Logging impacts on birds in New York: A role for private forest stewardship in bird conservation

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Abstract

Timber harvesting can have significant impacts on bird communities as a result of changes in habitat structure. We conducted bird and vegetation surveys in 71 northern hardwood stands in upstate New York from 1999-2001 to quantify avian responses to logging as it is conducted on private lands. In our study, we analyzed responses of three ecological habitat groups of bird species (based on previously published studies): generalists, those that prefer "early" forests with relatively few large trees, and those that prefer more "mature" forests. In addition, we analyzed the responses of individual species and all species pooled. Forest stands were grouped using cluster analysis of residual basal area and tree size into four categories resulting from their recent management: uncut or lightly thinned (category A), moderate partial harvest (category B), heavy partial harvest (category C), and clearcut (category D). Early-forest birds were more abundant in more disturbed habitats and were more habitat-specific than were mature-forest birds, which showed considerable overlap among forest categories in terms of both relative abundance and richness. For example, the abundance and richness of mature-forest birds were very similar in categories A and B and only slightly lower in C, whereas early-forest birds rapidly increased in abundance and richness across categories from A to D. Neither abundance nor richness of the generalists differed significantly among forest categories. The use of ecological habitat groups and forest condition categories simplified our findings and provided a meaningful way to describe to forestry professionals and landowners how birds responded to logging. These results provided the basis of a forestry education initiative promoting sustainable, wildlife-friendly forestry that targets private forest owners, who control nearly 85% of New York's forests. The education initiative was designed and implemented by a diverse group of stakeholders, including agency, non-profit, industry, and landowner representatives.

Objectives

- Describe breeding bird community of recently managed northern hardwood forests in New York State along a gradient of harvest intensity
- Develop outreach materials and strategies for communicating results to private forest owners and professional foresters

Methods

Study Design

- Study areas: Unfragmented regions of the Adirondacks and Appalachian Plateau (Catskills and Southern Tier)
- 71 northern hardwood forest stands sampled from 1999-2001
- Stands represent a gradient of harvest intensity, including unmanaged, partially harvested, and clearcut stands
- In harvested stands, logging had taken place within the previous 2-5 yrs

Vegetation Sampling

- 10-ha (25-acre) study plot in each stand
- 12-15 randomly located vegetation sample points
  - Basal area plots
  - Trees: dead or alive, species, DBH, cavities
  - Over-, mid-, and understory and ground cover estimated
  - Coarse woody debris measured
  - Canopy height
  - Slope, aspect, elevation

Bird Community Sampling

- Conducted at 6 points per stand (selected from the vegetation sample points such that bird points were at least 150m apart and 100m from the stand edge)
- 10-min point counts conducted between 5:00 and 10:00am
- 3 visits during June

Data Analysis

- Stands grouped using cluster analysis into 4 forest condition categories (Table 1, Figure 1)
- Bird species assigned (*a priori* using meta-analysis of previously published studies) into three ecological habitat groups according to the relationship between their relative abundance and stand basal area (Table 2)
- ANOVA (Duncan's Multiple Comparison Test) used to determine significant differences of bird group abundance and richness among forest condition categories (Figures 2-5)

Results

Table 1. Habitat characteristics of forest condition categories.

	(A) Mature	(B) Moderate Partial Harvest	(C) Heavy Partial Harvest	(D) Clearcut
Timber stocking	~100%	70-80%	40-60%	<20%
Canopy cover	>75%	>75%	<50%	<25%
Ground cover	35%	45%	55%	75%
Basal area (sq.ft.)	100	77	54	15

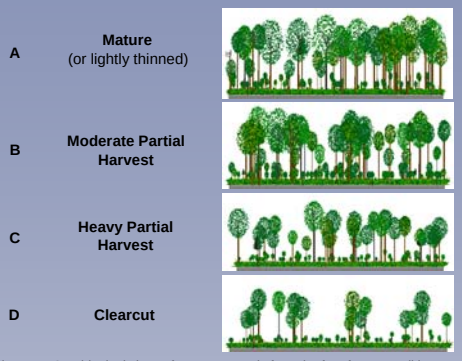

Figure 1. Graphic depictions of average stands from the four forest condition categories resulting from a cluster analysis of 71 northern hardwood forest stands.

Table 2. Alphabetical listing of birds in each of the three ecological habitat groups determined through meta-analysis of previously published studies (alpha=0.2). * denotes species of conservation concern (PIF 2002).

Prefer "early" forests	Generalists	Prefer "mature" forests
American Goldfinch	American Crow	Blackburnian Warbler*
American Redstart*	Baltimore Oriole*	Black-capped Chickadee
American Robin	Blue Jay	Black-throated Blue Warbler*
Black-and-white Warbler*	Common Grackle	Black-throated Green Warbler*
Brown-headed Cowbird	Dark-eyed Junco	Blue-headed Vireo*
Canada Warbler*	Downy Woodpecker	Brown Creeper
Chipping Sparrow	Eastern Phoebe	Eastern Wood-Pewee*
Common Yellowthroat	Great Crested Flycatcher*	Golden-crowned Kinglet
Chestnut-sided Warbler*	Hooded Warbler*	Hairy Woodpecker
Eastern Towhee*	Nashville Warbler	Hermit Thrush
Field Sparrow*	Northern Parula*	Least Flycatcher
Gray Catbird*	Northern Waterthrush	Ovenbird
House Wren	Pine Siskin	Red-eyed Vireo
Indigo Bunting*	Pine Warbler	Scarlet Tanager*
Magnolia Warbler	Pileated Woodpecker	Swainson's Thrush
Mourning Warbler	Prairie Warbler*	White-breasted Nuthatch
Northern Flicker*	Purple Finch*	Winter Wren
Olive-sided Flycatcher*	Red-breasted Nuthatch	Wood Thrush*
Rose-breasted Grosbeak*	Red-bellied Woodpecker	Yellow-bellied Sapsucker*
Ruffed Grouse*	Warbling Vireo	
Song Sparrow	Yellow-bellied Flycatcher	
Veery*	Yellow-billed Cuckoo	
White-throated Sparrow	Yellow-rumped Warbler	
Yellow Warbler	Yellow-throated Vireo*	

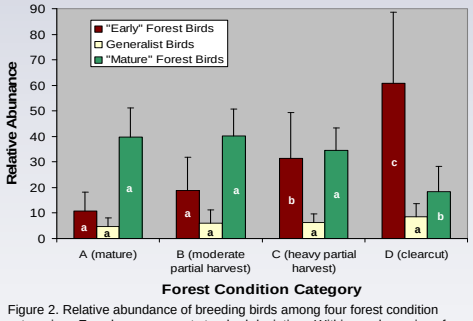

Figure 2. Relative abundance of breeding birds among four forest condition categories. Error bars represent standard deviation. Within a color series of bars, different letters indicate statistically significant differences among categories (alpha=0.1).

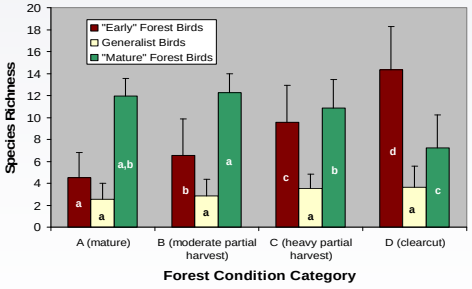

Figure 3. Species Richness of breeding birds among four forest condition categories. Error bars represent standard deviation. Within a color series of bars, different letters indicate statistically significant differences among categories (alpha=0.1).

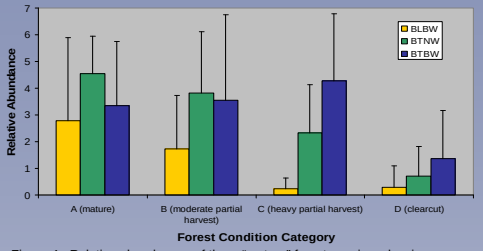

Figure 4. Relative abundances of three "mature" forest species, showing variation of patterns among individual species across forest condition categories. Error bars represent standard deviation. BLBW is Blackburnian Warbler, BTNW is Black-throated Green Warbler, BTBW is Black-throated Blue Warbler.

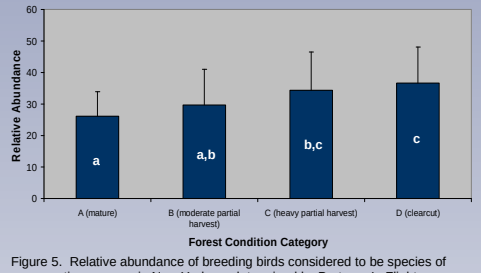

Figure 5. Relative abundance of breeding birds considered to be species of conservation concern in New York, as determined by Partners In Flight, among forest condition categories. Error bars represent standard deviation. Different letters in bars indicate statistically significant differences among categories (alpha=0.1).

Conclusions

- Northern hardwood forests in unfragmented regions of New York, managed at various intensities, support many breeding birds at relatively high abundances
- Different breeding bird "communities" are associated with each forest condition category
- Most species are abundant in more than one category
- No species was restricted to a single category
- Species of conservation concern are relatively more abundant and rich in forests managed more intensively
- Forest management can benefit the conservation of birds in New York

Outreach

The New York Forest Biodiversity Partnership formed to translate and communicate the results of this study to private forest owners, forestry professionals, and forestry students in New York State.

The goals of the partnership are:

- To share information about the effects of logging on non-game wildlife
- To promote sustainable forest management in New York

Outreach mechanisms include:

- Publication of *Wildlife and Forestry in New York Northern Hardwoods: A Guide for Forest Owners and Managers* (Figure 6)
- Conducting a series of workshops for forest landowners, Master Forest Owners, forestry students, private consulting foresters, state foresters, and loggers

Partners include:

Audubon New York
Consulting in the Public Interest
Cornell University
Empire State Forest Products Association
International Paper Company
New York Forest Owners Association
New York Institute of Consulting Foresters
New York State Dept. of Environ. Cons.
Northeastern Loggers Association
Paul Smiths College
SUNY-Environmental Science & Forestry
United States Fish & Wildlife Service

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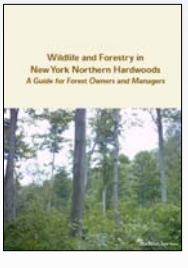

Figure 6. Cover of the forestry guide.

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