

A Summary of Initial Findings in Establishing a Baseline Understanding of Lowland Black Ash Forest Communities, Polk County, Wisconsin

Brian M. Collins, Unity High School Life Sciences, Balsam Lake, Wisconsin

bcollins@unity.k12.wi.us 715-557-0706



ABSTRACT

The Unity High School Biology program has initiated a study of black ash –dominated lowland forests in Polk County, Wisconsin. Because emerald ash borer has been detected within 60 miles of Polk County, we feel it is important to establish a baseline quantitative inventory of the biological communities associated with black ash lowland forests. The 2011 field season involved a steep learning curve and a preliminary investigation of methodologies. While some data was collected and summarized, the project is only just beginning. Tree health and diversity, ash size classes, breeding bird data, and some winter carnivore tracking data have been compiled. The grant award remains intact and will be used to continue field work through 2012 with Unity School District serving as the grant agent.

INTRODUCTION

Emerald ash borers pose a significant threat to ash forests and could disrupt ecological associations common to lowlands containing black ash (*Fraxinus nigra*). Northern Hardwood Swamp communities represent less than 10% of Wisconsin's forest cover types and less than 5% of Wisconsin's total land cover (Wisconsin DNR). Seeps associated with riverside bluffs in the

driftless area occupy significantly less area and often contain rare species and species of conservation concern.

Polk County, Wisconsin is an area rich in natural communities and has many excellent examples of black ash communities protected in lands overseen by the Wisconsin DNR, the West Wisconsin Land Trust, the National Park Service, and Polk County Forestry. Because Polk County is only an hour from the Minneapolis /St. Paul metropolitan area, it seems likely that emerald ash borers, already detected there, could find their way into these natural communities. The proposed goal of this study is to locate and access prime examples of black ash-dominated, lowland communities and to establish working data sets regarding tree health, tree age and mortality, plant and animal community associates, threatened species, hydrologic and wet soil conditions, and area coverage of target habitats. Such baseline data could prove useful in understanding changes that would occur in the event of emerald ash borer infestation.



Golden-winged Warbler, Polk County, Wisconsin

METHODS:

Study Plot Locations and Study Timing

We have identified a variety of study locations in Polk County for the 2012 field season, including two sites along the St. Croix River, two sites within the Rice Beds Creek State Wildlife Area, and one site within the Behning Creek State Fishery Area. Our investigation of study areas has resulted in a strong desire to focus our study to fewer plots and to study those plots in more detail. One of the best plots is located in the Governor Knowles State Forest in the vicinity of Wolf Creek, along the St. Croix River. The Wolf Creek plot is very large block of habitat and a good example of typical black ash lowland forest. It is very diverse in hydrology and topography.

In working through our methodologies, we have determined that our monitoring efforts in each of the plots will rely on a number of seasonal survey windows. Each plot will be visited once during each of these time frames. Incorporating a variety of sampling techniques and a variety of seasonal opportunities is especially beneficial in utilizing the study to encourage stewardship and foster active participation in science by Unity High School students. The time frames are as follows:

1. ***January-February: Carnivore tracking; mammals***
2. ***March – April: Amphibian song/frog surveys***
3. ***April – May: Aquatic insect larvae; Flowering plants, early bloom***
4. ***June: Breeding Birds ; Flowering plants; Dragonflies***
5. ***July: Tree Health and Size; Flowering Plants; Butterflies***

Our initial plot, used to practice and explore our tree health and tree community methodology, is located along the St. Croix River at 45.46142 North Latitude and -92.66419 West Longitude. This plot was visited in May, and again in July. Though our tree data comes from a 900 square-meter plot, we did expand our search outside of the study plot slightly for other biological data. We visited another plot for winter tracks at 45.46598 North Latitude and -92.67758 West Longitude during the months of January and February.

Tree Health, Tree Diversity and Size Class

We devised a quick health score for trees (4 = Robust, 3 = Some dead branches, 2 = Largely dead with some green branches, 1 = Dead) and collected this data when measuring each tree with dbh tape. We recorded tree health, tree species, and dbh for each tree greater than 2 inches in diameter. Data was collected using teamwork in line transects until all trees in a 900 square-meter area had been investigated.

Bird Communities

Bird Surveys were conducted for a ten-minute listening period in a variety of locations within Polk County's black ash lowlands. Bird surveys were conducted while investigating sites for potential in late May. In 2012, each confirmed study plot will be visited twice in the first week of June for standardized point counts. Audio recording equipment will accompany student surveyors so that the survey may be used as an educational tool with no compromise of data.

Winter Mammal Evidence

Winter mammal tracks were investigated along the St. Croix River in a black ash lowland with an open water seep. Tracks were identified to species, but no data was collected beyond presence of species.

Further Investigations

In the 2012 field season, we will expand our investigations to include aquatic insects, adult dragonflies, butterflies, an inventory of flowering plant species, and use of the areas by reptiles and amphibians. Plot sizes will likely increase to 2500 square meters, and all surveys will be conducted within the plots. We will attempt to thoroughly sample 5 plots, including repetition and revision of successful sampling methods from the 2011 field season.

RESULTS

Initial Findings and Results from the 2011 Field Season

Saint Croix River, West River Road Site: 45.46142, -92.66419

This forest study plot is dominated by black ash, with a total of 126 black ash trees of all ages recorded in a 900 square meter plot. Most trees were very young with an average dbh of 3.3 inches (diverse with SD = 4.2 inches) and contributed to a fairly luxurious subcanopy level, estimated to occupy roughly 60% of the volume of this layer. Mature black ash trees had a large size and averaged 17 inches in diameter. The range of trees varied from the less than one inch in diameter to 29 inches in diameter, with a “life table” pattern of decreasing abundance with increasing size. American basswood were important in the forest structure and community, and American elm, choke cherry, box elder, quaking aspen, bitternut hickory, bur oak and black cherry were also present in this forested plot. American basswood, quaking aspen and bur oak contributed to overall forested structure with a few large, saw timbers.

Trees of older age were in very good health with full canopies, few dead branches, and a full leaf-out with almost no marring, wilting or other signs of disease. Mature trees had few dead branches, and most dead branches were below the level of the canopy, apparently the result of self shading. Younger trees had more sign of disease and stress, including some wilting leaves, dead branches, and some with death occurring in the upper third or upper half of the tree. The overall health score (average score) assigned to this initial plot ranked as a 3.56 / 4.00. Young trees were densely packed, with each tree having approximately 7 square meters between neighboring trees. Mature trees were clumped in close proximity to one another and were not evenly distributed through the plot.

Tree Relative Abundance in a Black Ash-Dominated Lowland Forest Along the St. Croix River, Polk County, WI

<u>Tree Species</u>	<u>Quantity</u>	<u>Relative Abundance %</u>
Black Ash	126	79.2
American Basswood	17	10.7
American Elm	3	1.9
Choke Cherry	3	1.9
Box Elder	3	1.9
Quaking Aspen	2	1.3
Bitternut Hickory	2	1.3
Bur Oak	2	1.35
Black Cherry	1	0.6

Quantities of Black Ash of Various Diameters in a Black Ash-Dominated Lowland Forest Along the St. Croix River, Polk County, WI

Note that populations by size class closely resemble a life table, with abundance decreasing by age.

<u>Diameter</u>	<u>Qty</u>
<1 inch	15
1 inch	28
2 inches	26
3 inches	21
4 inches	10
5 inches	9
6 inches	3
7 inches	5
8 inches	2
9 inches	2
10 inches	1
16 inches	1
23 inches	1
24 inches	1
29 inches	1

Bird Data

We completed a total of 13 bird surveys in candidate study plots. Bird detections within 50 Meters were very high, with an average of 24.5 birds per count. In 13 surveys, a total of 53 species of birds were detected. Veery was the dominate species, occurring at 8.0% of the total community. Common Yellowthroat (6.9%), Ovenbird (6.0%), Red-eyed Vireo (4.9%), American Redstart (3.7%), and Rose-breasted Grosbeak (3.7%) all occurred at greater than or equal to 1 detection per survey. Great Crested Flycatcher (3.2%), House Wren (2.9%), Red-bellied Woodpecker (2.9%), and Black-capped Chickadee (2.6%) were all important in community composition, reflecting the availability of snags in black ash lowland forest habitats. Low areas with alder were important to Veery, Golden-winged Warbler, Blue-winged Warbler, Black-and-white Warbler, Alder Flycatcher, Gray Catbird, Common Yellowthroat, and Yellow Warbler.

SPECIES	Total	Rel Abund %	Per Count
Veery	28	8.0	2.153846154
Common Yellowthroat	24	6.9	1.846153846
Ovenbird	21	6.0	1.615384615
Red-eyed Vireo	17	4.9	1.307692308
American Redstart	13	3.7	1
Rose-breasted Grosbeak	13	3.7	1
Song Sparrow	12	3.4	0.923076923
Great Crested Flycatcher	11	3.2	0.846153846
Yellow Warbler	11	3.2	0.846153846
Blue Jay	10	2.9	0.769230769
House Wren	10	2.9	0.769230769
Red-bellied Woodpecker	10	2.9	0.769230769
Black-capped Chickadee	9	2.6	0.692307692
Eastern Phoebe	9	2.6	0.692307692
Alder Flycatcher	8	2.3	0.615384615
Brown-headed Cowbird	8	2.3	0.615384615
Black-and-White Warbler	7	2.0	0.538461538
Gray Catbird	7	2.0	0.538461538
Blue-winged Warbler	6	1.7	0.461538462
Cedar Waxwing	6	1.7	0.461538462
Eastern Wood Pewee	6	1.7	0.461538462
Indigo Bunting	6	1.7	0.461538462
Ring-necked Pheasant	6	1.7	0.461538462
Scarlet Tanager	6	1.7	0.461538462
Sedge Wren	6	1.7	0.461538462
White-breasted Nuthatch	6	1.7	0.461538462
American Crow	5	1.4	0.384615385

Downy Woodpecker	5	1.4	0.384615385
Hairy Woodpecker	5	1.4	0.384615385
American Goldfinch	4	1.1	0.307692308
Baltimore Oriole	4	1.1	0.307692308
Least Flycatcher	4	1.1	0.307692308
Mourning Dove	4	1.1	0.307692308
Swamp Sparrow	4	1.1	0.307692308
Wood Thrush	4	1.1	0.307692308
Yellow-throated Vireo	4	1.1	0.307692308
Golden-winged Warbler	3	0.9	0.230769231
Northern Flicker	3	0.9	0.230769231
Red-winged Blackbird	3	0.9	0.230769231
Blue-gray Gnatcatcher	2	0.6	0.153846154
Chestnut-sided Warbler	2	0.6	0.153846154
Chipping Sparrow	2	0.6	0.153846154
Mourning Warbler	2	0.6	0.153846154
Northern Cardinal	2	0.6	0.153846154
Pileated Woodpecker	2	0.6	0.153846154
Ruby-throated Hummingbird	2	0.6	0.153846154
Acadian Flycatcher	1	0.3	0.076923077
Common Loon	1	0.3	0.076923077
Great Blue Heron	1	0.3	0.076923077
Red-tailed Hawk	1	0.3	0.076923077
Ruffed Grouse (Drumming)	1	0.3	0.076923077
White-throated Sparrow	1	0.3	0.076923077
Yellow-bellied Sapsucker	1	0.3	0.076923077



Veery, Polk County, WI

Evidence of Mammalian Residents by Winter Tracking

Carnivores were attracted to hunter-discarded deer remains near to the West River Road along the St. Croix River in the winters of 2010 and 2011. While no formal surveys were conducted in the winter, visits to these deer remains provided numerous opportunities to identify resident carnivore species. Tracks of gray wolf (documented with photographs and reported to Adriane Wydeven), coyote, red fox, raccoon, opossum, fisher, otter, mink, and a species of weasel were detected within the black ash lowland. Raccoon, opossum, mink and otter were also observed utilizing the forest or moving through the habitat.



Gray wolf tracks, St. Croix River, Polk County, WI

Conclusions:

Our early findings are most important in demonstrating that we will be able to quantify large species assemblages and describe similarities and differences in community composition from site to site. Diversity of forest community varies somewhat with hydrologic features, history of disturbance, and location within the ecological landscape. Specifics of community, even in the subtle rankings of ecological importance from species to species, will be compared among forest plots. As has been demonstrated with our current bird data, an overall, average picture of black ash lowland forest species assemblages will also be revealed. Because many species of animals are potentially rapid indicators of habitat change, establishing ranks of relative abundance and establishing density estimates among various groups of animals will be important in a descriptive baseline analysis of these communities. Presence-absence data for less abundant species will also be important in detecting change, though it may be very difficult to determine significance or causation for changes. In addition to demonstrating success in quantifying community assemblages, we have also demonstrated success in quantifying structural components of black ash habitats. If black ash lowland forests decline due to emerald ash borer, community changes related to death and decay of trees and other habitat structural changes will be readily measured, both in the context of community assemblages and structural habitat components.

Early findings also indicate that black ash tree health is currently quite good. While trees have been stressed by a variety of climate factors in recent years, we have found little evidence of disease of any sort in our initial investigations. Recruitment into the forest community by black ash is excellent, and young trees are competing for space from understory to subcanopy to canopy. We are beginning to recognize how different hydrologic conditions lend to different tree species assemblages and corresponding differences in habitat structure. Subtle variations in habitat structure are of value to different species of animals, and we are eager to follow up on what currently amounts to a glimpse into important community differences where form follows function.

Black ash-dominated lowland forests occupy a mysterious world of skunk cabbage, watery seeps, matted roots, ephemeral pools, and immense biological diversity. Figuring out how to measure such diverse taxonomic groups in series with meaningful measures of habitat structural complexity is a vast and challenging undertaking, especially for a citizen science monitoring group. We are thrilled to take on the challenge, and we are pleased to report that we are finding success as we attempt to implement our field methodologies. As our methods become clearer and our data begins to surface, we will certainly be in contact with experts. 2012 will be a very revealing year in the black ash forests of Polk County, Wisconsin. Stay tuned...