Evaluating the Efficacy of Audubon's Bird-friendly Maple: Can Managing Sugarbushes for Birds Provide Additional Benefits to Biodiversity, Ecosystem Services, and Forest Resilience?

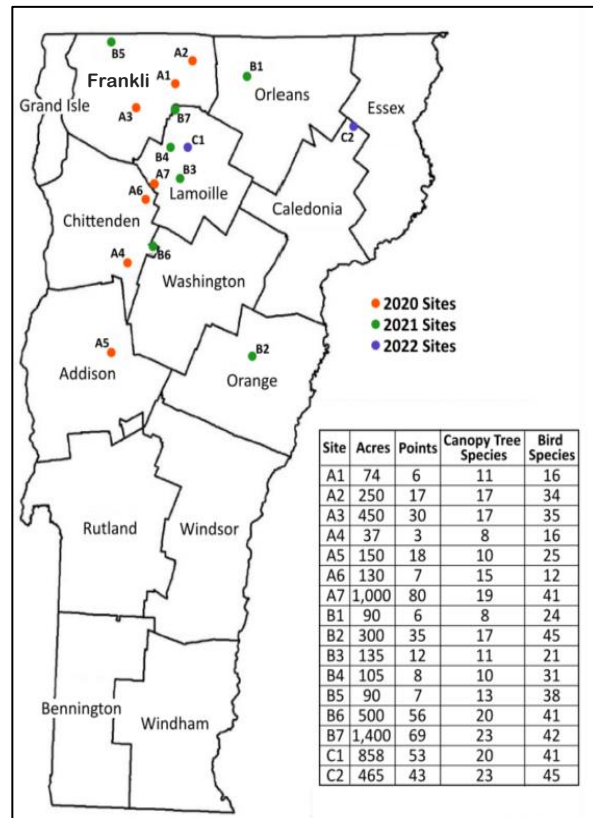**PI Steven D. Faccio, Vermont Center for Ecostudies**

Project Abstract

Audubon Vermont's Bird-Friendly Maple Project recommends forest management activities that promote sugarbush stands with a diversity of tree species and vertical habitat structure. Although these forests are more likely to support a diverse bird population, the efficacy of Audubon's bird-friendly management guidelines to provide measurable benefits to bird populations is unknown. Additionally, the long-term sustainability of maple sap production is entirely contingent on healthy forests, but our knowledge is limited on how the complex drivers of increased maple sap production intensity, differing management strategies, and climate change will affect biodiversity, ecosystem services, and overall ecological health of sugarbushes.

By conducting field surveys of biodiversity and ecosystem service metrics across a gradient of sugarbush production and management intensities, NSRC researchers will establish this knowledge base and develop tools and policies that provide sustainable sugarbush management guidelines that are relevant across the Northern Forest landscape. This will result in updated guidance for sugar makers and specific revisions to the bird-friendly maple management guidelines in order to increase habitat for bird populations.

Progress in 2022

Our partners at UVM conducted additional field work at two cooperating sugarbushes in 2022, conducting bird point count, vegetation, and arthropod surveys, bringing the total number of study sites sampled since 2020 to 16. The 16 study sites were distributed across 7 northern Vermont counties (Addison (1), Caledonia (1), Chittenden (3), Franklin (4), Lamoille (5), Orleans (1), and Orange (1)), and ranged in size from 37 to 1,400 acres (See figure). All sites were working sugarbushes producing syrup and other maple sap

Site	Acres	Points	Canopy Tree Species	Bird Species
A1	74	6	11	16
A2	250	17	17	34
A3	450	30	17	35
A4	37	3	8	16
A5	150	18	10	25
A6	130	7	15	12
A7	1,000	80	19	41
B1	90	6	8	24
B2	300	35	17	45
B3	135	12	11	21
B4	105	8	10	31
B5	90	7	13	38
B6	500	56	20	41
B7	1,400	69	23	42
C1	858	53	20	41
C2	465	43	23	45

Distribution of study sites located in cooperating sugarbushes across northern Vermont by year. Table shows study site acreage, number of study points, and species richness of canopy trees and birds.
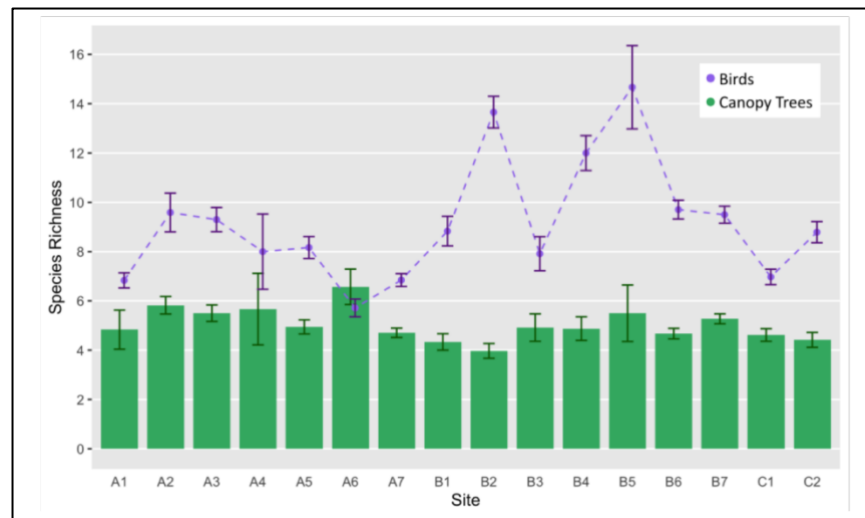
products; nine (56%) are enrolled in Audubon's Bird-friendly Maple Program.

We completed error-checking our extensive database of bird, arthropod, and vegetation data during 2022. Preliminary results indicate that a total of 73 bird species and 37 canopy tree species (with 2 additional canopy tree species documented as snags) were observed across all study sites. Initial data show little variation in species richness of canopy trees between sugarbushes, but more substantial variation in bird species richness (see figure). The majority of sugarbushes had at least 50% basal area in sugar maple (range = 24.4%–73.6%), which meets Audubon Vermont's Bird-friendly Maple guideline of a maximum of 75% sugar maple by basal for all sugarbushes surveyed.

Plans for 2023

Plans for 2023 include conducting preliminary statistical and analytical modeling to determine the most biologically significant habitat covariates (vegetation and arthropod abundance) that explain variation in forest bird abundance and species richness/diversity. We can then determine which of those habitat factors can be manipulated through silvicultural practices to achieve the structural conditions that result in the best habitat for forest birds. This will allow our

Mean species richness and standard error of birds and canopy trees by site.

cooperator at Audubon Vermont to update management recommendations of their Bird-friendly Maple Project. Additionally, our UVM cooperator, Liza Morse, plans to sample birds and vegetation at unmanaged reference sites for comparison with managed sugarbush stands and collect data on sugarbush management and operations metrics via a sugar maker survey. Once that work is completed, we will prepare a manuscript for peer review.

Collaboration

During 2022, we met regularly with our cooperating partners at UVM and Audubon Vermont to discuss data error-checking and determine what covariates to include in statistical modeling. PI Faccio, along with Cooperators Morse and Hagenbuch, were interviewed for the Northern Woodlands article mentioned below.

Deliverables

- Cooperator and UVM PhD Candidate Liza Morse presented a poster on the project at the annual meeting of Forest Ecosystem Monitoring Cooperative in December 2022.
- The Winter 2022/23 issue of Northern Woodlands magazine, a feature article was published on Audubon Vermont's Bird-friendly Maple Program and the efficacy study.