

# From Research to Management: Development of Best Management Practices for Cerulean Warblers



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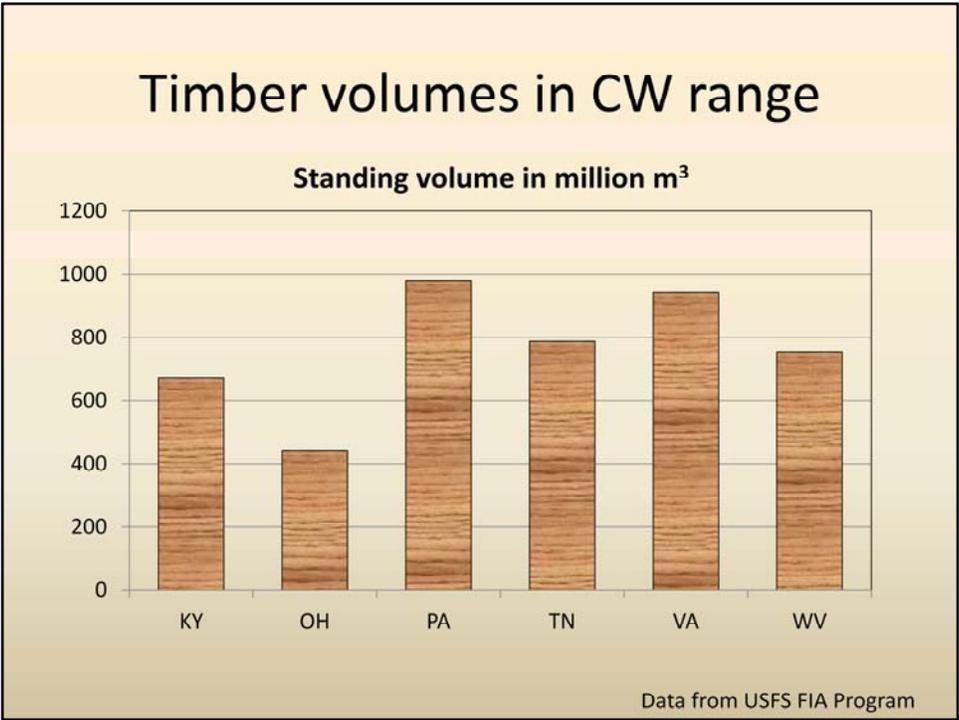


## What I'll talk about:

- Need for BMPs
- Research inputs
- Landscape-scale considerations
- Stand-scale considerations
- Temporal considerations

## Why BMPs?

- Cerulean Warblers require large tracts of mature hardwood forest
- Hardwood forests in core of range at or approaching financial maturity
- Tremendous value in hardwood timber
- Potential conflict between maintaining Cerulean habitat and realizing economic value of forests



Mostly specialty hardwoods from these core states (i.e., high-value timber)

## Economic value of timber in CW states

- PA: \$5.5 billion/yr
- WV: \$4.0 billion/yr



These were the two seemingly reliable figures I could find for timber sales only – not including forest products receipts/value added

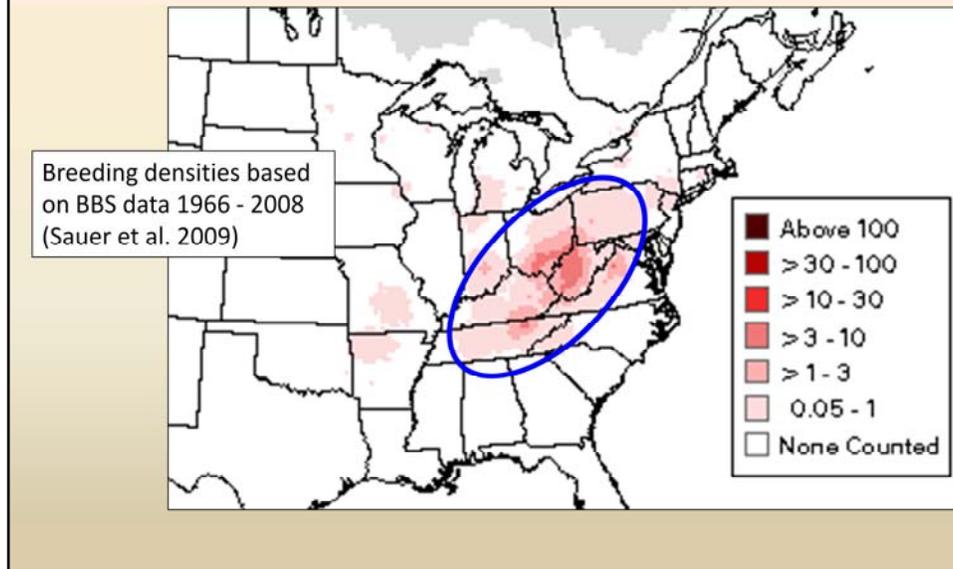
How can we sustain Cerulean Warblers when their forest habitats constitute such a valuable resource for local economies?



Goals: Use research results to develop guidelines for forest management to (1) minimize impacts to Cerulean warblers and their habitat and (2), where possible, improve habitat quality.

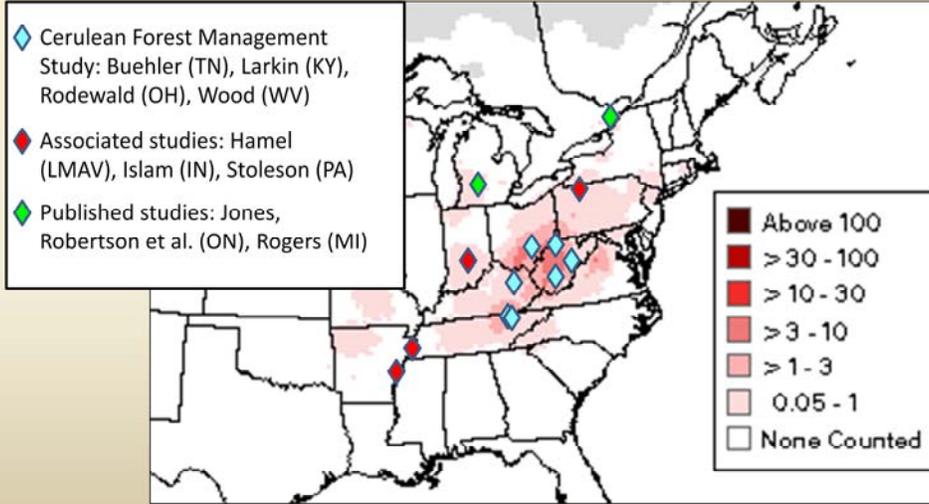
*Where, How, and When*

## Where to manage for Cerulean Warblers



To show where CW management most relevant: in the core of its range indicated by blue oval

# Cerulean Warbler Research



To highlight sources of information from which BMPs developed

## Landscape considerations

- Ceruleans in 2 primary topographic locations:
  - Ridge tops & shoulders
  - Bottomlands along major waterways



## Features common to CERW-occupied stands

- Open, broken, or gappy canopy



## Examples of Cerulean landscapes

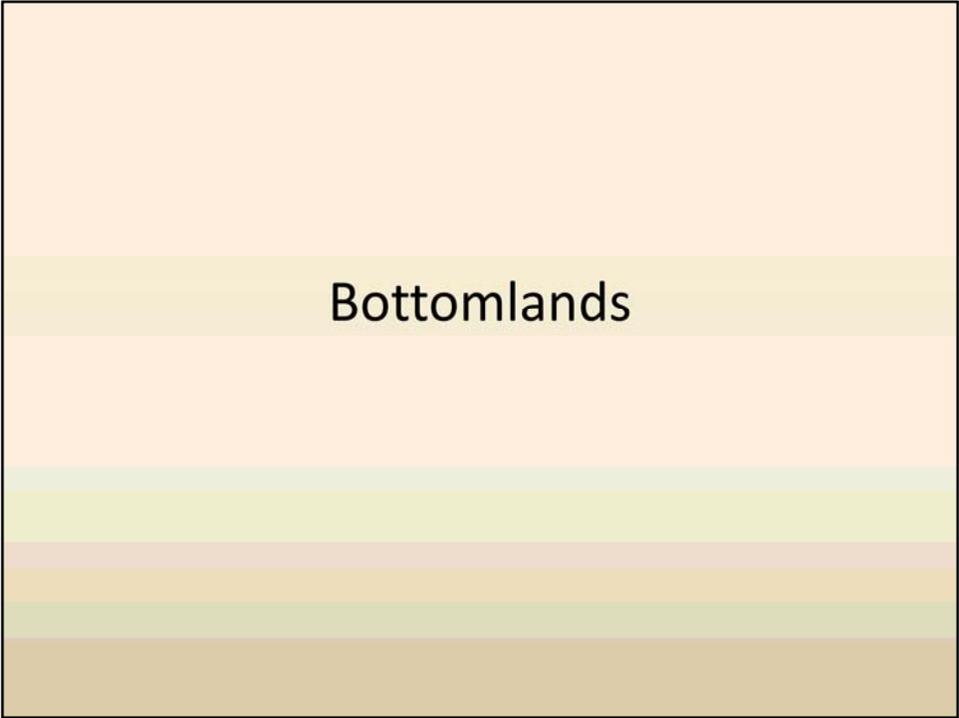


## Examples of Cerulean landscapes



## Examples of Cerulean habitat





## Bottomland forest

- **Where** to consider Cerulean Warblers in bottomland forest management?
  - In large tracts of contiguous forest (>4,000 ha)
  - Where subject to active timber management
  - Where tree species composition suitable

## Bottomlands: Data sources

- Tree info primarily from Hamel, plus Stoleson unpubl. data, Gabbe 2002.
- Guidelines based primarily on P. Hamel, 2005. *Suggestions for a Silvicultural Prescription for Cerulean Warblers in the Lower Mississippi Alluvial Valley*. Pages 567-575 in Ralph, C. John; Rich, Terrell D., eds. Bird Conservation Implementation and Integration in the Americas. USDA Forest Service Gen. Tech. Rep. PSW-GTR-191.

## Bottomlands: Tree species utilized disproportionately by Ceruleans

- Sycamore (*Platanus occidentalis*)
- Hickory/Pecan (*Carya* spp.)
- Box elder (*Acer negundo*)
- Sweet gum (*Liquidambar styraciflua*)
- American elm (*Ulmus americana*)
- Hackberry (*Celtis laevigata*)
- Eastern cottonwood (*Populus deltoides*)



## Bottomlands: Tree species under- utilized by Ceruleans

- Red maple (*Acer rubrum*)
- Green Ash (*Fraxinus pennsylvanica*)
- Slippery elm (*Ulmus rubrum*) [F]
- Baldcypress (*Taxodium distichum*)



## Guidelines for bottomlands

- Promote large sawtimber trees with expansive crowns.
- Promote shade-intolerant dominant trees growing over shade-tolerant subcanopy trees.
- Grow these trees in such a way that numerous gaps are present throughout the stand to stimulate growth of long limbs with abundant foliage.



## Upland Forest

- **Where** to consider Cerulean Warblers in forest management?
  - Often concentrated along “topographic edges”: shoulders of slopes, knolls, knobs, ridges
  - Generally on east-facing slopes (NE in south, SE in north)
  - Often along trails or little-used roads (timber roads)
  - Generally avoid conifers

## Uplands: Data sources

- Tree preferences based on nesting records across range, and foraging preferences from WV, KY, OH (G. George Ph.D. dissertation, WVU, 2010).
- Management strategy based primarily on info from CW Forest Management Study, and draft prescription from Buehler for Tennessee.

## Upland BMP approach

- Xeric vs. mesic sites.
- Consider different management for **high** and **low** Cerulean density sites (based on potential “ecological trap”, per Boves, this symposium).
- Consider **sustainability** of any harvests (esp. presence of advance regeneration and maintaining oak dominance into future stand), and mast production.

## Xeric vs. Mesic Sites



↑  
**Xeric:** Dominated by white, black & chestnut oaks, black gum, ericaceous understory

**Mesic:** Dominated by red oak, tulip poplar, hickories, sugar maple, diverse and often dense understory →



## Xeric to Intermediate Sites (white oaks)

- If Cerulean Density < 5 prs/ 25 acres (2 pr/ 10 ha):
  1. Apply CERW treatment: cut to 50-60 ft<sup>2</sup> / acre residual basal area (= 11.5 – 13.8 m<sup>2</sup> /ha)
  2. Remove overstory after 14 – 45 yrs

## Recommended CERW treatment



Residual trees should include the largest diameter individuals of the preferred species

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  1. Apply CERW treatment: cut to 50-60 ft<sup>2</sup> / acre residual basal area (= 11.5 – 13.8 m<sup>2</sup> /ha)
  2. Remove overstory after 14 – 45 yrs
- If Cerulean Density > 5 prs/ 25 acres:
  1. No harvest for 30 yrs

## Rationale

- At high Cerulean densities, we propose a conservative approach of no cut, as the “Cerulean prescription” harvest would not increase density, but could degrade fecundity.
- At low Cerulean densities, sites could be enhanced as habitat by forest management.

## Mesic sites

- If no red oaks:
  1. No harvest 30 years
- If red oaks present:
  1. Determine Cerulean density



## Mesic sites: red oaks present

- If Cerulean Density < 5 prs/ 25 acres (2 pr/ 10 ha):
  1. If there is adequate red oak advance regeneration
    - a) Regenerate red oaks when necessary using appropriate methods



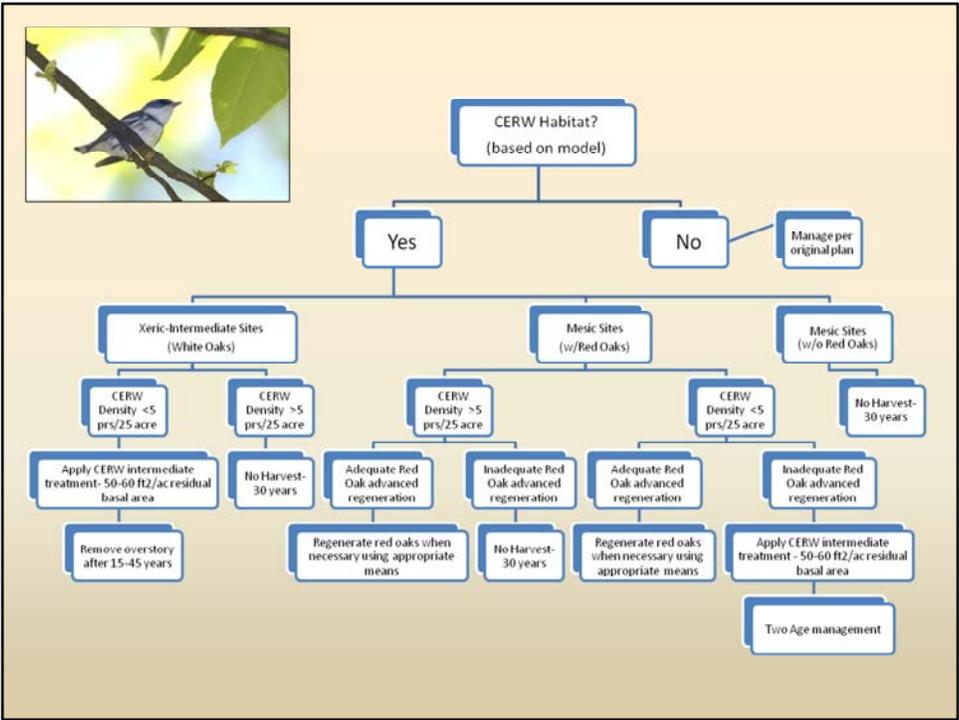
## Mesic sites: red oaks present

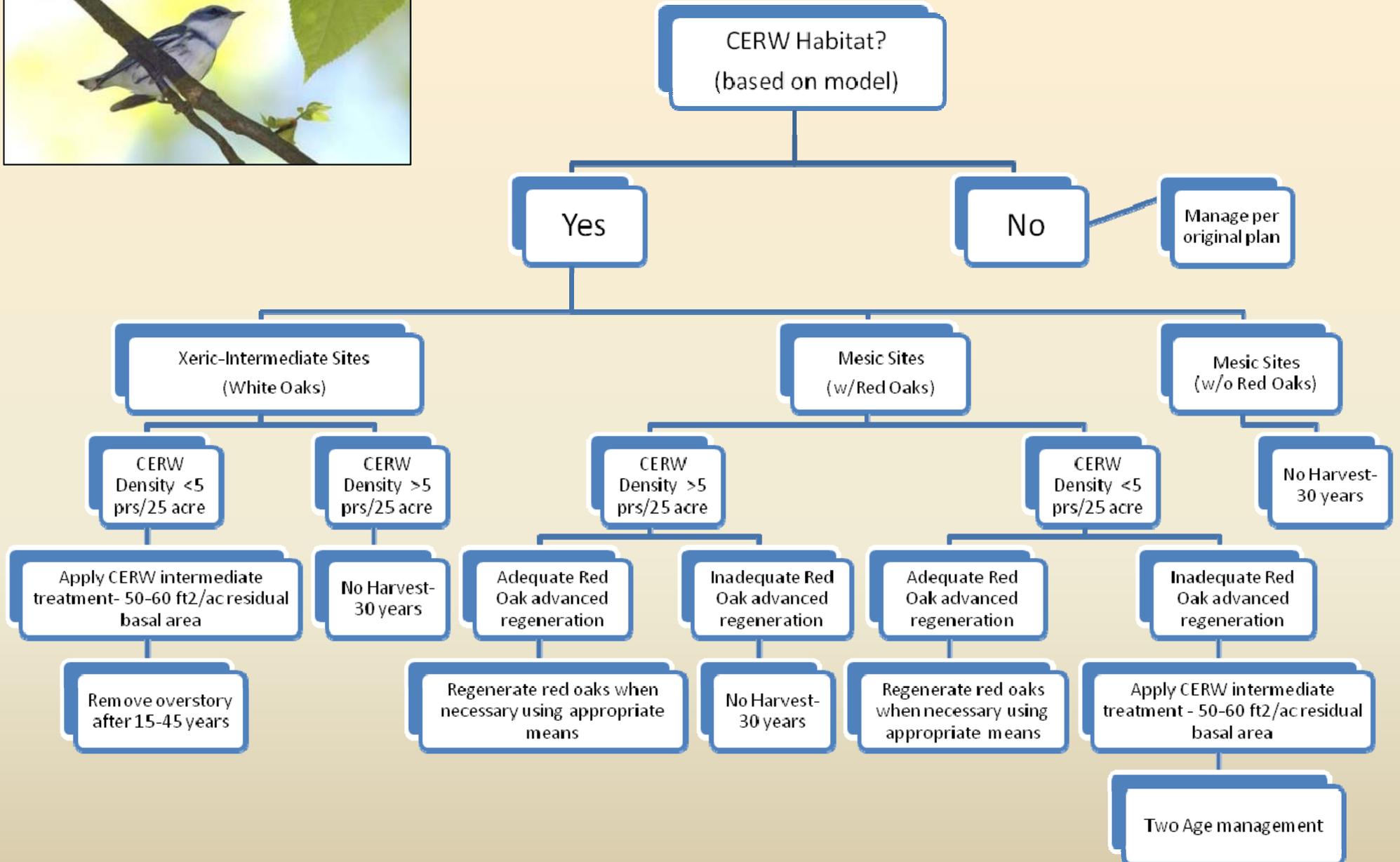
- If Cerulean Density < 5 prs/ 25 acres (2 pr/ 10 ha):
  2. If inadequate advance red oak regeneration
    - a) Apply CERW treatment: cut to 50-60 ft<sup>2</sup> / acre residual basal area (= 11.5 – 13.8 m<sup>2</sup> /ha)
    - b) Manage as two-aged stand



## Mesic sites: red oaks present

- If Cerulean Density > 5 prs/ 25 acres (2 pr/ 10 ha):
  1. If there is adequate red oak advance regeneration
    - a) Regenerate red oaks when necessary using appropriate methods
  
  2. If inadequate advance red oak regeneration
    - a) No harvest for 30 yrs







What to manage?

## Uplands: Which trees species?

Promote/retain:

- White oak (*Quercus alba*)
- Chestnut oak (*Quercus montana*)
- Hickories (*Carya* spp.)
- Sugar maple (*Acer saccharum*)

Avoid/cull:

- Red maple (*Acer rubrum*)
- Red oak (*Quercus rubra*)



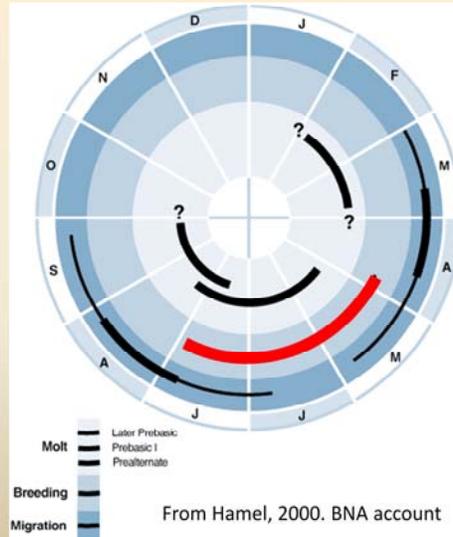
## Uplands: retain grapevines!

- Often a good predictor of Cerulean territories
- Often used for nest-building



## Temporal considerations

- Stand entry should be avoided during brief breeding season (late April – early August)



## Temporal considerations

- Manage forest for maximum rotation length (120+ yrs good)
- Ensure 50% of area is in 50+ yr-old age class at all times (harvest & regenerate 10% every 12 yrs for 120-yr rotation length)
- Apply intermediate treatments (shelterwoods) adjacent to stands harvested



## Caveats

- These BMPs are tentative, and may not apply to areas outside of the regions where they were developed.
- We still need to determine optimal rotation lengths, tree heights, diameter and density of canopy trees, extent of ground and midstory cover, landscape patterns and constraints.
- These BMPs require testing and refinement/local tweaking.

## Future Steps

- Identify managers of appropriate public and private land where CERW density high
- Disseminate & implement BMPs in adaptive management framework
- Continue to refine BMPs

# Acknowledgments

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- Additional funding by Pennsylvania Department of Natural Resource Conservation, Penn. Game Commission, & Northern Allegheny Conservation Association
- Based on reams of data collected by MANY graduate students and field assistants who now suffer from chronic “warbler neck”.





American  
Warbler

Photo by W.W. Miller