

2013 Annual Research Report to Baxter State Park

Bird communities of coniferous forests in the Acadian region; their response to management, and habitat associations.

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Background and Project Overview

Several bird species of concern are found in the coniferous forests of Northern New England. Cape May (*Setophaga tigrina*), and Bay-breasted Warblers (*Setophaga castanea*) have been declining within the Acadian Region since region-wide monitoring began with the USGS Breeding Bird Survey in 1966, while species such as Blackburnian Warbler (*Setophaga fusca*) are increasing (Sauer et al. 2012, Figure 1). The United States Federal government has the authority to manage these species under the U.S. Migratory Bird Treaty Act. Maine contributes up to 96% of breeding habitat for some of these spruce-fir associated species, and population declines are not well understood. The coniferous forests where these species reside are heavily managed by the timber industry with a variety of silvicultural and industrial prescriptions. Habitat requirements for these species are not well understood, nor are the species' responses to management. Standardized region-wide surveys used for assessing populations may not be sufficiently comprehensive to fully understand population trends (i.e., USGS Breeding Bird Survey), in particular, when the species of concern are absent (i.e., during the Audubon Christmas Bird Count, which occurs in the non-breeding season). Furthermore, these surveys do not typically account for detection error, where a species can be present but goes undetected.

Our goals are to investigate factors influencing the distribution and abundance of species that represent the Acadian coniferous forests and to assess the influence of prevalent silviculture techniques on the Acadian forest bird community. Our objectives include: (1) to quantify and define the composition and forest associations of coniferous bird communities in five silvicultural treatments representing a gradient in mature canopy residuals including conifer regenerating, overstory removal, pre-commercially thinned, selection, and shelterwood harvest compared to mature softwood reference sites; (2) to model the influences of silvicultural practices on coniferous forest bird communities while accounting for detection error; (3) use data at both landscape and fine scales to determine important habitat and beneficial management; and (4) provide accessible and interpretable results for silviculturalists that can be used to manage species of concern.

Progress in 2013

Our research in 2013 focused on two components: bird community surveys in 110 forest stands in Maine, New Hampshire, and Vermont and vegetation surveys within stands at Telos and Clayton Lake in Maine (Figure 2).

Field Site Establishment

Our sites are located within the Acadian Forest Region, which coincides roughly with Bird Conservation Region 14 in the United States (Figure 2). We established survey points in the North Maine Woods (Clayton Lake and Telos), Baxter State Park, and four National Wildlife Refuges (Nulhegan Basin Division of Silvio Conte NWR, Umbagog NWR, Moosehorn NWR, and Aroostook NWR). We attempted to have at least five samples of each treatment at every site to survey a range of possible forest conditions, but this goal was not reached at all sites due to the distribution of forest management types (Tables 1 and 2). We surveyed 110 forest stands with approximately 3 to 8 survey locations per stand for a total of 610 sampling points. For each stand, we included one hard edge and one soft edge survey point along with as many core points as could be independently distributed within a stand (typically 3-8 points). We defined a hard edge as any abrupt change from the forest treatment to early successional habitat including roads, meadows, and recently harvested areas. We defined soft edges as any transition from one forest treatment or time since harvest to another forest. If an adjacent edge type was not available, we could not add the edge survey point. Core points were defined as ≥ 110 m from a hard edge and ≥ 250 m from any other point.

Occupancy Surveys

We used standardized point count surveys (Ralph et al. 1993) to count all bird species during the breeding season (1 June to 1 August 2013). We navigated to preset locations, and counted the number of individuals of each bird species that were audibly and visually detected for 10 minutes. Details for our protocols generally followed Hamel (1996). All point counts occurred within four hours of civil dawn when most birds are most active and singing. We returned to each location for a total of three repeated surveys. Repeated surveys allow us to account for the probability that an undetected bird was present during a survey. Across all study areas, we recorded 19,431 detections of 123 species. In addition to birds, we recorded detections of Red Squirrel (*Tamiasciurus hudsonicus*), because they are known nest predators of many passerines in New England.

Baxter State Park

We added two mature softwood stands within Baxter State Park (Figure 3) to supplement the number sampled in other study areas. We were able to survey these stands only once during the 2013 breeding season because of time constraints. Species detected are summarized in Table 3. We hope to include these stands in 2014 with standardized bird surveys that are described above. Coordinates of survey points are listed in Table 4. Vegetation within these stands was measured in preparation for next year.

Future Plans

In 2014, we will expand our vegetation surveys to include the National Wildlife Refuge study areas and analyze our current vegetation data from North Maine Woods to identify measurements to collect at other sites. We will continue point counts throughout all locations to obtain multi-season bird community and species data. We will begin exploratory statistical analyses in 2014. A third field season will be conducted in 2015, followed by data analysis and report preparation in 2016.

Table 1. The number of point count locations in each treatment class at each property that were surveyed in 2013.

| Site | Number of point counts in each treatment | | | | | | Total |
|-------------------|--|-----------------|-------------------|-----|-----------|-------------|-------|
| | Conifer Regen | Mature | Overstory Removal | PCT | Selection | Shelterwood | |
| Aroostook NWR | 3 | 28 | 0 | 0 | 9 | 0 | 40 |
| Baxter State Park | 0 | 23 ^a | 0 | 0 | 0 | 0 | 0 |
| Clayton Lake | 49 | 0 | 5 | 0 | 12 | 0 | 66 |
| Moosehorn NWR | 0 | 46 | 0 | 0 | 0 | 6 | 52 |
| Nulhegan NWR | 56 | 12 | 0 | 39 | 34 | 3 | 144 |
| Telos | 61 | 31 | 0 | 43 | 26 | 0 | 161 |
| Umbagog NWR | 23 | 51 | 0 | 20 | 47 | 7 | 147 |
| Total | 192 | 191 | 5 | 102 | 127 | 16 | 610 |

^a Stands at Baxter State Park did not meet our standardized criteria, so do not count toward the summed total.

Table 2. The number of stands in each treatment class at each property that were surveyed in 2013.

| Property | Number of stands in each treatment | | | | | | Total |
|-------------------|------------------------------------|----------------|-------------------|-----|-----------|-------------|-------|
| | Conifer Regen | Mature | Overstory Removal | PCT | Selection | Shelterwood | |
| Aroostook NWR | 1 | 9 | 0 | 0 | 2 | 0 | 12 |
| Baxter State Park | 0 | 2 ^a | 0 | 0 | 0 | 0 | 0 |
| Clayton Lake | 8 | 0 | 1 | 0 | 2 | 0 | 11 |
| Moosehorn NWR | 0 | 8 | 0 | 0 | 0 | 1 | 9 |
| Nulhegan NWR | 6 | 2 | 0 | 5 | 5 | 1 | 19 |
| Telos | 10 | 5 | 0 | 10 | 4 | 0 | 29 |
| Umbagog NWR | 6 | 6 | 0 | 4 | 10 | 2 | 28 |
| Total | 31 | 32 | 1 | 19 | 23 | 4 | 110 |

^a Survey points at Baxter State Park did not meet our standardized criteria, so do not count toward the summed total.

Table 3. Detections for each species from the 2013 survey at Baxter State Park of 23 points at 2 forest stands. These raw data have not been adjusted for detection probability.

| Common Name | Number detected | Common Name | Number detected |
|------------------------------|-----------------|---------------------------|-----------------|
| American Robin | 1 | Myrtle Warbler | 4 |
| American Woodcock | 1 | Nashville Warbler | 4 |
| Black-and-White Warbler | 2 | Northern Parula | 3 |
| Black-Capped Chickadee | 1 | Ovenbird | 10 |
| Blue-Headed Vireo | 3 | Red-Breasted Nuthatch | 7 |
| Blackburnian Warbler | 1 | Ruby-Crowned Kinglet | 2 |
| Blue Jay | 2 | Red-Eyed Vireo | 1 |
| Brown Creeper | 2 | Rusty Blackbird | 1 |
| Black-Throated Blue Warbler | 1 | Swainson's Thrush | 3 |
| Black-Throated Green Warbler | 5 | Tennessee Warbler | 1 |
| Canada Warbler | 1 | Unknown | 1 |
| Common Yellowthroat | 1 | Veery | 1 |
| Downy Woodpecker | 1 | Wilson's Warbler | 2 |
| Golden-Crowned Kinglet | 5 | Winter Wren | 10 |
| Gray Jay | 1 | White-Throated Sparrow | 7 |
| Gray Catbird | 1 | Yellow-Bellied Flycatcher | 3 |
| Hairy Woodpecker | 1 | Yellow-Bellied Sapsucker | 3 |
| Hermit Thrush | 7 | Yellow Palm Warbler | 3 |
| Least Flycatcher | 1 | Red Squirrel | 6 |
| Magnolia Warbler | 4 | | |

Table 4. Point count locations and coordinates at Baxter State Park.

| Id | Property | PointCateg | UTM_easting | UTM_northing | StandID | Treatment |
|-----|----------|------------|-------------|--------------|---------|-----------|
| 579 | Baxter | HardEdge | 506309 | 5114071 | MSW12 | Mature |
| 580 | Baxter | Core | 505980 | 5113974 | MSW12 | Mature |
| 581 | Baxter | Core | 506136 | 5113945 | MSW12 | Mature |
| 582 | Baxter | Core | 506294 | 5113910 | MSW12 | Mature |
| 583 | Baxter | Core | 506475 | 5113958 | MSW12 | Mature |
| 584 | Baxter | SoftEdge | 506039 | 5113812 | MSW12 | Mature |
| 612 | Baxter | Core | 506324 | 5113451 | MSW12 | Mature |
| 613 | Baxter | Core | 506155 | 5113395 | MSW12 | Mature |
| 614 | Baxter | Core | 506824 | 5113410 | MSW12 | Mature |
| 615 | Baxter | Core | 506763 | 5113280 | MSW12 | Mature |
| 616 | Baxter | Core | 506642 | 5113189 | MSW12 | Mature |
| 617 | Baxter | Core | 506470 | 5113145 | MSW12 | Mature |
| 618 | Baxter | Core | 506577 | 5113031 | MSW12 | Mature |
| 619 | Baxter | Core | 506821 | 5113138 | MSW12 | Mature |
| 620 | Baxter | SoftEdge | 506972 | 5113274 | MSW12 | Mature |
| 621 | Baxter | HardEdge | 506327 | 5113179 | MSW12 | Mature |
| 635 | Baxter | Core | 504017 | 5108976 | MSW13 | Mature |
| 636 | Baxter | Core | 504157 | 5109020 | MSW13 | Mature |
| 637 | Baxter | HardEdge | 504457 | 5109049 | MSW13 | Mature |
| 638 | Baxter | Core | 504139 | 5108875 | MSW13 | Mature |
| 639 | Baxter | Core | 504283 | 5108902 | MSW13 | Mature |
| 640 | Baxter | SoftEdge | 504061 | 5109127 | MSW13 | Mature |
| 641 | Baxter | Core | 504287 | 5109043 | MSW13 | Mature |

Figures

Figure 1. Three species of concern, their estimated population trends in Bird Conservation Region 14 from USGS Breeding Bird Survey data, and their breeding distributions. Photo credits: Bay-breasted Warbler by Bill Majoros, Cape May Warbler, and Blackburnian Warbler were used from the USGS Breeding Bird Survey website.

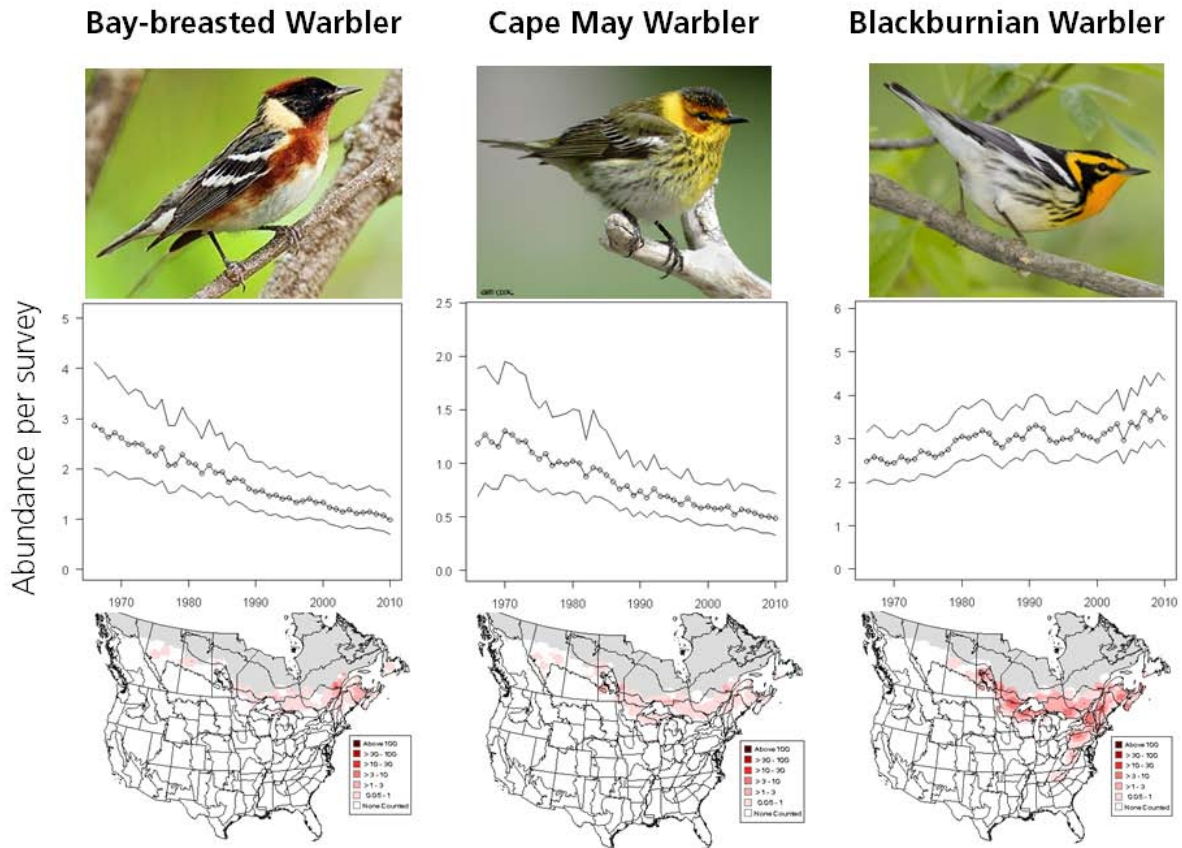


Figure 2. Survey locations in Northern New England.

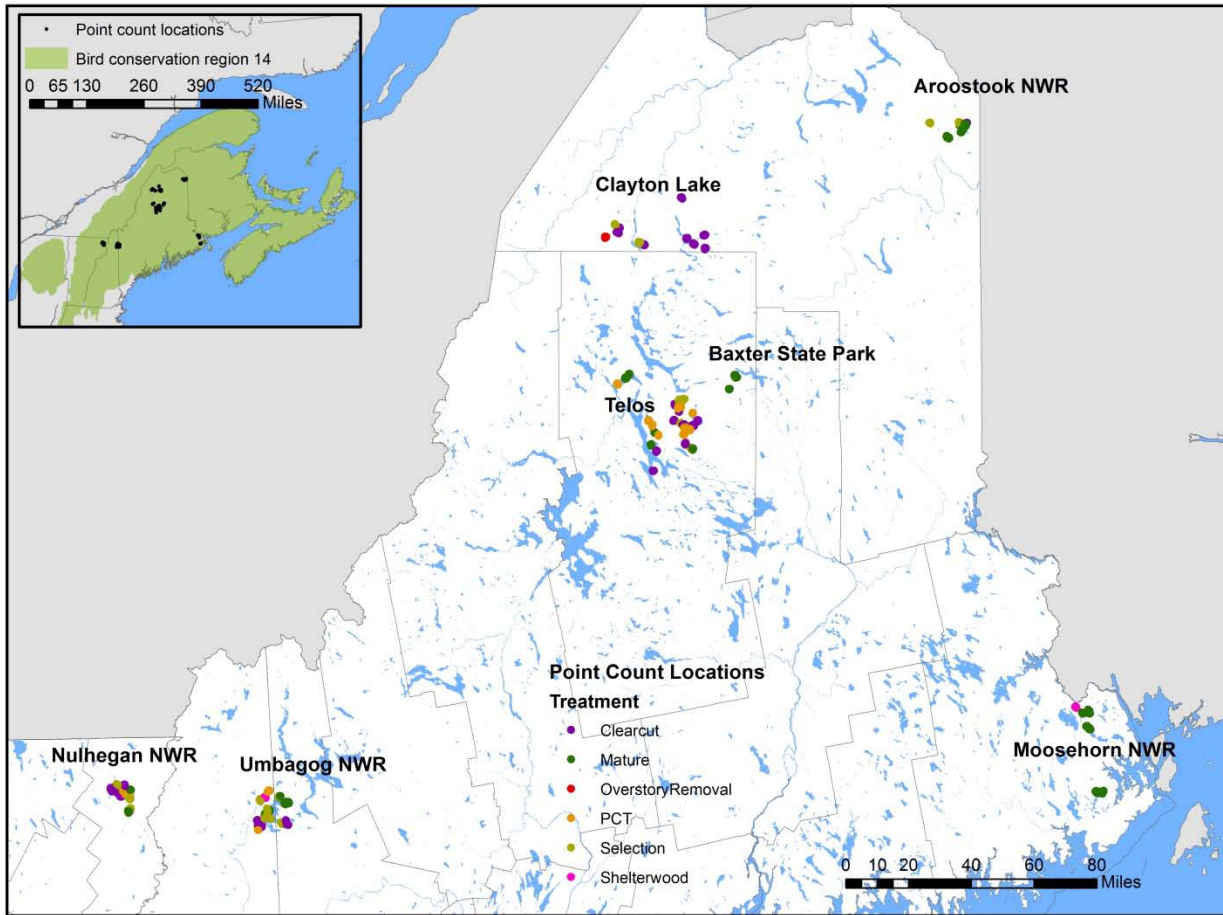
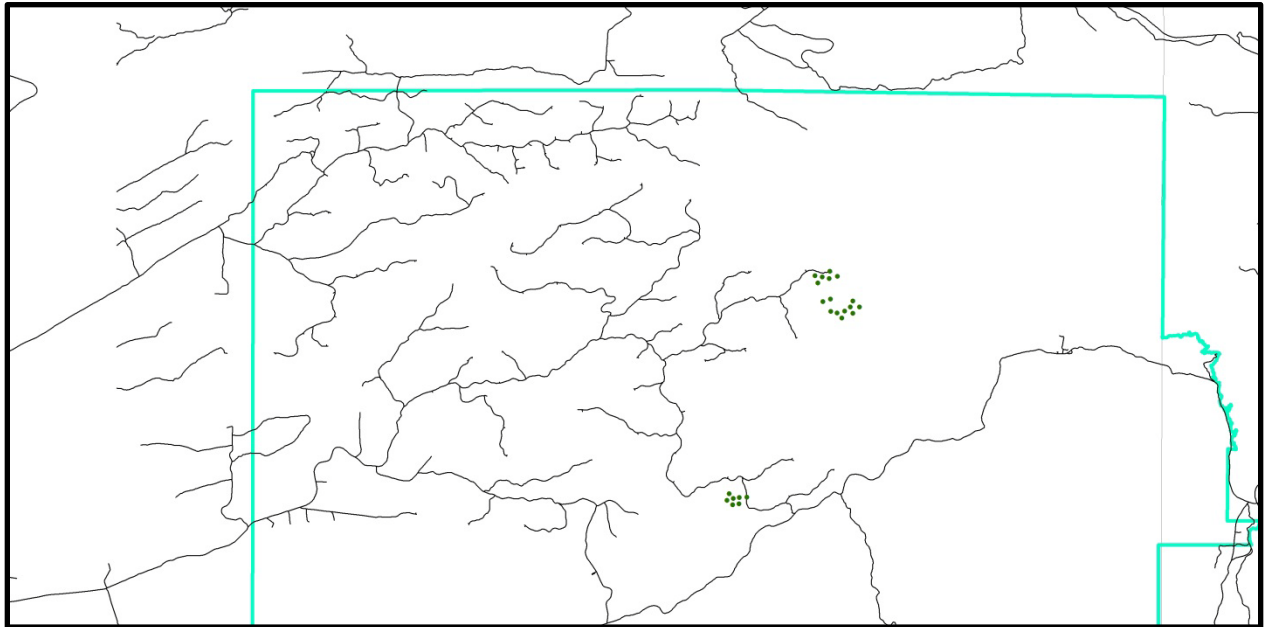


Figure 3. Point count locations at Baxter State Park (green points). Roads are displayed as black lines and Baxter State Park boundaries are depicted in blue.



Literature Cited

Hamel, P. B., and Southern United States Forest Service. 1996. A land manager's guide to point counts of birds in the Southeast. US Department of Agriculture, Forest Service, Southern Research Station.

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