Phil Doerr
 - Banding begun 1978-1979
 - First year of data 1980, full data 1983
 - Few avian studies of this duration, especially of territorial species



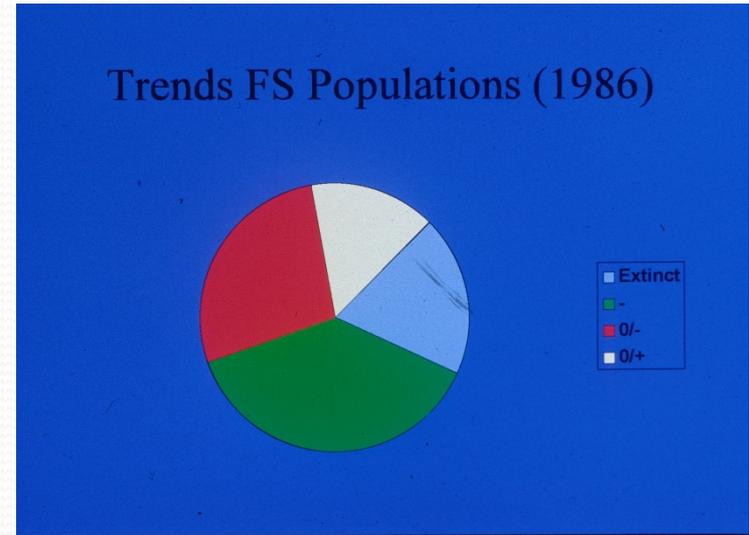
Spans the recovery of the RCW

The early 1980s

- In rapid decline
- No increasing populations

Today: proposed downlisting

- 72% of populations of over 30 groups increasing
- 6 populations recovered (started with 1)

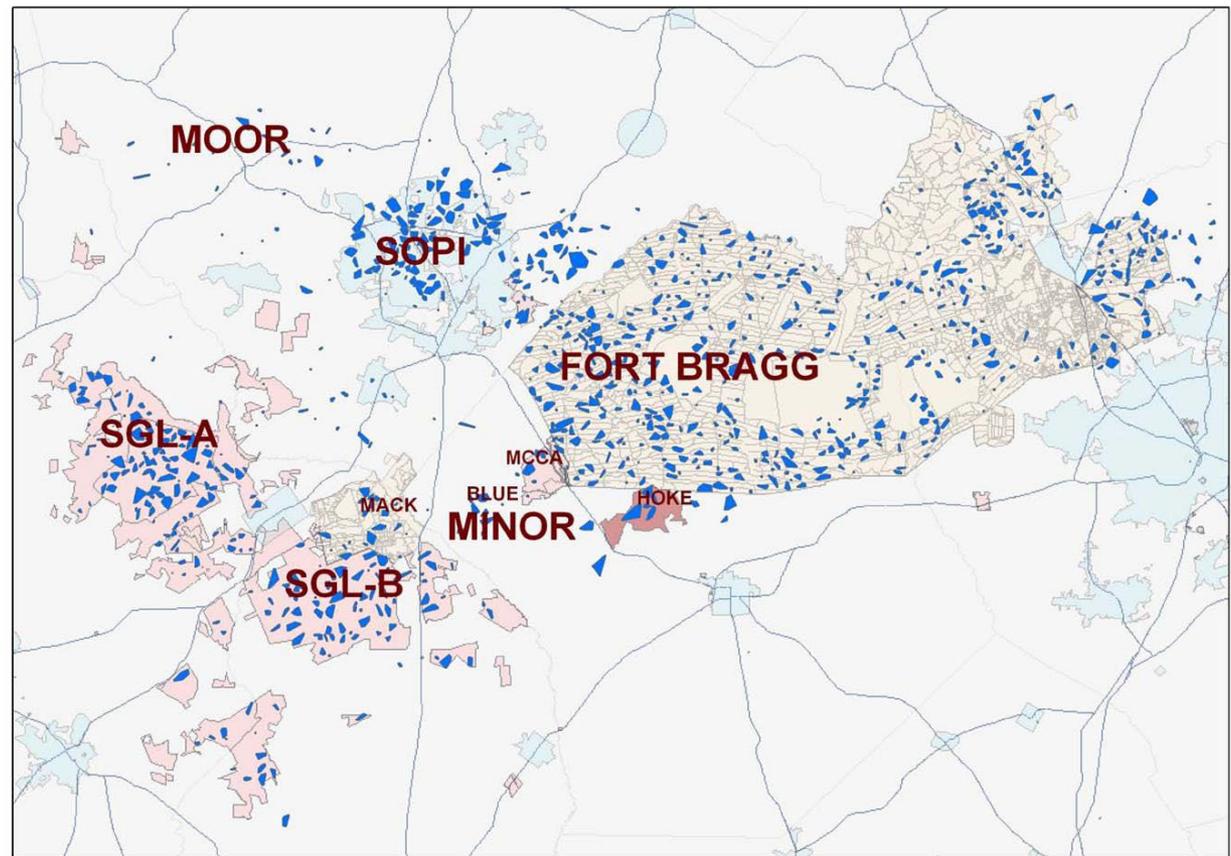


| Size | Number | Range | Increasing | Stable | Decreasing |
|-----------|--------|---------|------------|--------|------------|
| Recovered | 6 | 386-858 | 5 | 1 | 0 |
| Large | 10 | 102-248 | 4 | 3 | 0 |
| Medium | 16 | 51-97 | 10 | 2 | 1 |
| Small | 21 | 31-47 | 14 | 2 | 4 |

Features of the long-term RCW study

- **Scale**

- 110,000 ha
- 229 (1983) to 354 (2020) groups
- FB, SGL, SOPI, MIN

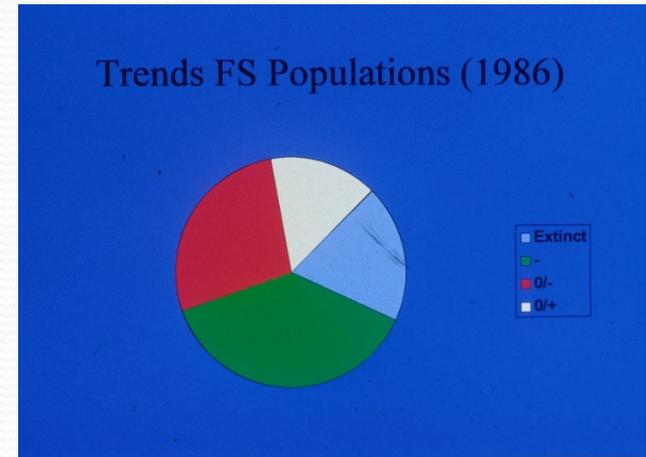


Features of the long-term RCW study

- Intensity
 - Complete annual census of color-banded population
 - Survival, status changes, dispersal
 - Complete reproductive data
 - Clutch size, nest fates
 - Color-banded nestlings
 - Fledging success, dominance effects, natal dispersal
- Objectives
 - Monitoring
 - Applied research
 - Basic research

My beginning: 1983

- Arrived at NCSU in 1981
- RCWs were in big trouble
 - No increasing populations
 - Management was failing
 - Recruitment stands
 - Rampant fire suppression
 - Existence of viable wiregrass seeds disputed



My beginning: 1983

- Brought basic research objective
- Applied and basic research were different realms
- Field of conservation biology did not yet exist
- Non-game wildlife biologist was not yet a thing
- Behavioral ecology and color banding were relatively new



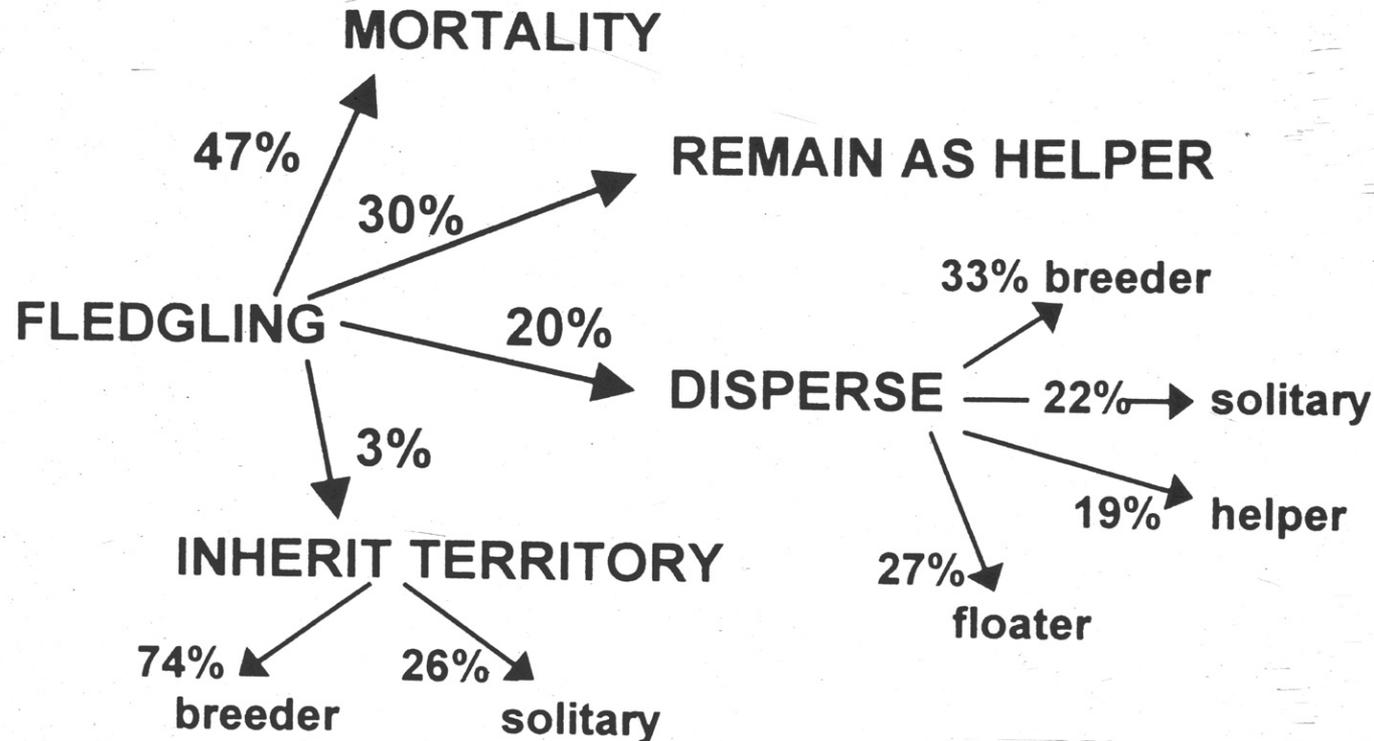
1984-1986: Basic research on the evolution of cooperative breeding

- Initially studied RCW due to social system, not endangered status
- Interest in apparent altruism of helpers



Studies of cooperative breeding system

- Helping as a life history tactic



Studies of cooperative breeding system

- Helping as a pathway to success
 - Staying a means to acquire a high quality breeding position
 - Helping produces inclusive fitness benefits

| Pathway | P (Breed) | Years | Fledglings | Annual Production | Fitness | N |
|------------------|-----------|-------|------------|-------------------|---------|----|
| Stay | | | | | | |
| Helper Inherit | 53%* | 4.1 | 6.6 | 1.60 | 3.5 | 98 |
| Helper Disperse | 53%* | 4.5 | 6.1 | 1.41 | 3.2 | 88 |
| Juvenile Inherit | 100% | 5.9 | 8.3 | 1.38 | 8.3 | 19 |
| Depart | | | | | | |
| Breeder | 100% | 4.0 | 4.6 | 1.14 | 4.6 | 44 |
| Helper | 38% | 3.7 | 3.7 | 1.25 | 1.4 | 15 |
| Floater | 60% | 4.6 | 6.2 | 1.42 | 3.7 | 51 |

Studies of cooperative breeding system

- Why does staying pay off?
- Habitat saturation / Benefits of philopatry
- Territories with cavities are high quality



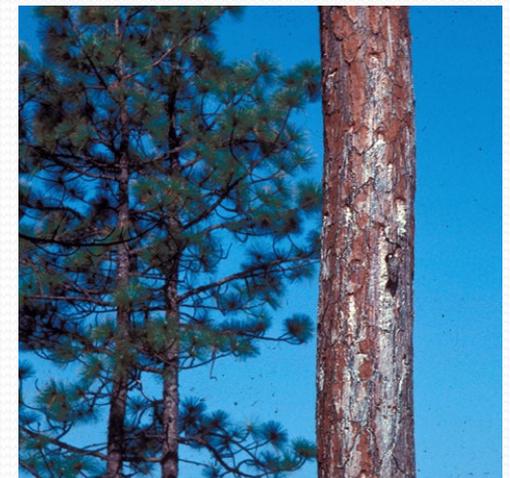
Studies of cooperative breeding system

- Clear management implications
 - Build it and they will come
- Ivory tower idea not well received
- Recruitment clusters as test of cooperative breeding theory, not management tool



Studies of cooperative breeding system 1987-1990: the cavity experiment

- Carole Copeyon drill method
- Recruitment cluster experiment
 - 40 sites, 150 acres each
 - 2 cavities + 3 starts in 20



| | Occupied | Empty |
|--------------|----------|-------|
| Experimental | 19 | 1 |
| Control | 0 | 20 |

Basic research suggests new management paradigm (1991 paper)

- Use recruitment clusters to induce new group formation
- Protect existing cavities (cavity management)
- Use prescribed fire to restore and maintain habitat
- Predators, cavity kleptoparasites not the problem



Management tools from the long-term study

- Artificial cavities (drilled cavities – Carole Copeyon)
- Cavity restrictors (Jay Carter)
 - Cavity kleptoparasites are a problem if they destroy cavities (Pileated Woodpeckers)



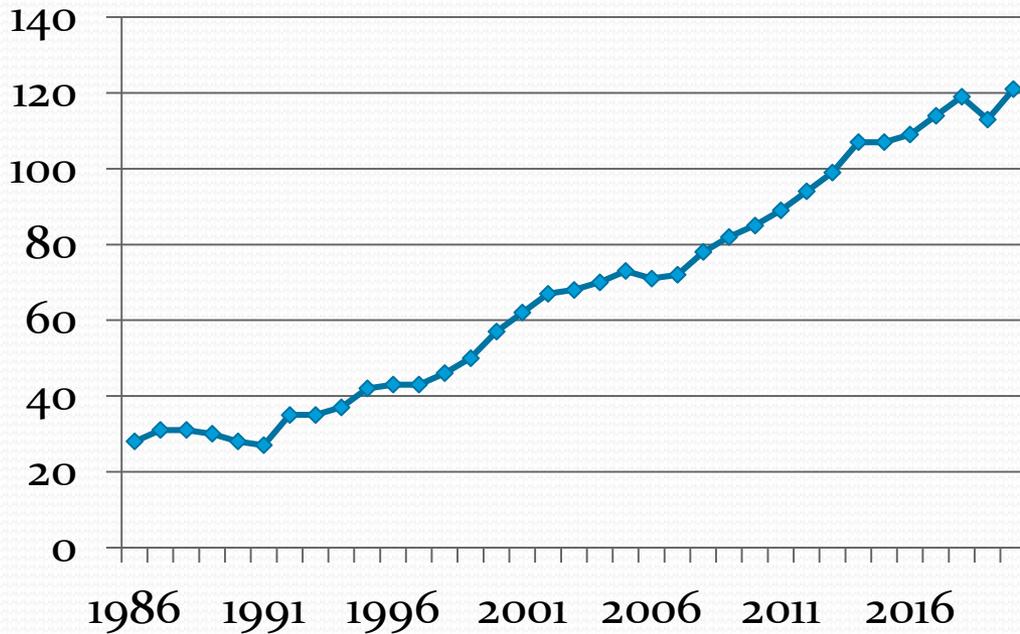
The 1990s: applied research

- New management paradigm not immediately accepted
- Early 1990s a period of great contention in Sandhills
- Proof of concept studies instead at EAFB, MCBCL



Application to a small population: MCBCCL

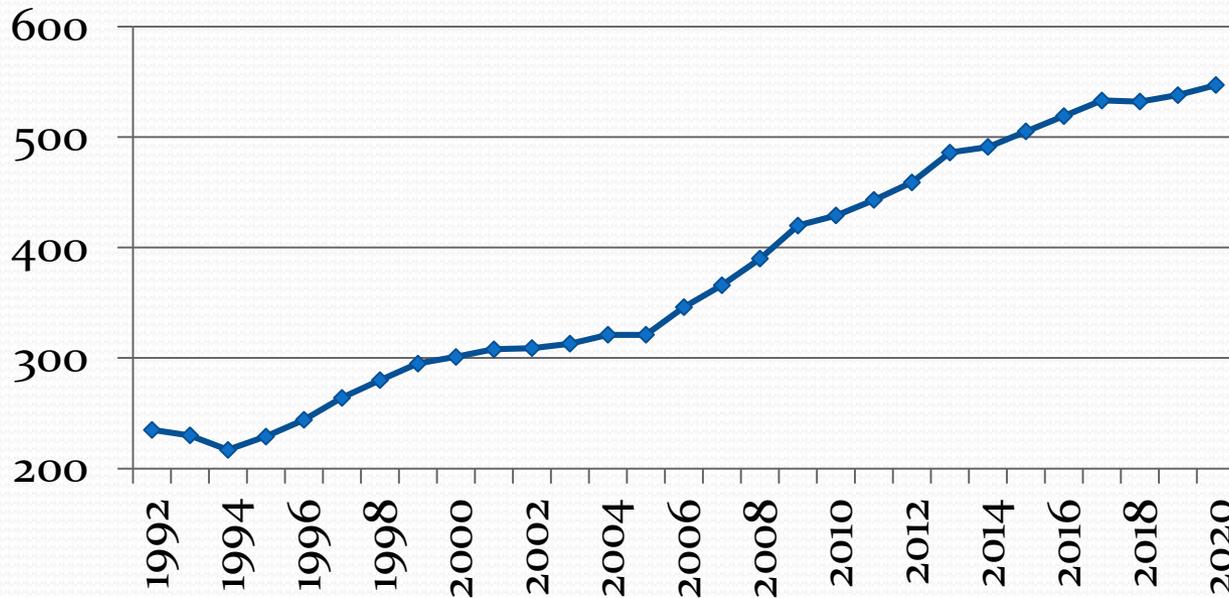
Groups



Application to a large population: EAFB



Clusters



Population
declared
recovered
in 2009

The 1990s: applied research

- New management paradigm becomes policy by the end of the 1990s
 - Codified in 2000 Recovery Plan
- Success of paradigm over subsequent two decades leads to proposed down-listing
 - Period of analysis in RCW SSA = 1998-2017

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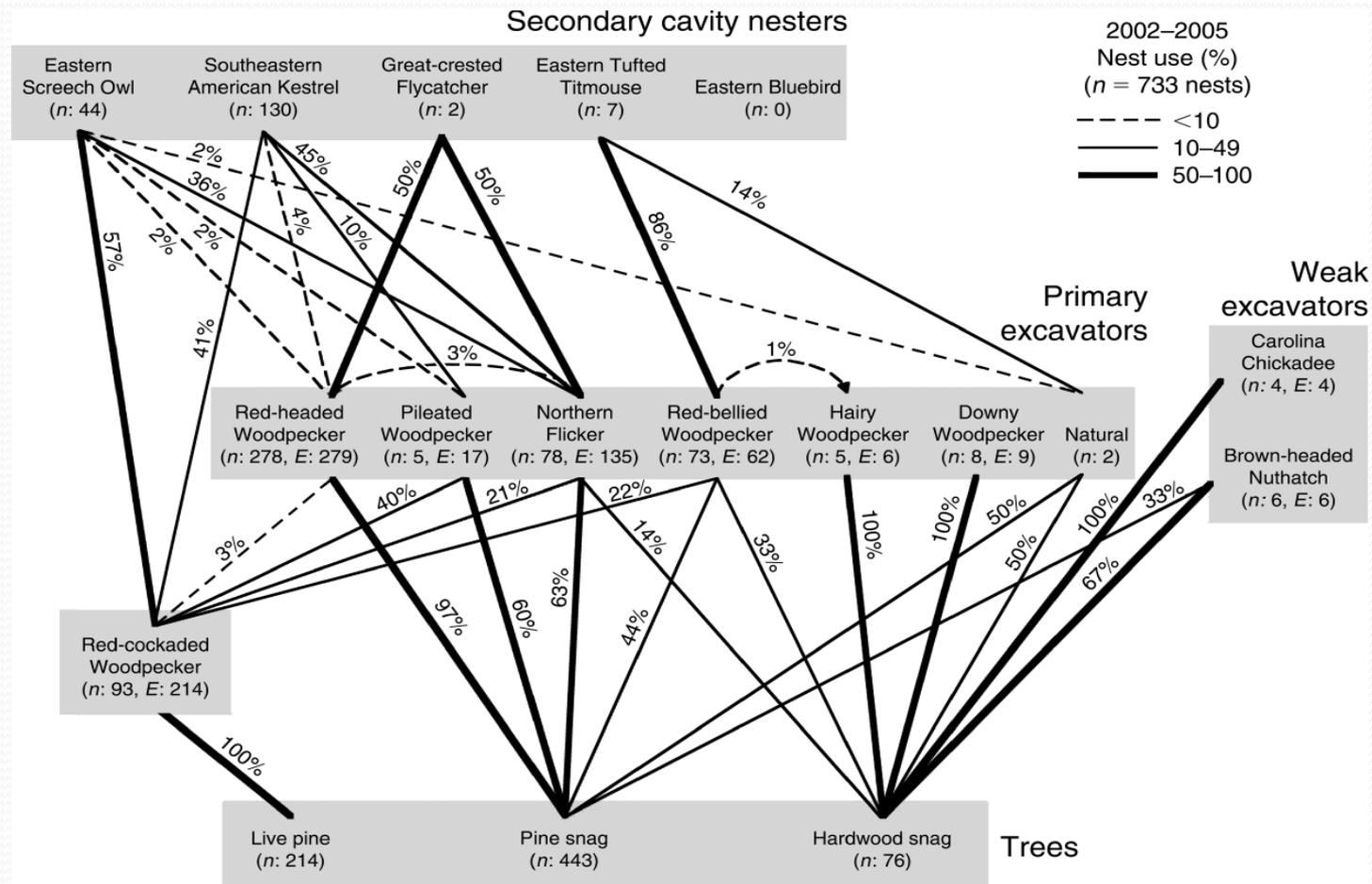
The RCW as an umbrella species

- Longleaf management initially driven by RCW
- Critical needs of RCW are ecosystem drivers
 - Fire, old growth
 - Few negative effects
- RCW recovery evolved into ecosystem restoration and management



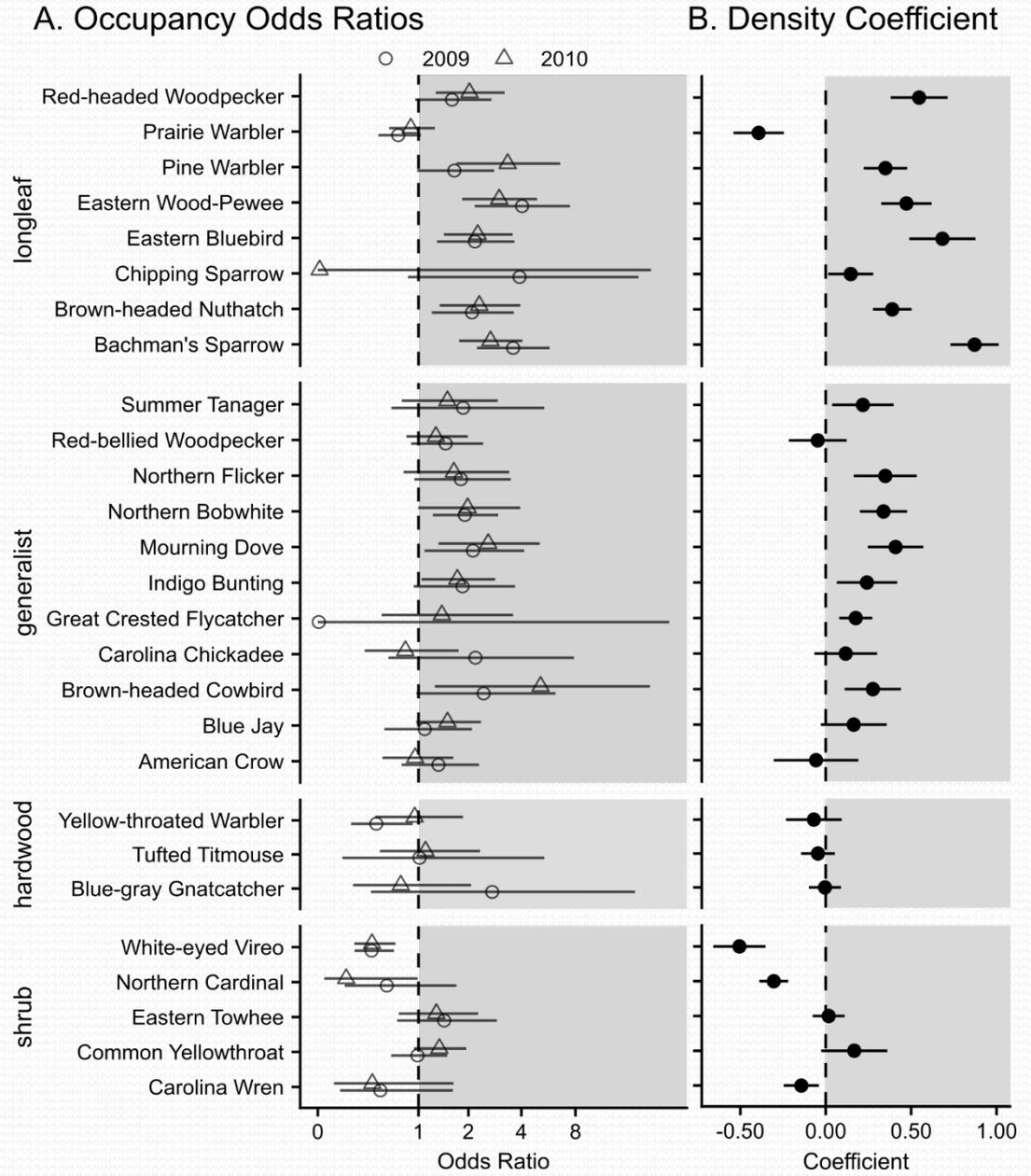
The RCW as an umbrella species

- Creating and protecting cavities benefits cavity-nesters



RCW as umbrella: MCBCL example

Occupancy and abundance as a function of RCW matrix score



Human dimensions of RCW recovery in the Sandhills: late 1980s to mid-1990s

- Intense controversy over “southeastern Spotted Owl”
- Conflicts with property rights, military training, timber harvest
- Wise use movement (property rights)
- Timber harvest driven proximity RCWs



Human dimensions of RCW recovery in the Sandhills: Safe Harbor



- Introduced 1995 Sandhills for RCWs
- Quickly reduces anti-RCW attitudes
 - Property value, ability to pass on to heirs key
- Research from long-term study: larger impact on human dimensions than RCW fitness (Jen Smith)
 - Affects probability of cavity abandonment due more cavity work on Safe Harbor properties

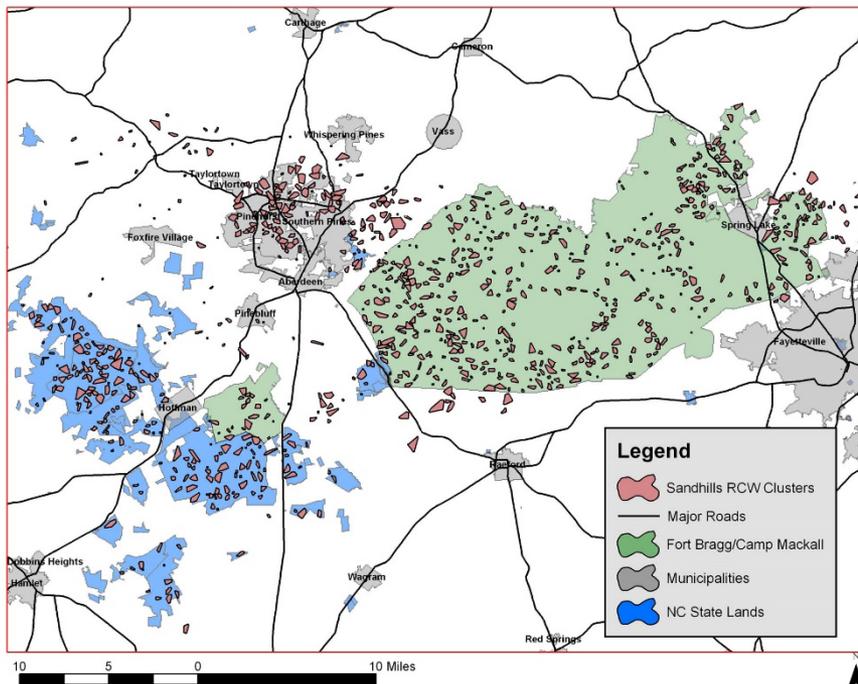
Human dimensions of RCW recovery in the Sandhills: The Conservation Partnership

- Initially subject to the ongoing conflicts in the region
 - Incentivized desire to reduce recovery responsibility DoD
- Transformed from conflicts based on hidden agendas to cooperation based on integration of partner objectives and honest communication



Research and the Partnership come together: the RCW Working Group

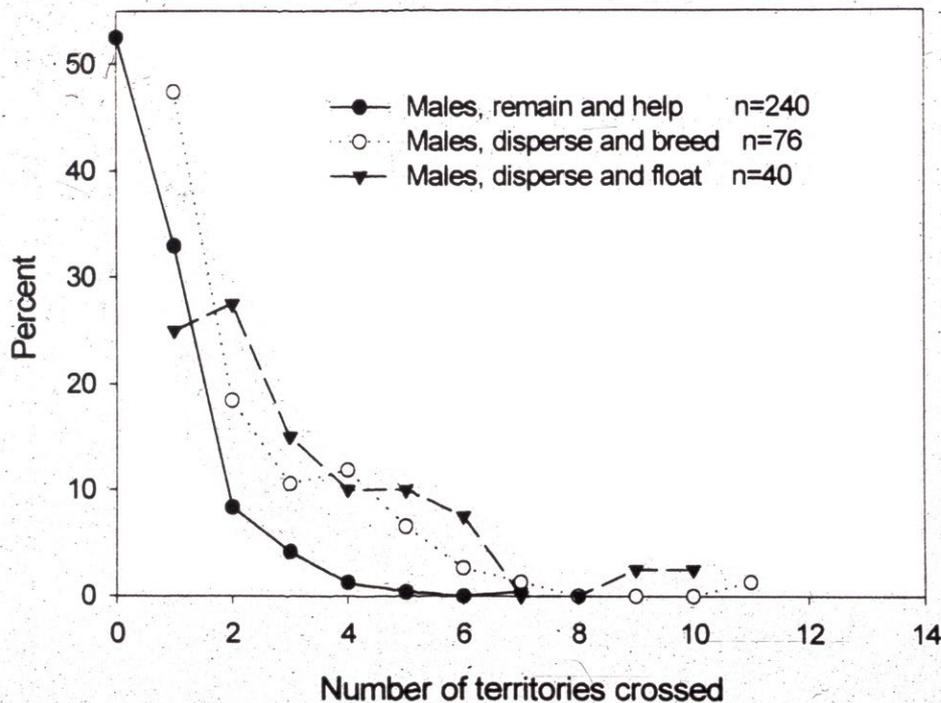
- Analysis by the Working Group based on research on RCW movement leads to land acquisition and conservation that increases population connectivity



Note “the gap”, the initial
focus of the Partnership

The Research

- Studies based on dispersal outcomes reveal contrast between short-distance dispersal of helpers (3 km) and long-distance dispersal of juveniles
 - Scale, intensity of study critical to this finding



Future is largely
predestined

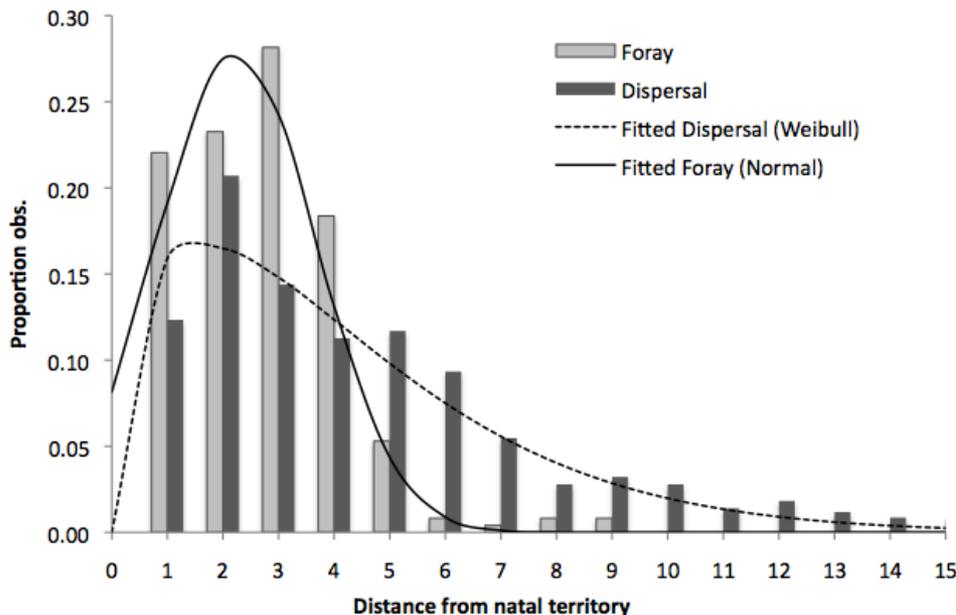
The Research

- Modeling studies reveal impact of cluster distribution driven by restricted dispersal of helpers on population dynamics
 - Confirmed by empirical studies of effects of population size and distribution on population dynamics



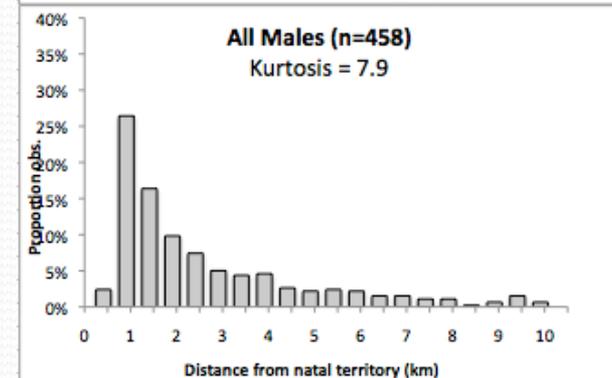
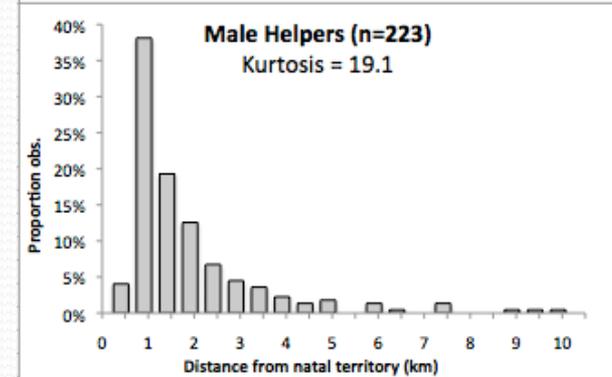
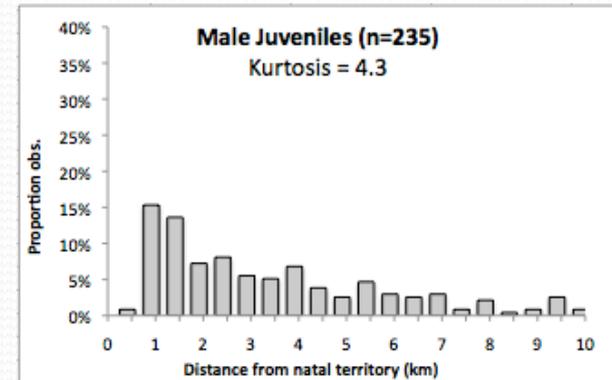
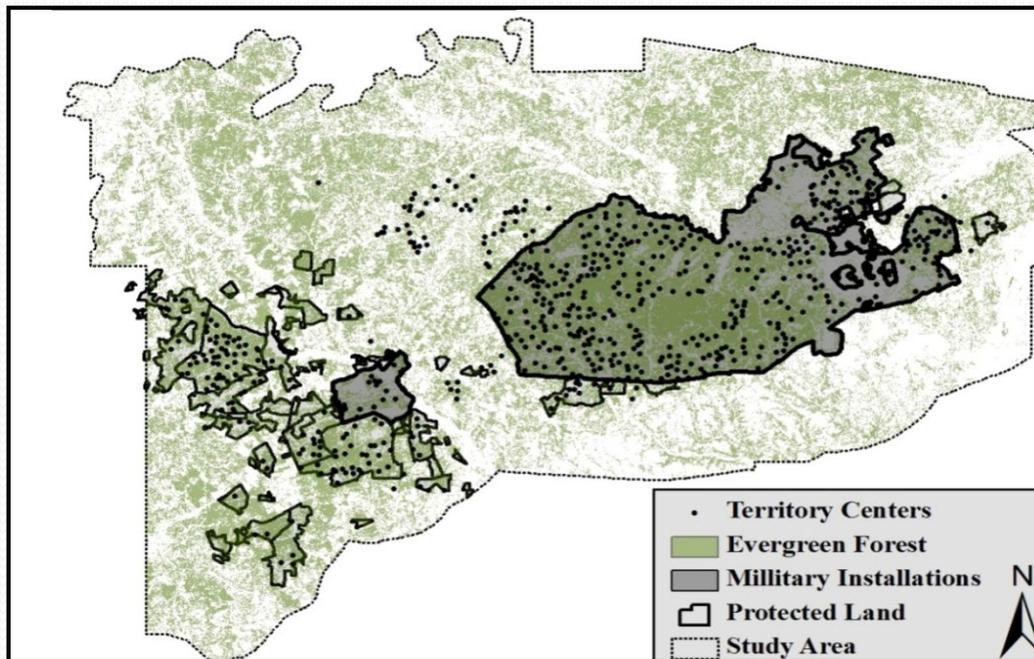
The Research

- Telemetry studies reveal two modes of juvenile dispersal that differ in distance moved and response to landscape
 - Conducted by John Kappes, Dylan Kesler, Anne Trainor



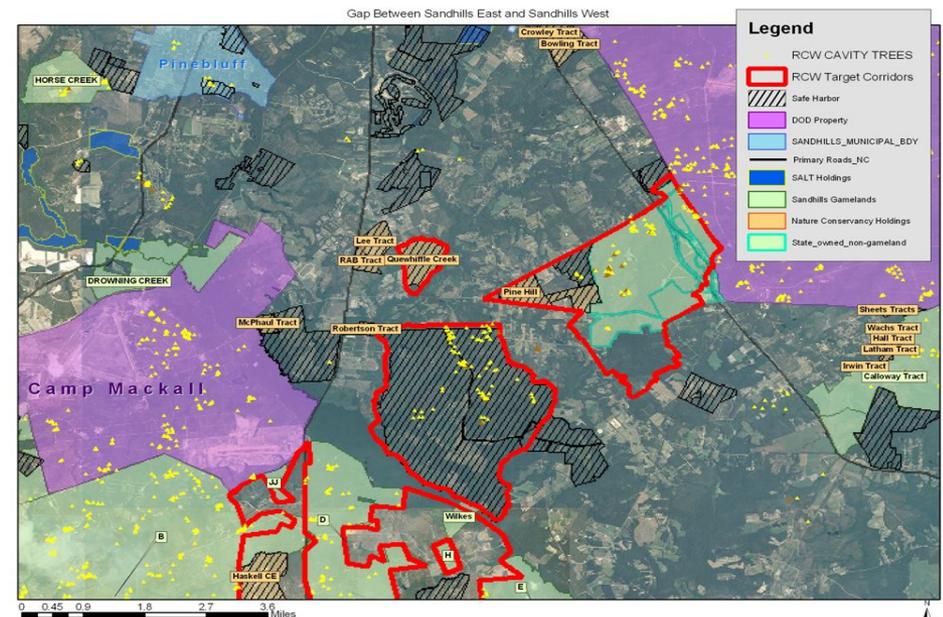
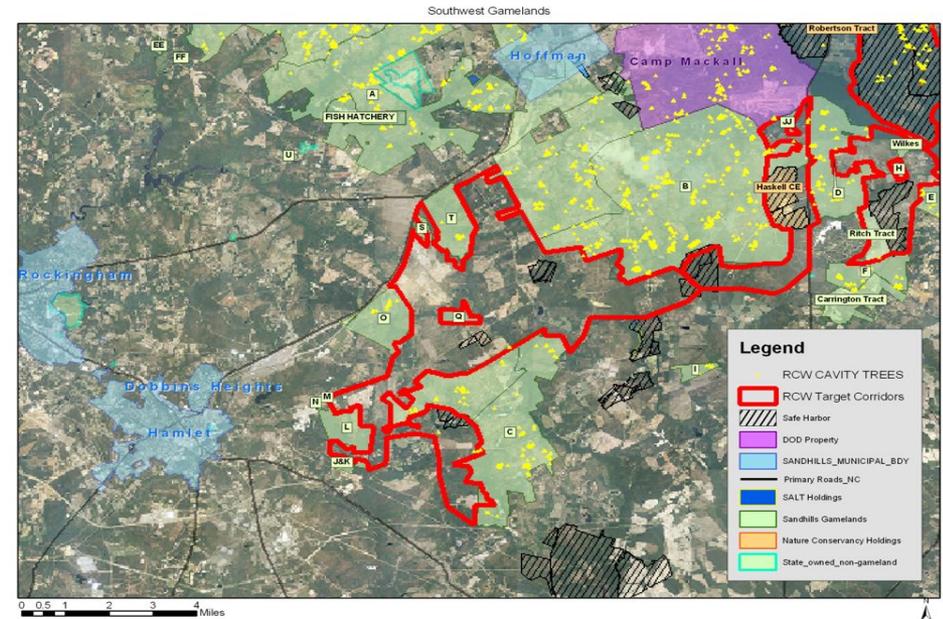
The Research

- Three modes of dispersal
 - Helper and juvenile foray-based dispersal depend on landscape connectivity
 - Juvenile jumper dispersal does not



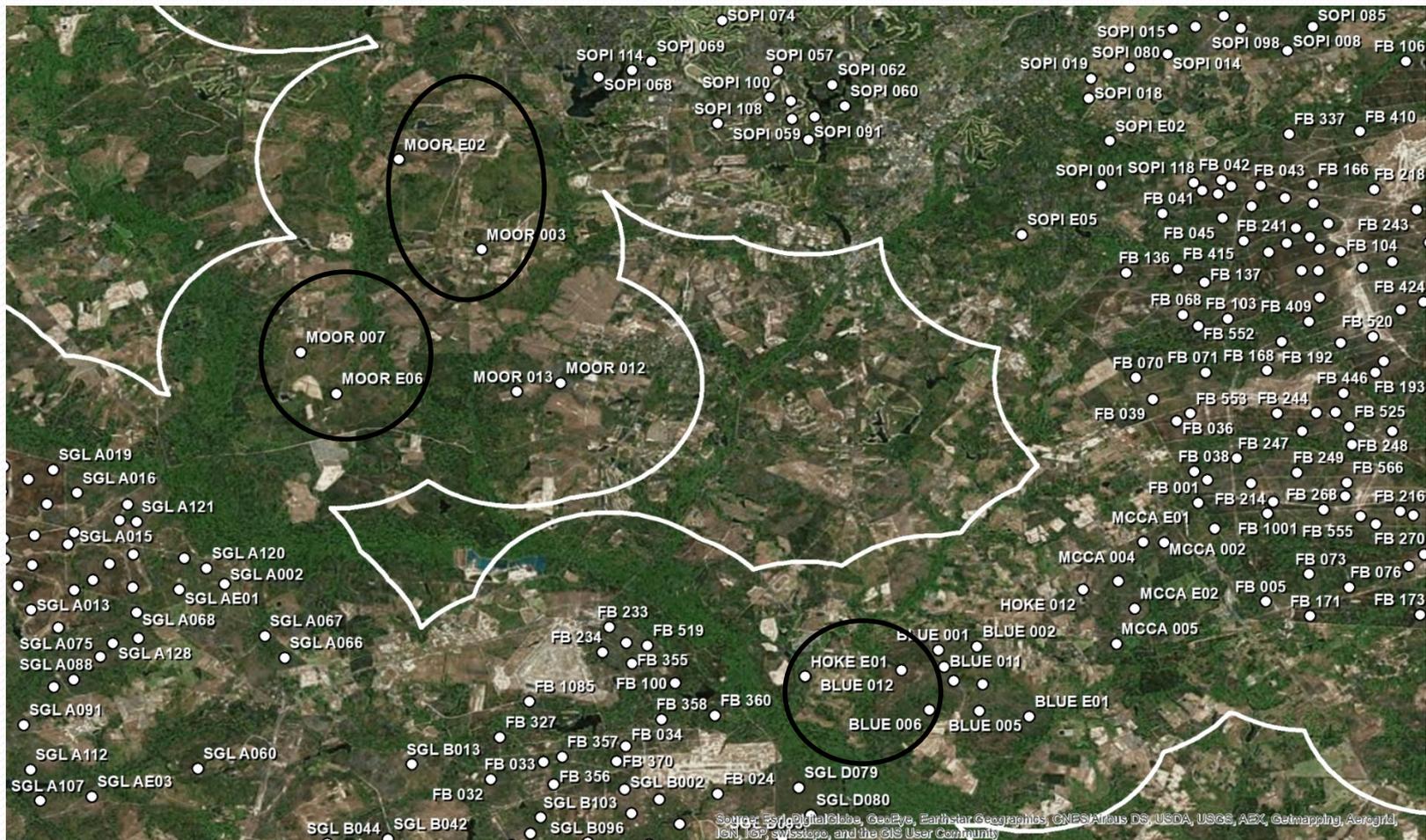
The Working Group

- Identified focus areas to improve connectivity in 5 regions, including the “gap” in 2010
 - Gap least likely, lowest priority
- Many of these areas now protected through Partnership (TNC)
 - RCW population connectivity improved



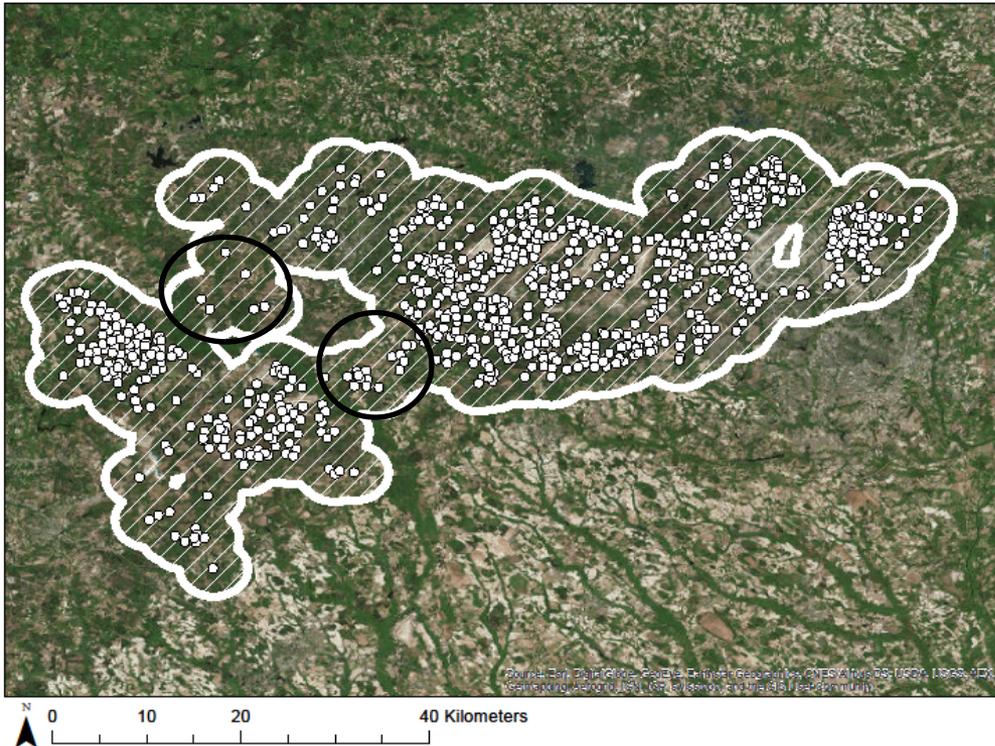
The Working Group

- Success even in the gap (recruitment clusters)



The Working Group

- RCW SSA classifies Sandhills as one population
 - Based on connectivity defined by helper, foraging juvenile dispersal distances



A look to the future

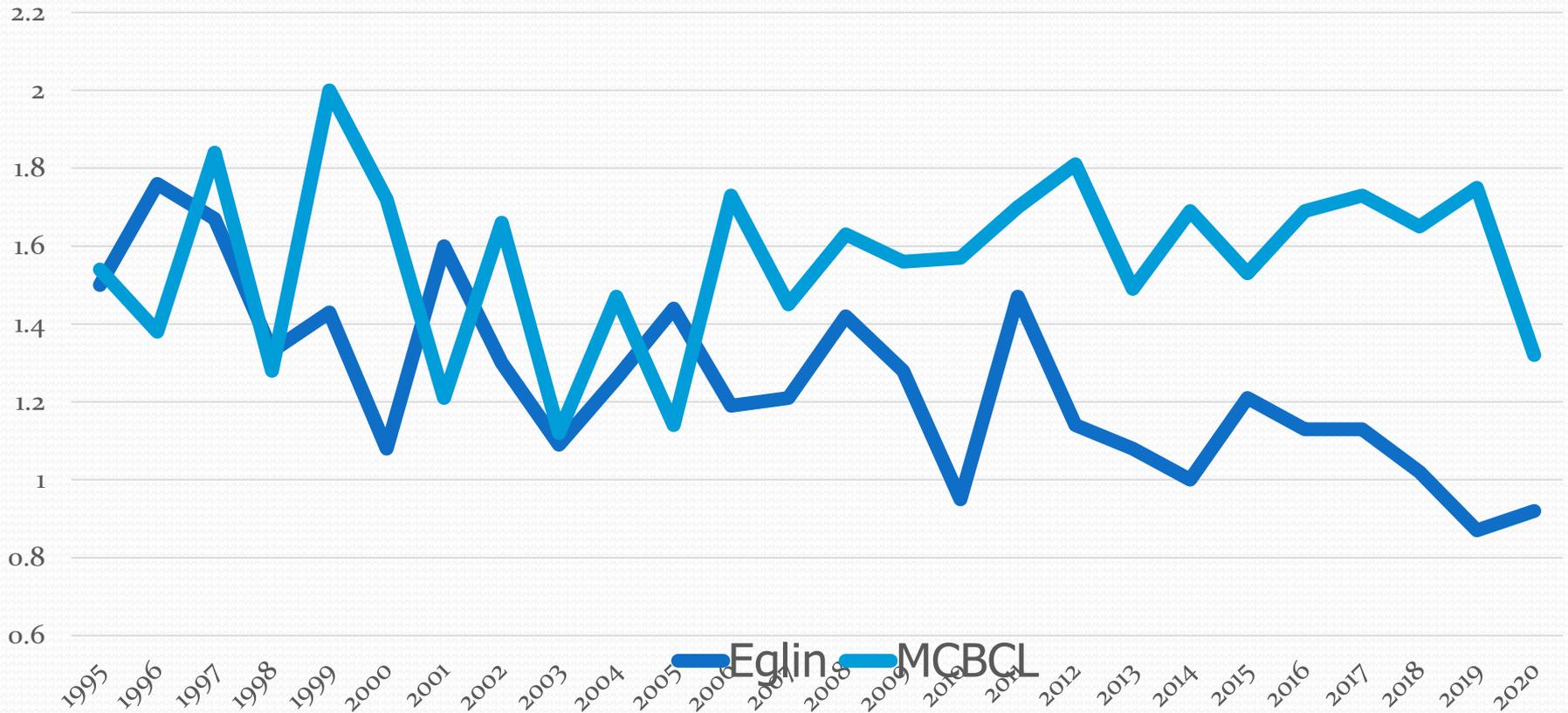
- Long-term project as a regional resource
 - Future research needs
 - Future management needs
- New challenges
 - Effects of climate change
 - Density effects
- Impacts of down-listing



A look to the future: climate change

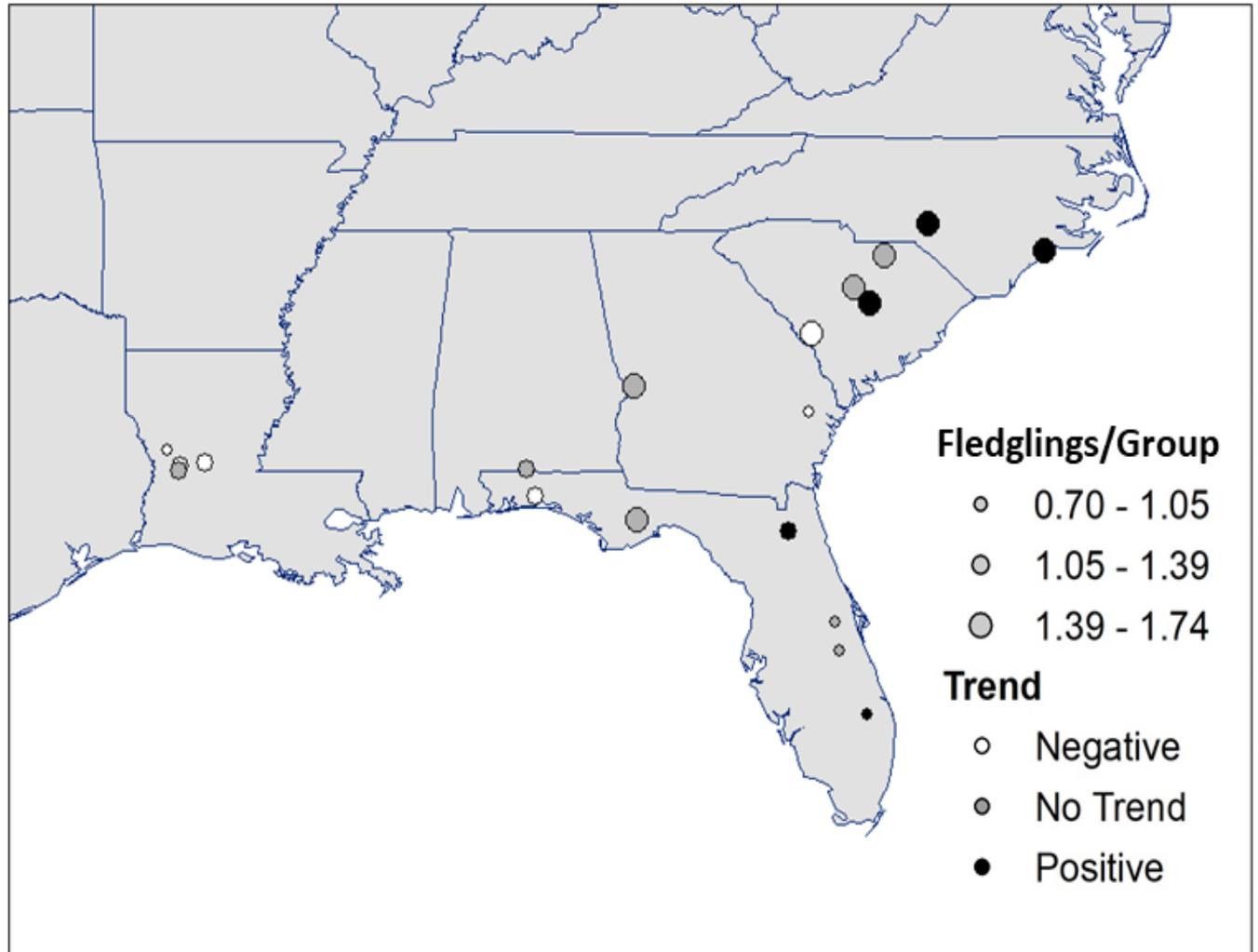
- Demography is already changing

2021: MCBCL tied 3rd highest (1.81), EAFB record low



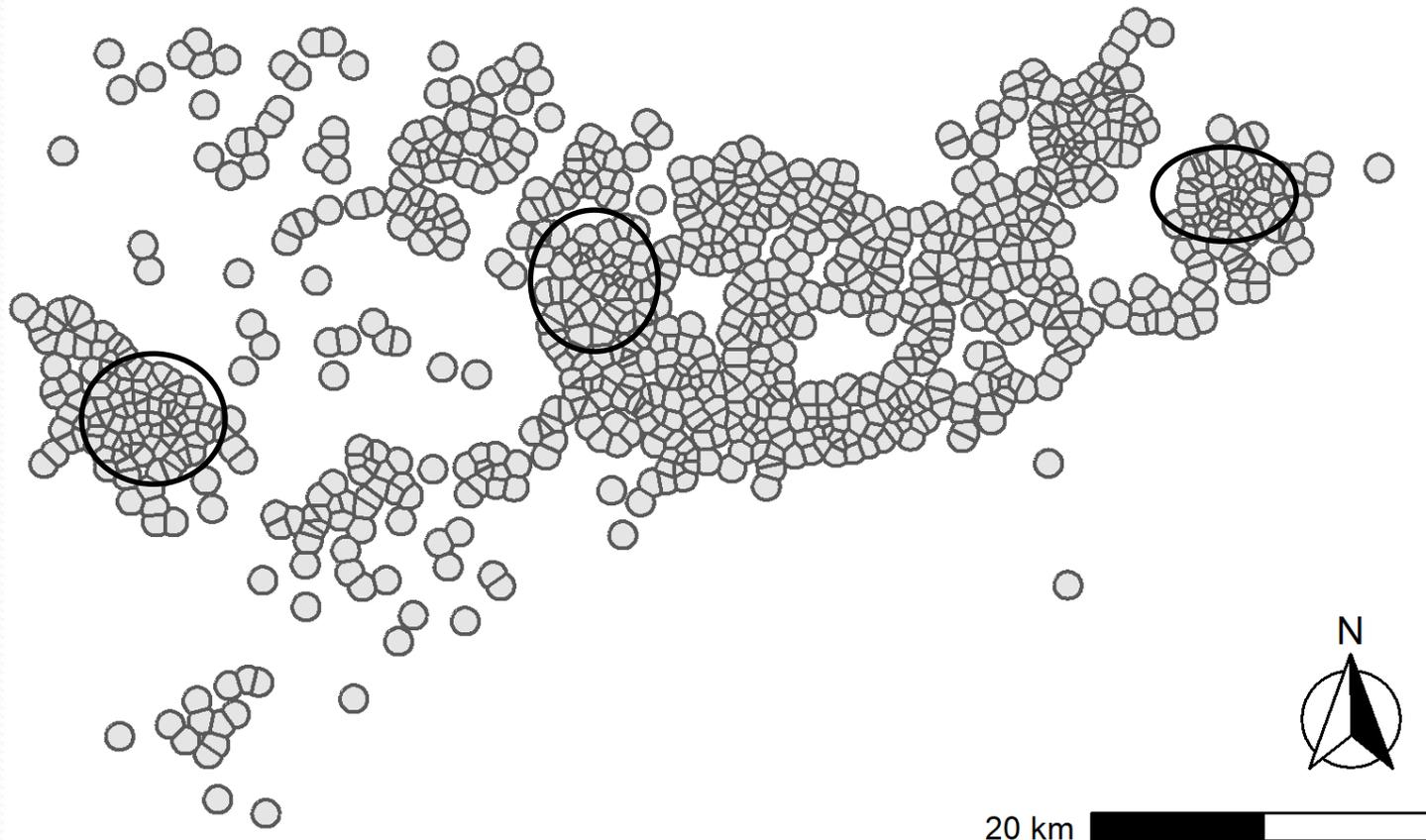
A look to the future: climate change

- Second geographic pattern emerging



A look to the future: density effects

- Evidence of density dependence (James Garabedian)
- Revisit habitat area requirements?



20 km

A look to the future: down-listing

- RCW is conservation-reliant
 - Prescribed burning in perpetuity
 - Artificial cavities until forests mature
- Timber management will evolve
 - Upper, lower basal area threshold?



The long-term RCW project team (partial list)

PIs

Phil Doerr
Jay Carter

NCSU

Jackie Britcher
Dick Repasky
Phil Manor
Clyde Sorenson
Tim Stamps
Dave Davenport
Steve Everhart
Robbie Blue
John Hammond
Carole Copeyon
Mindy LaBranche
Laurie McKean
Michael Reed
Armando Pizzoni
Brad Blackwell
Ben Letcher
Selina Heppell
Lauren Pharr

Virginia Tech

Erin Hewett
Michelle Jusino
Vicki Garcia
Sue Daniels
Sergio Harding
Memuna Khan
Caren Cooper
Lori Blanc
John Kappes
Dylan Kesler
(Anne Trainor)

Funding

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Fort Bragg
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TNC
Jay Carter
NCDA

SEI et al.

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Brady Beck
Susan Miller
Jeanette Sabo
Alicia Jackson
Vivian Genovese
Jen Maynard
Gabriella Garrison
Kendra Noyes
Karen Beck
Kevin Oday
Lisa Richman
Ryan Speckman
Stephanie Toussaint
Rex Badgett
Caroline Causey
Val Campbell
Jan Goodson
Sarah Haney
Dakota Hunter
Matthew King



Questions?

