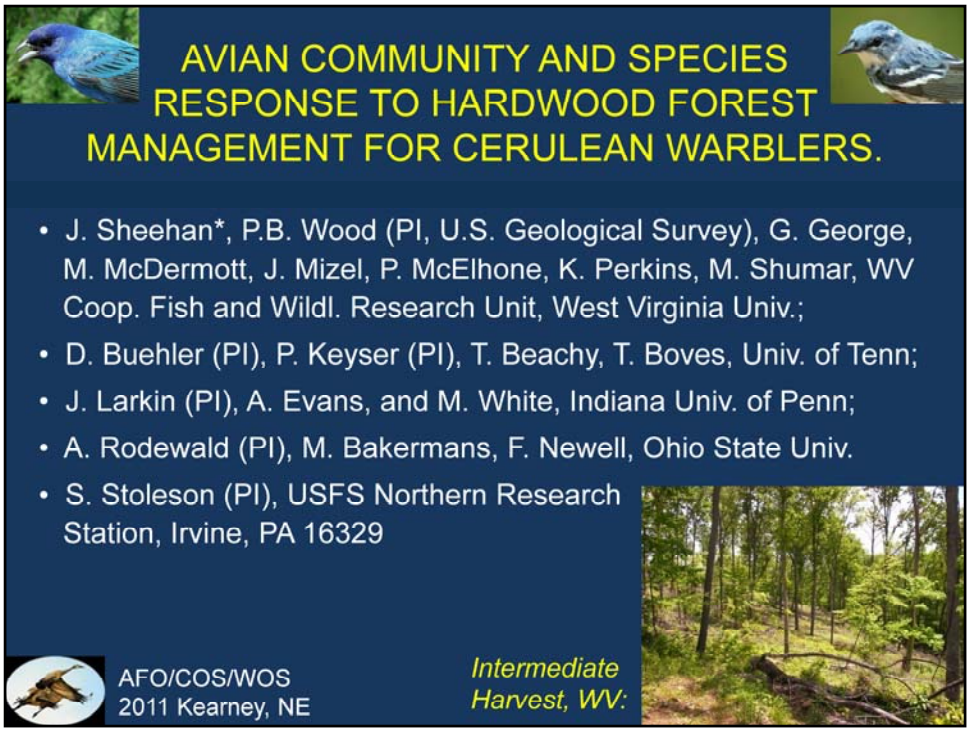
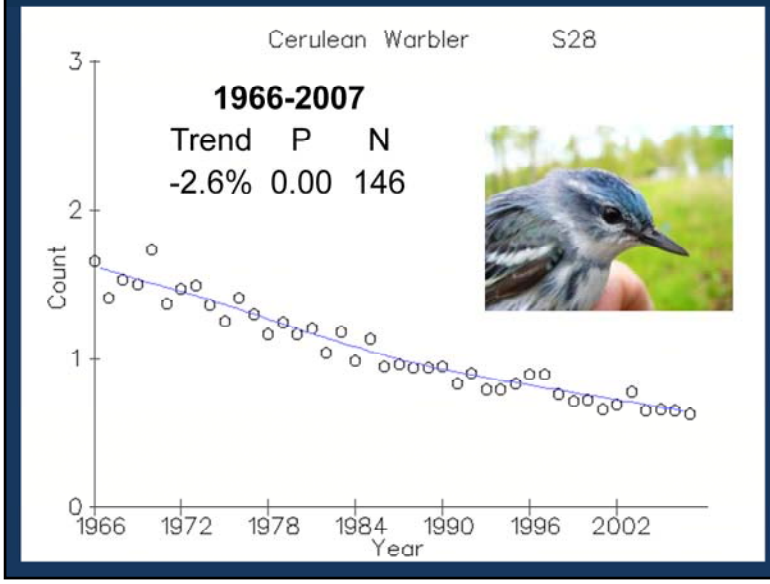


1. Tale of 2 blue birds: CERW Forest Interior, INBU Edge/Early Successional Spp – Both tied to gaps
2. Number of Collaborators/Field Researchers
3. Mention intermediate shelterwood harvest

Breeding Bird Survey
Cerulean Warbler – Appalachian BCR



1. Why we studied CERW – long-term decline
2. Appalachian BCR – much of the population, extensive hardwood forest

Early Successional / Scrub Breeding Birds Eastern BBS Region

36 species, 1966 – 2007

significant negative trend	17 spp (47%)
significant positive trend	5 spp (14%)

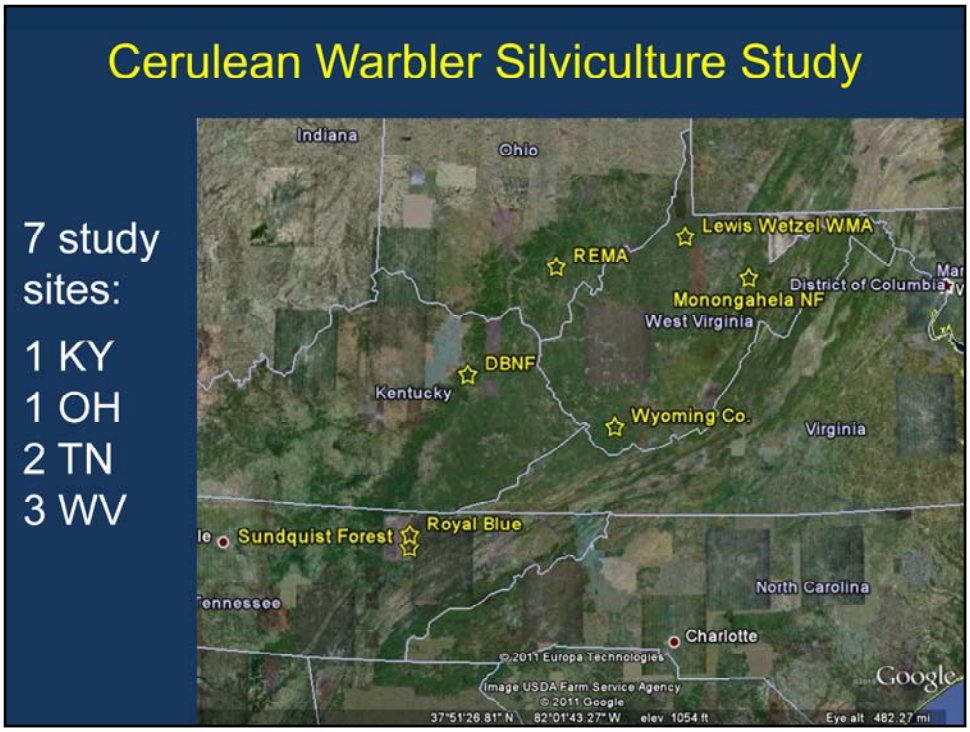
Prairie Warbler

Indigo Bunting

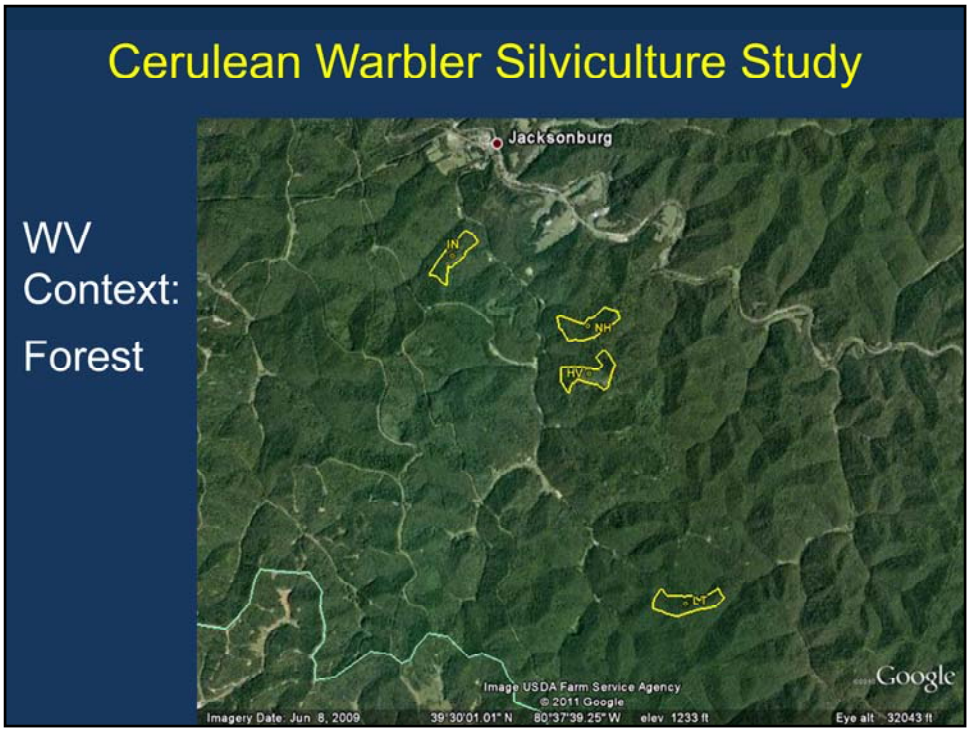
Field Sparrow

Field Sparrow	-3.0 % / Year
Prairie Warbler	-1.8
Eastern Towhee	-1.6
Mourning Warbler (PA)	-1.5
Blue-winged Warbler	-1.2
Chestnut-sided Warbler	-0.7
Indigo Bunting	-0.6
Song Sparrow	-0.6
Common Yellowthroat	-0.5

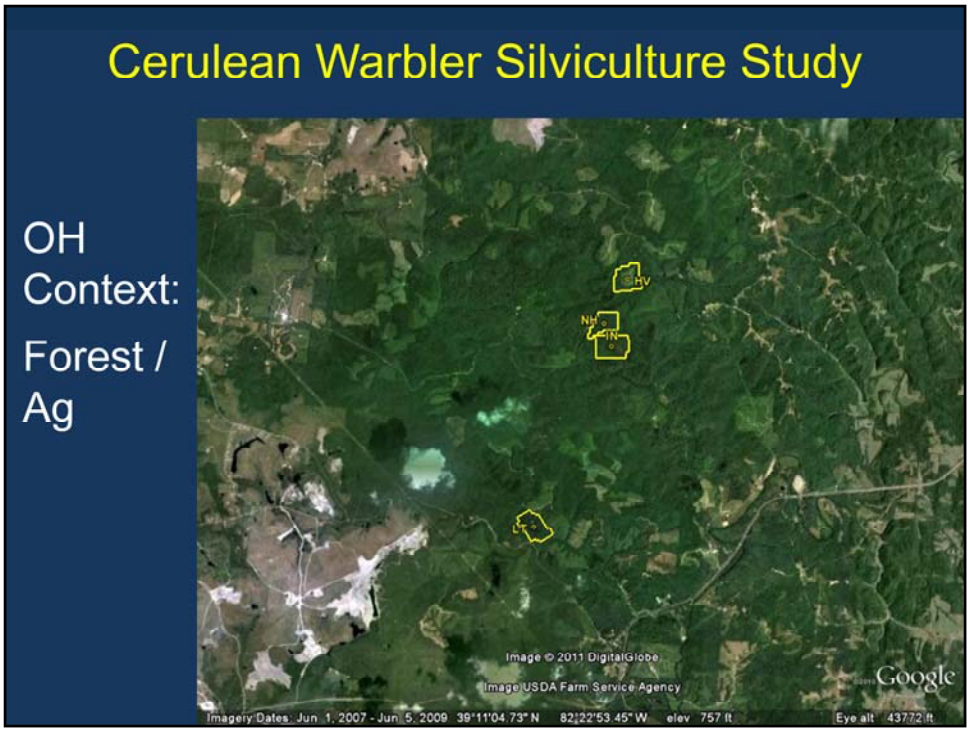
1. Negative trend for early successional species – 36 species with BBS data, more declining than increasing
2. Habitat change?
3. We have PRAW, INBU – not really FISP



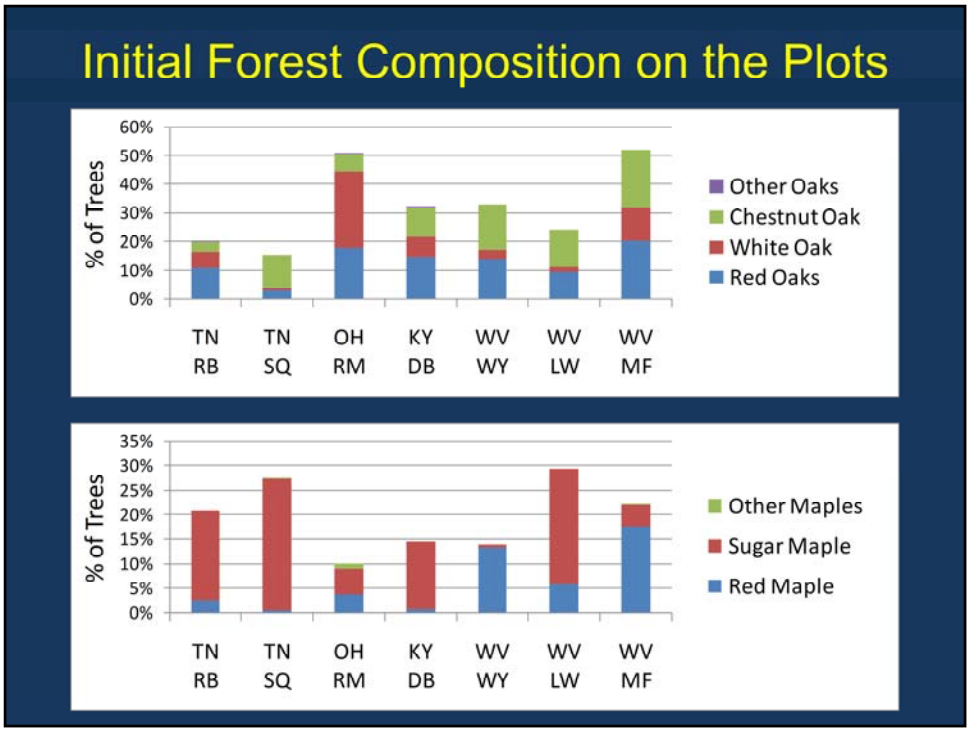
1. Overview of Cerulean Warbler Silviculture Study Areas.



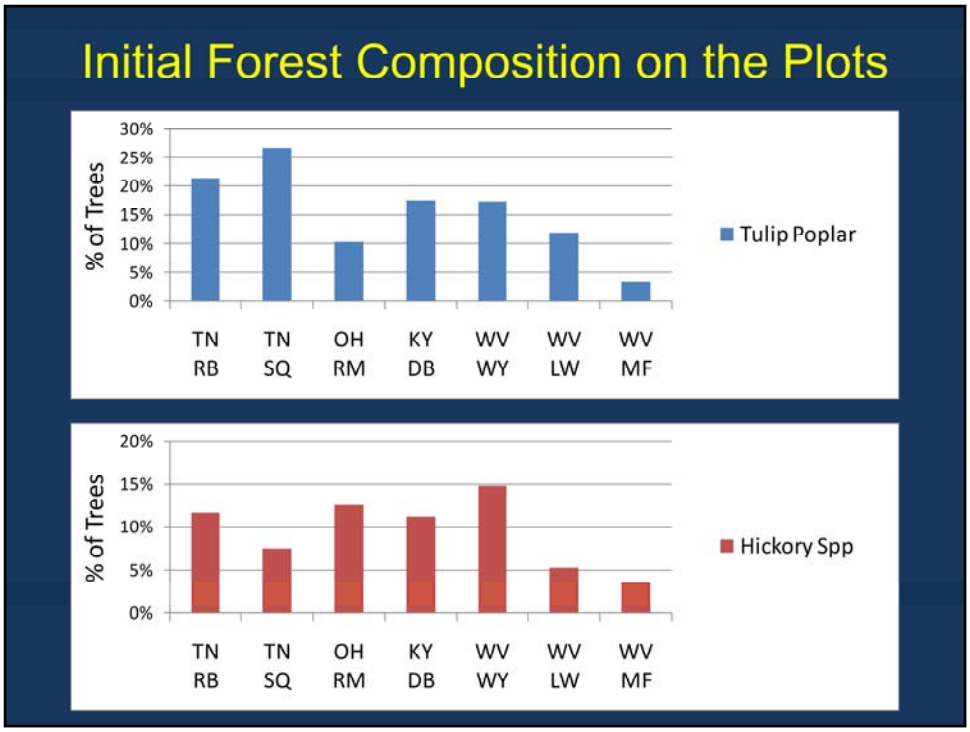
1. Spatial context may be important – Forest around Forest



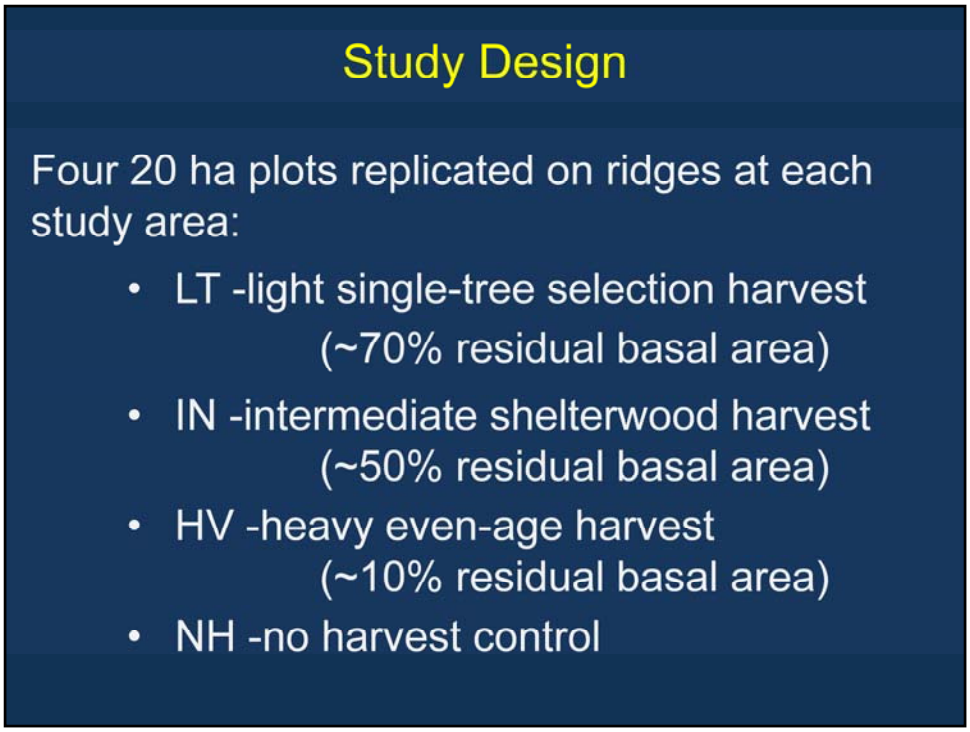
1. Spatial context may be important – Forestry and Agriculture around Forest
2. Likely a different species pool (BHCO?)



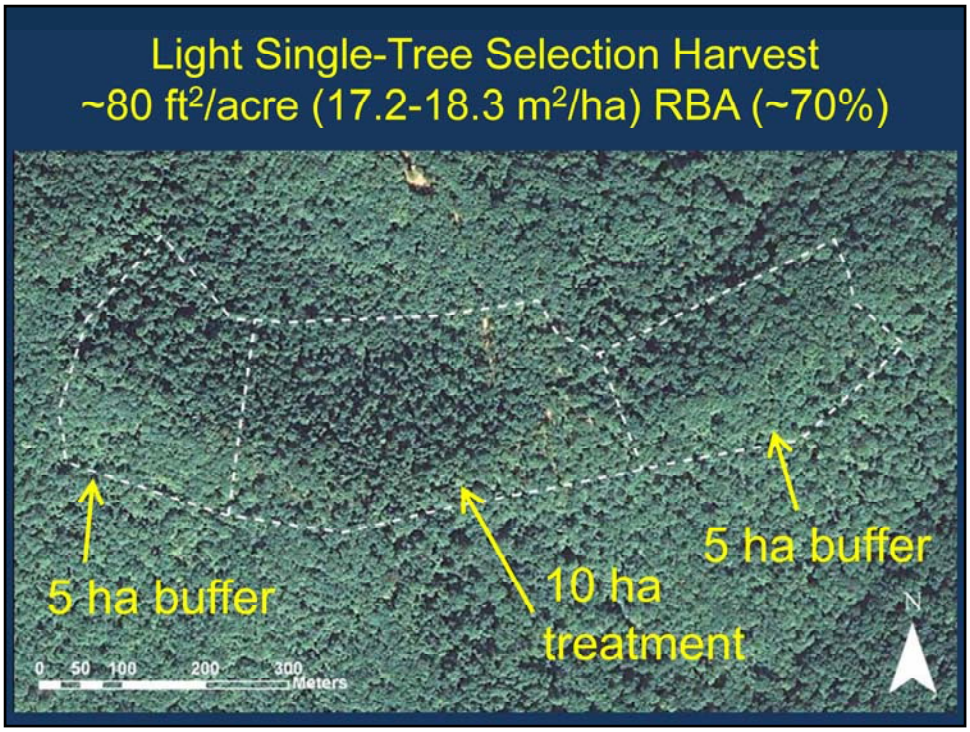
1. Major tree species – Oaks and Maples ~50% of trees
2. Site to site variability



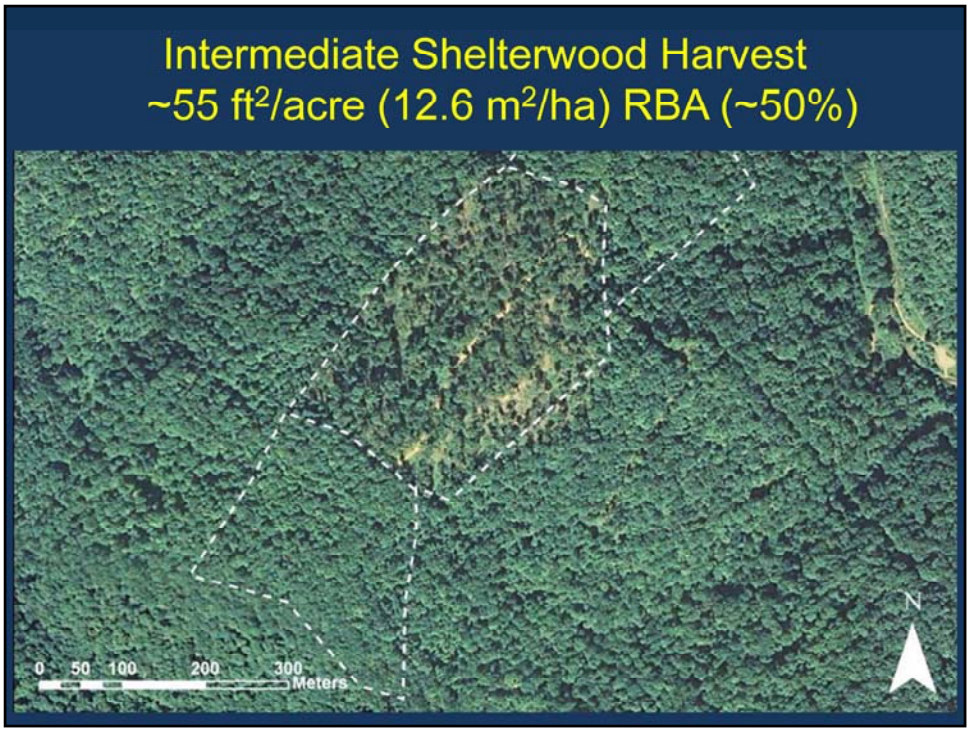
1. Major tree species – Tulip Poplar and Hickory Spp ~20-30% of trees
2. Site to site variability



1. Study area – replication of harvests at each



1. Buffer and Treatment Portions
2. Ridge Tops!
3. Differences in degree of canopy removal from light to heavy treatment.



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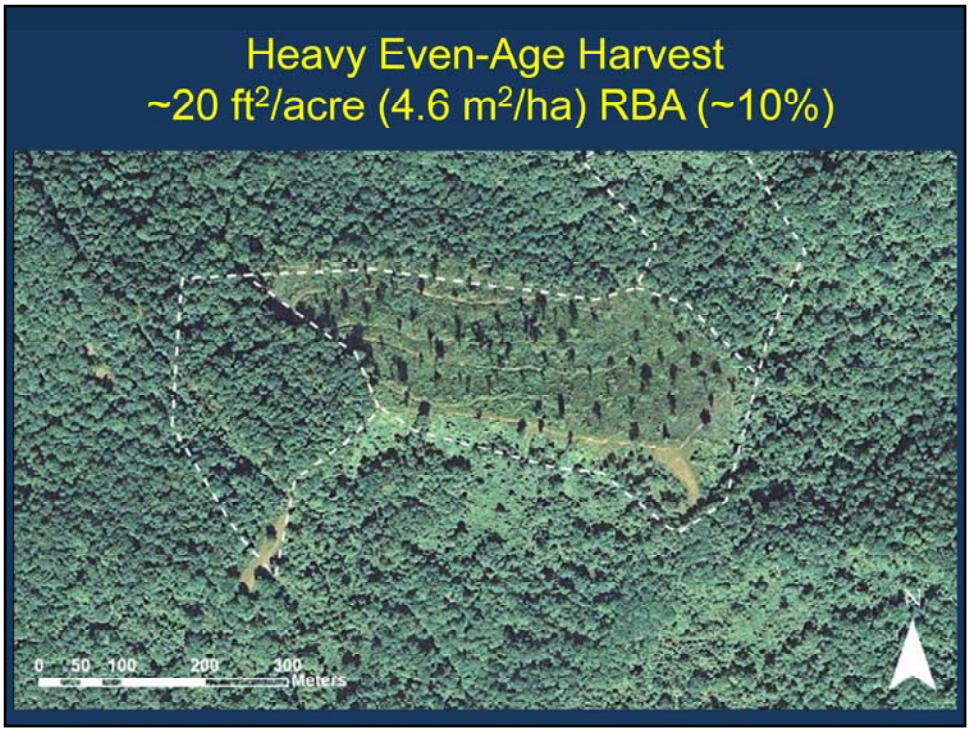
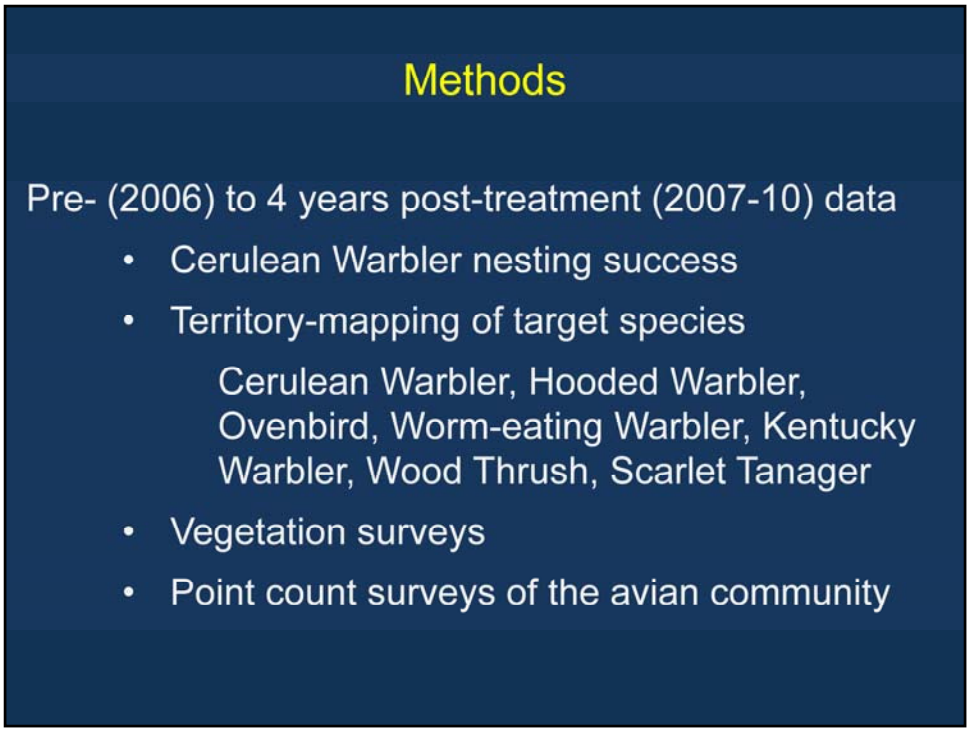
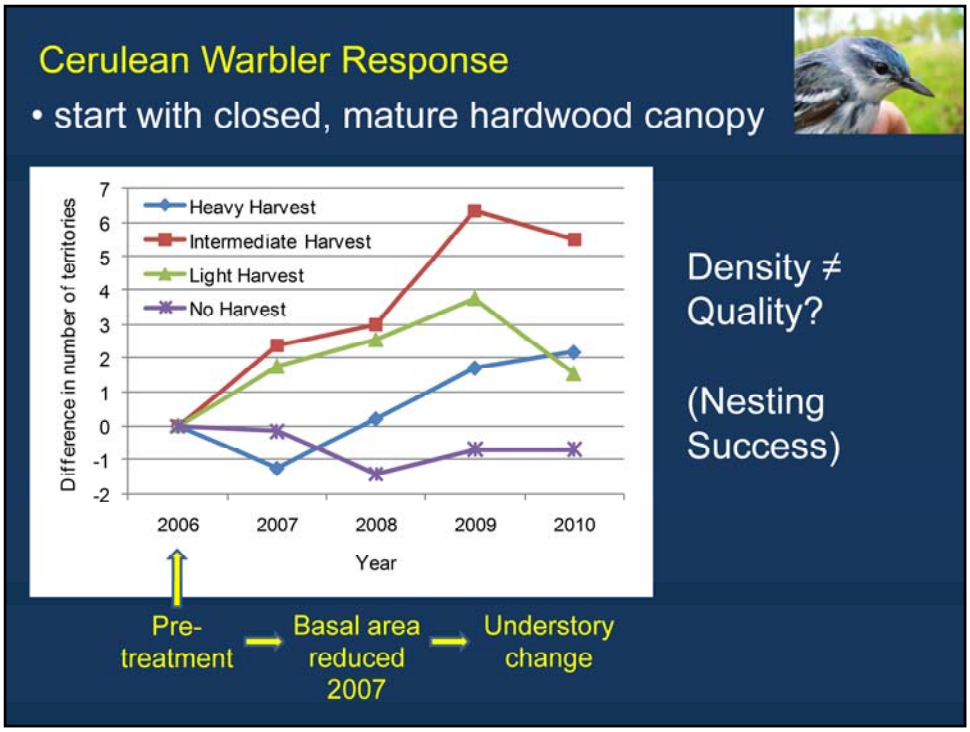


1. Buffer and Treatment Portions
2. Ridge Tops!
3. Differences in degree of canopy removal from light to heavy treatment.

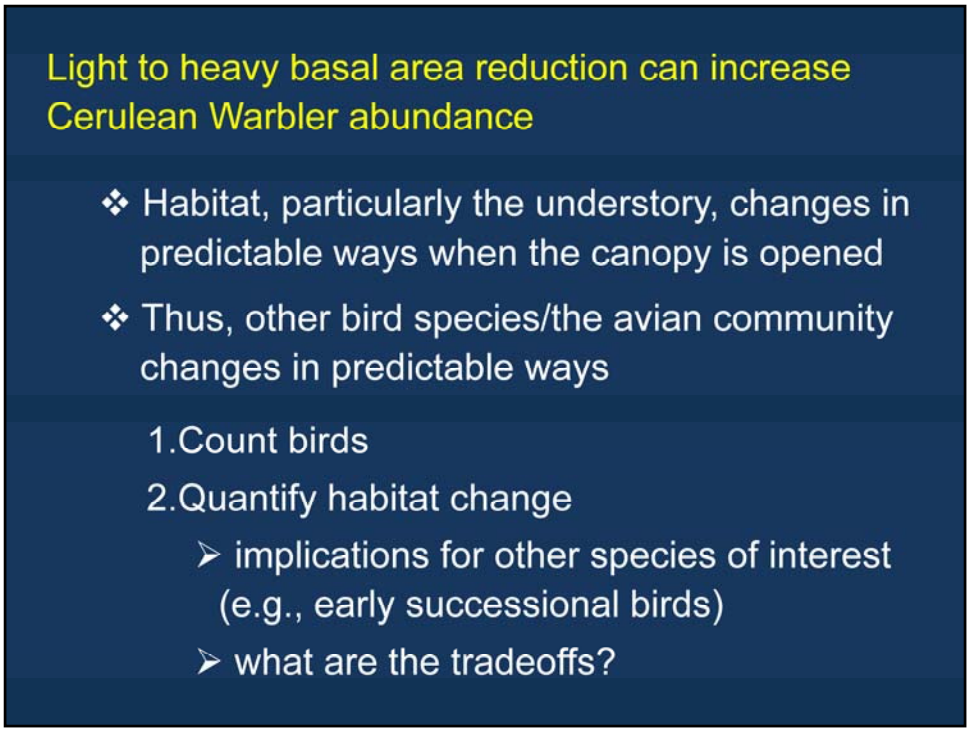
1. Also a “No Harvest” treatment



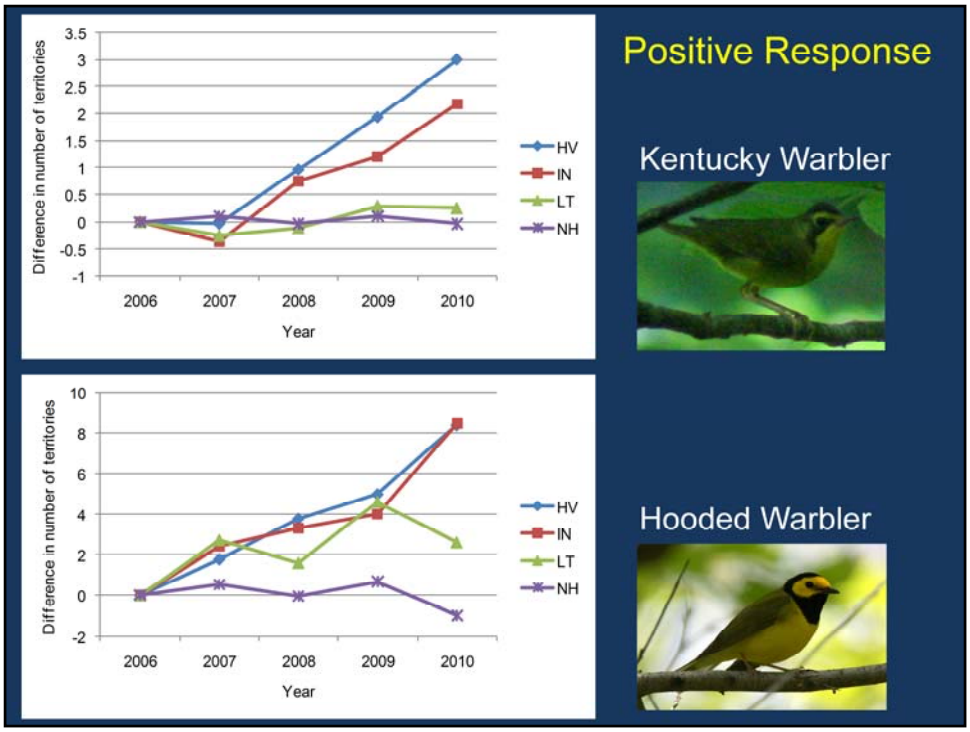
1. Methods – short-term response
2. Numeric and Reporductive Response
3. Addition of early successional species due to heavier treatments
4. Point Count data is the focus today – species and community



1. Key is CERW positive numeric response possible in all harvests
2. But what about potential negative effects on population



1. This may be an opportunity – flexible response so may have greater consideration of other species/community, but could be a tradeoff –other forest interior species that don't like gaps
2. Again, the final results of CERW nesting success important



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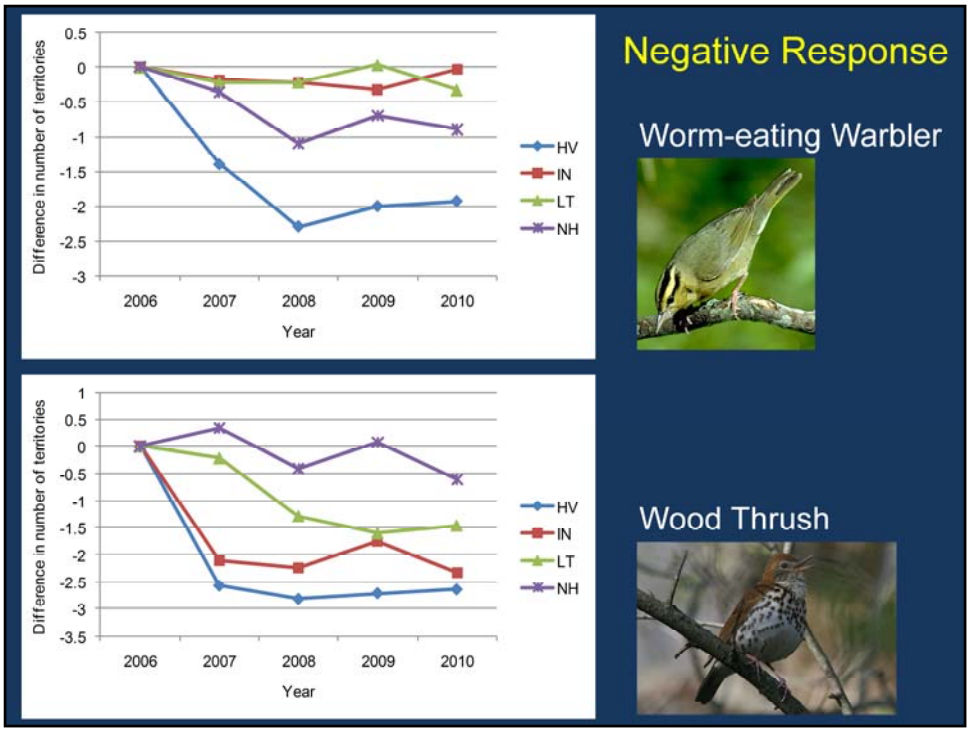

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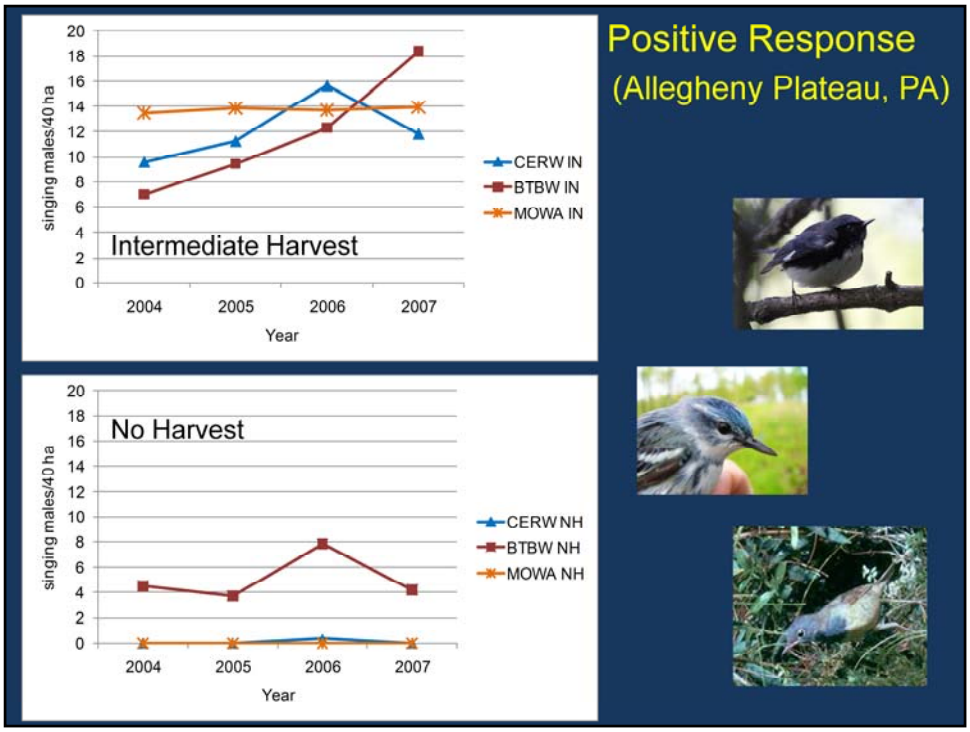

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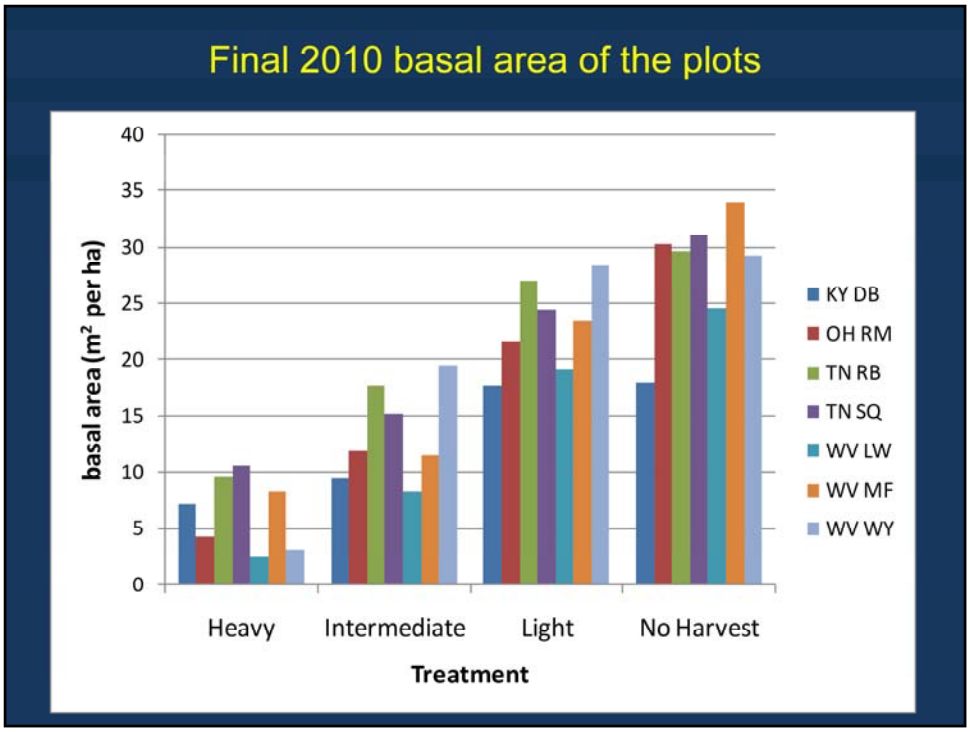
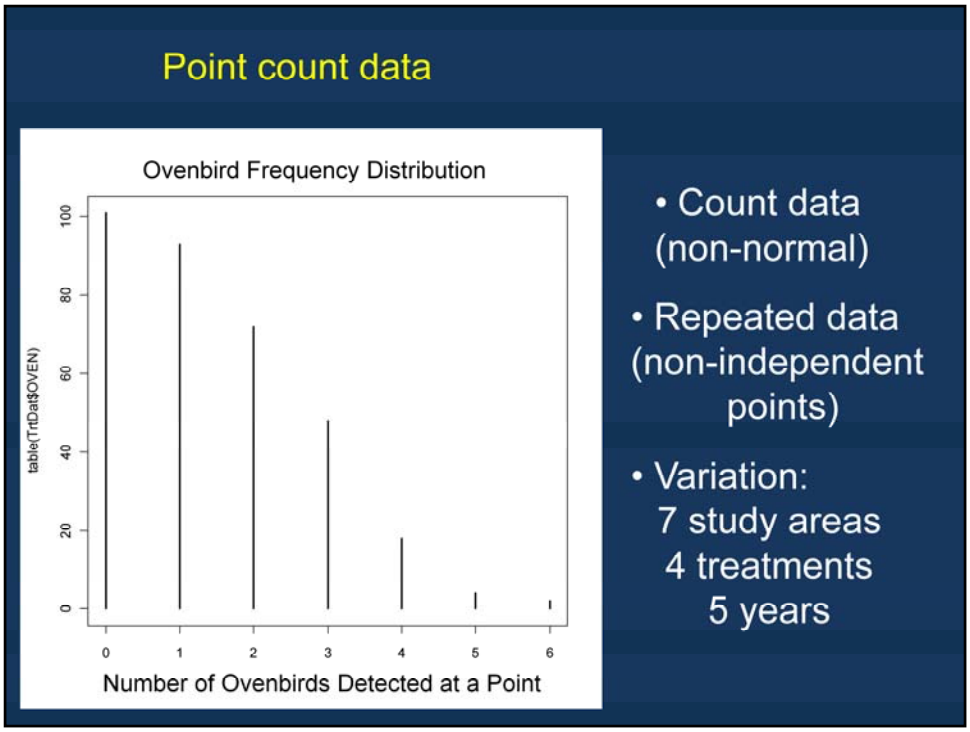


1. General grouping of plots by their treatment type works, although overlap



1. Data analysis considerations

Point count data

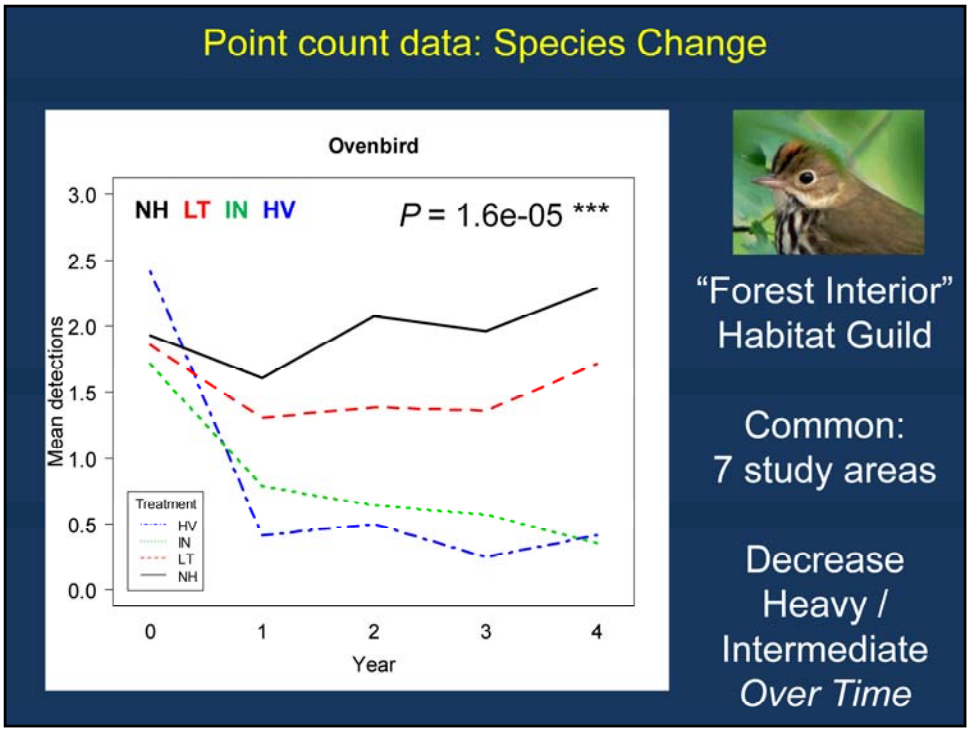
- Generalized mixed model repeated measures analysis

Ovenbird Example:

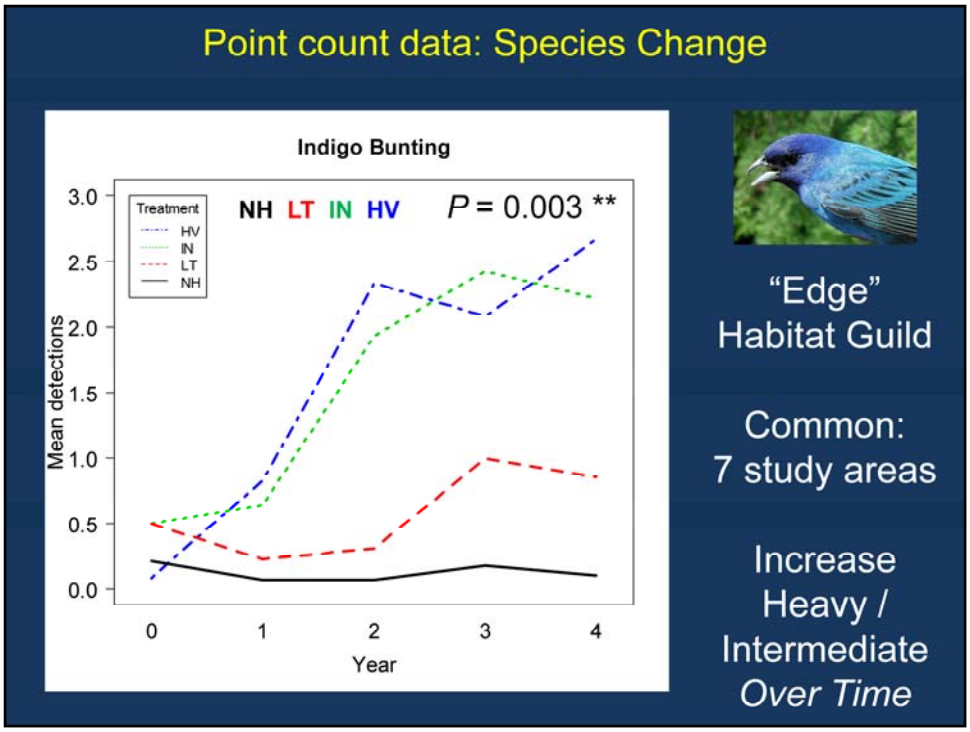
Number detected = Treatment + Year + Treatment*Year, (random = Study Area/Plot/Survey Point)

- Use Poisson distribution, not Gaussian (“Normal”)
- Include Treatment*Year Interaction

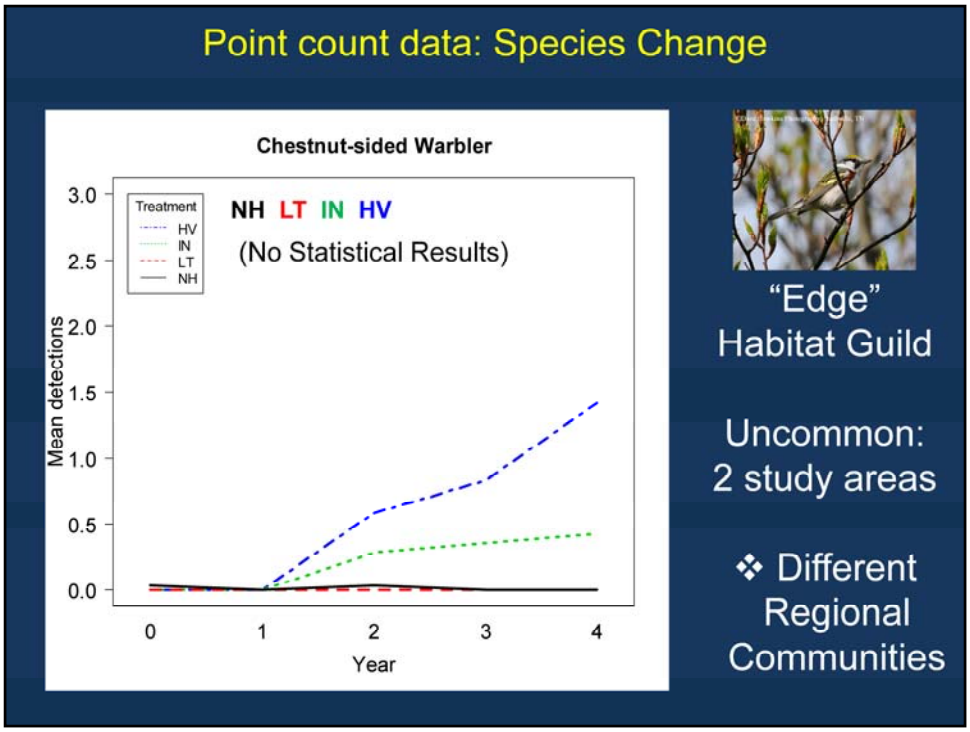
1. Generalized –to deal with count data
2. Repeated measures to deal with correlation between non-independent points
3. Inclusion of Treatment by Year interaction, Individual effects of Year, Treatment



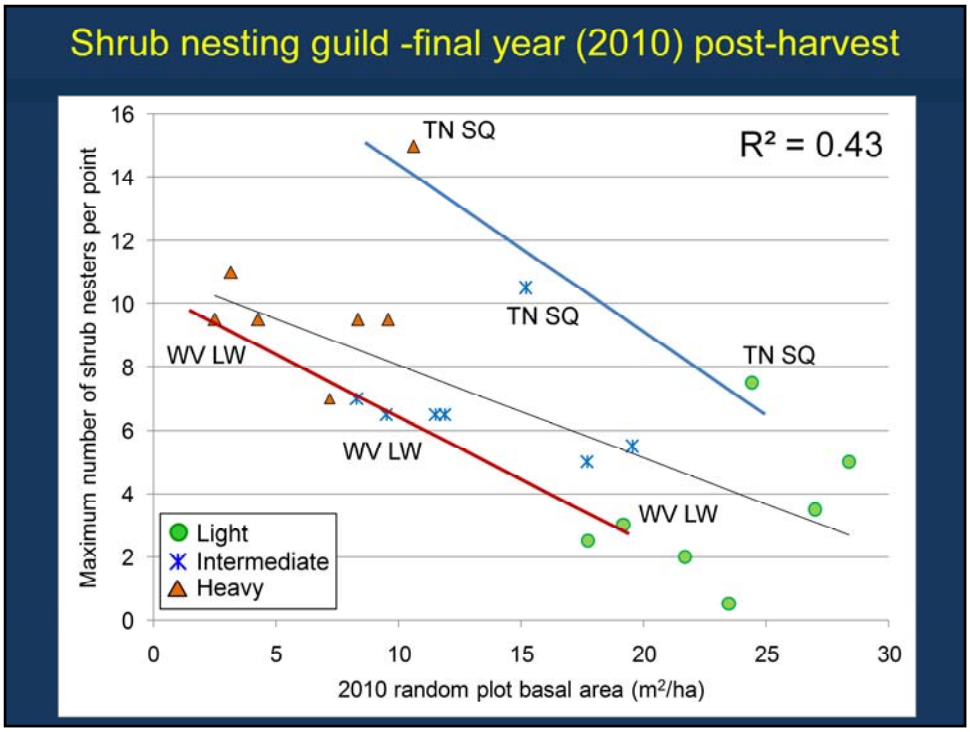
1. Forest Interior species, same as CERW but requires a different type of structure
2. Interaction significant – difference in slope of the response according the treatment
3. Heavy/Intermediate



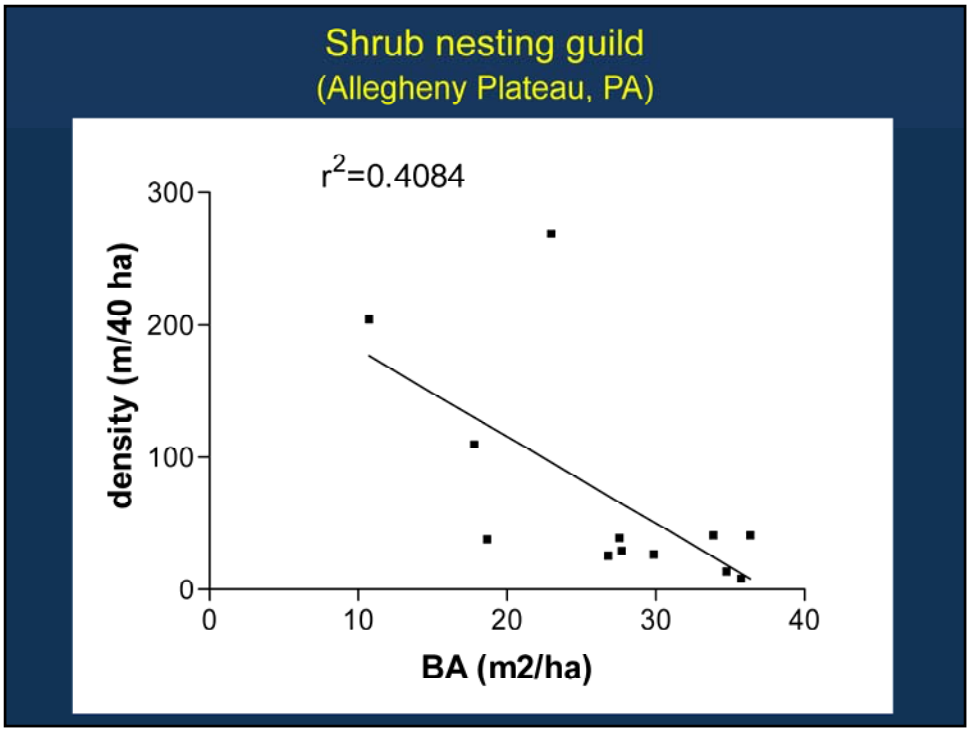
1. Early successional species, shares some similarity with CERW structure
2. Interaction significant – difference in slope of the response according the treatment
3. Heavy/Intermediate



1. Early successional species, but not widespread enough for statistics
2. Probably Interaction significant – difference in slope of the response according the treatment
3. Heavy/Intermediate
4. Implication for different avian communities in, around the study areas



1. Gradient of Plot Basal Area, general grouping by treatment type with some overlap
2. Gradient in early successional bird response – predictable
3. Individual study areas also follow the pattern



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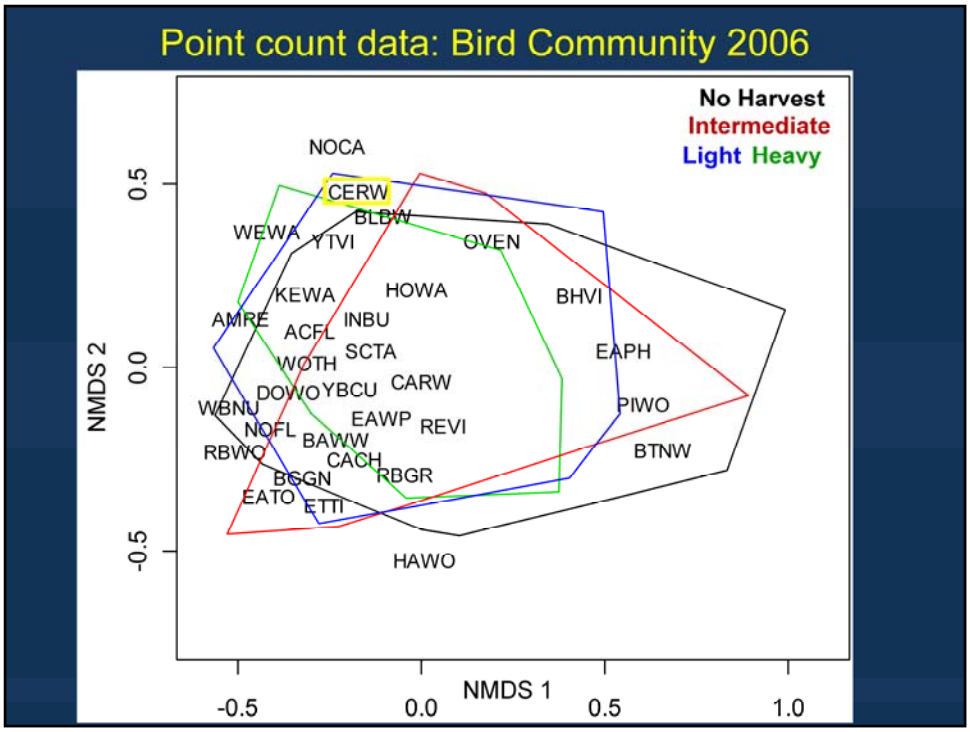
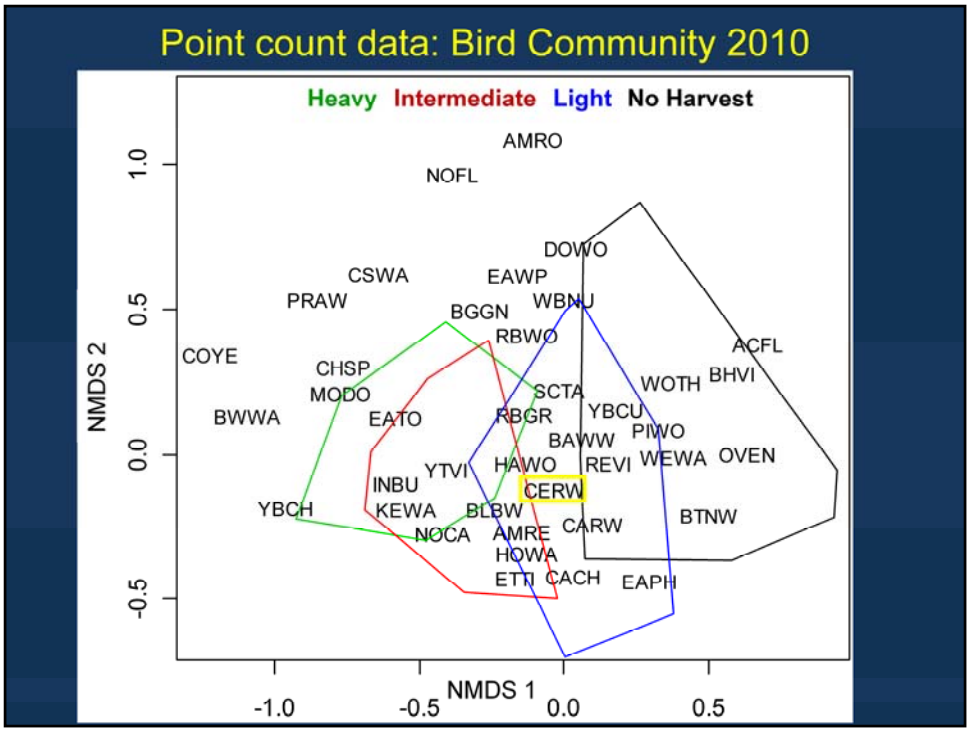


1. Multivariate data analysis
2. Survey points (not seen) and the treatment type polygons drawn around them due to simultaneous consideration of all data
3. Lack of differentiation, as expected
4. How the species are distributed



1. Multivariate data analysis
2. Survey points (not seen) and the treatment type polygons drawn around them due to simultaneous consideration of all data
3. Differentiation, as expected, by 2010, by treatment as might be predicted
4. How the species are distributed, CERW central position, gradient of habitat tendencies at least on the horizontal

Conclusions

- Species/Community Response
  - Heavier BA reduction = Positive for edge/successional birds
  - Regional differences due to different bird species pool
    - e.g., Chestnut-sided Warbler
  - Spatial context important? Forest vs. Agriculture
    - Brown-headed Cowbird – nest parasite
  - Some Forest Interior species may decline (Ovenbird)
  - How long will response persist?
- Habitat Implication
  - Early successional habitat = Post-fledging Habitat
    - even for Forest Interior Species

Conclusions

- Cerulean Warbler as a management target
  - Flexible strategy since (some) increase in all harvests?
    - consider associated species/community response
    - Birds & (economic) Forestry compatible?
  - Harvest effects on CERW nest success may be a concern
  - Restrict inference to ridge tops, ~10 ha (25 acre) cuts
  - Again, how long will response persist?

- Need to develop regional guidelines
  - Best Management Practices in the works

Management Recommendations

- Cerulean Warblers may favor east/south aspects
  - Leave some large trees
  - Preferably not red oak – poor for foraging
  - White oak may be a favorite nest tree
  - Spatial considerations – Knolls
  - Obtain information on Cerulean Warbler abundance
    - Vary harvest intensity
    - Avoid too much impact to known cluster

Acknowledgements:

- MANY Field Technicians!
- USFS Monongahela National Forest
- USFS Daniel Boone National Forest
- US Fish and Wildlife Service
- National Fish and Wildlife Foundation
- Tennessee Wildlife Resources Agency
- Kentucky Department of Fish and Wildlife Resources
- West Virginia Division of Natural Resources
- Ohio Department of Natural Resources
- The Nature Conservancy