Rhode Island Department of Environmental Management Vegetation Surveys

At Nicholas Farm and Pratt Farm Management Areas

2021 Post-Management Surveys

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Introduction

Dr. Brian Maynard and graduate student Emma Brown of the University of Rhode Island have conducted transect studies at Nicholas Farm and Pratt Farm to survey the species present, overall biodiversity, and percent (%) cover of plant species prior to management at each location. The original intent for management was to prescribe controlled burning of the Nicholas Farm property and logging of the Pratt Farm property. Following pre-management vegetation surveys in mid-July of 2020, actual management consisted of logging at both sites within seven of the eight total transects in this study. Both sites had been overwhelmed with *Pinus strobus* (PIST), white pine, at varying stages of growth, as indicated by multiple counts of PIST among all cover classes. The controlled removal of white pine materials was expected to increase accessibility of resources within the ecosystem to increase biodiversity as the plants regrow within each site.

Having collected further data in 2021, the original 2020 survey results have been reformatted and included in this report, facilitating ready comparisons between pre- and post-management survey data.

Contents

Transect Methods and Sampling

Four transects were traversed at each site and two types of vegetation surveys were conducted at points along each transect.

Line-Point Intercept Survey

A line-point intercept survey was conducted along each of the transects, 50 meters in length apiece. Eleven points were marked at 5-meter increments, beginning at 0 meters, serving as the points at which data was collected. Data at each point included the presence of each type of plant species found recorded using the USDA abbreviated code for the plants.

Materials:
Garmin GPS Unit
50-meter measuring tape
Plumbob measure
Recording sheets

Methods:
A starting point was marked on the GPS unit. Coordinates, site description details, and the date were recorded. The tape measure was drawn in 5-meter increments as straight and low to the ground as possible. At each 5-meter point, a vertical measure was used to intersect vegetation. Any vegetation that touched the plumbob was recorded. This process was repeated until reaching 50 meters and was conducted across four different transects at each location for a total of eight transects.

Ground-Point Survey

At every other point of the line-point intercept survey, a ground-point survey of percent coverage of species was taken. Beginning at 0 meters, six points were marked every 10 meters along the 50-meter transect. The plants were assessed by sight for percent coverage of the area and assigned a cover class from 1 to 6.

Cover classes:

1 = <1% cover
2= 1-4% cover
3= 5-24% cover
4= 25-49% cover

5= 50-74% cover
6= 75-100% cover

Due to the overlap in transect data every 10 meters, only a portion of the recorded plants received a cover class designation. Some plants present in all parts of each transect received a variety of cover class ratings. Some received consistent cover class ratings throughout the study.

Materials:
Garmin GPS Unit
50-meter measuring tape
Recording sheets

Methods:
A starting point was marked on the GPS Unit. Coordinates, site description details, and the date were recorded. The tape measure was drawn in 10-meter increments as straight and low to the ground as possible. At each 10-meter point, cover class was estimated for each recorded species at the same point in the line-point survey within a visual radius of 5 meters. This process was repeated until reaching 50 meters and was conducted across four different transects at each location for a total of eight transects.

Cover Class

Assessment of site biodiversity and ecological health is based upon the presence of a wide variety of species that fill as many ecological niches as possible. In the case of plants, these niches are typically related to height and thus position in the forest canopy. Forest cover of a biodiverse area should be represented by many species each between the second and fifth cover class, 1-5% and 50-75% cover, respectively, within each tier of height. If there are too many individuals of only one species occupying a particular niche, this indicates that they have been the most successful competitor, suppressing the growth of the other species.

Forest Composition

Forest composition was characterized by defining each species by mature height and relating the quantities present to the forest strata including the forest floor, low, medium, and high understory, and tree canopy. Compositions were used to compare transects before and after management.

Species List

The following is a list of all species found among transects at Nicholas and Pratt Farm Management Areas in the years 2020 and 2021.

Family	Code	Scientific name
Sapindaceae	ACRU	*Acer rubrum* (L.)
Rosaceae	AMCA4	*Amelanchier canadensis* (L.) Medik
Apocynaceae	APAN2	*Apocynum androsaemifolium* (L.)
Rosaceae	ARME6	*Aronia melanocarpa* (Michx.) Elliott
Araliaceae	ARNU2	*Aralia nudicaulis* (L.)
Betulaceae	BELE	*Betula alleghaniensis* Britton
Betulaceae	BEPO	*Betula populifolia* Marshall
Cyperaceae	CA	*Carex spp.*
Cyperaceae	CADE5	*Carex debilis* Michx.
Cyperaceae	CAPE6	*Carex pensylvanica* Lam.
Cyperaceae	CASW	*Carex swanii* (Fernald) Mack.
Ericaceae	CHMA3	*Chimaphila maculata* (L.) Pursh
Orchidaceae	CYAC3	*Cypripedium aucale* Aiton / L.
Lycopodiaceae	DEOB4	*Dendrolycopodium obscurum* L. A. Haines
Dennstaedtiaceae	DEPU2	*Dennstaedtia punctilobula* (Michx.) T. Moore
Poaceae	DIAC2	*Dichanthelium acuminatum* (Sw.) Gould & C.A. Clark
Dryopteridaceae	DRIN5	*Dryopteris intermedia* (Muhl ex. Willd.) A. Gray
Dryopteridaceae	DRMA4	*Dryopteris marginalis* (L.) A. Gray
Dryopteridaceae	DRYOP	*Dryopteris* spp. Adans.
Asteraceae	ERHI12	*Erechtites hieraciifolius* (L.) Raf. ex DC.
Fagaceae	FAGR	*Fagus grandifolia* Ehrh.
Poaceae	FEOV	*Festuca ovina* L.
Cyperaceae	FIAU	*Fimbristylis autumnalis* (L.) Roem. & Schult.
Ericaceae	GABA	*Gaylussacia baccata* (Wangenh.) K. Koch
Orchidaceae	GOTE	*Goodyera tesselata* Lodd.
Primulaceae	LYQU2	*Lysimachia quadrifolia* (L.)
Asparagaceae	MACA4	*Maianthemum canadense* Desf.
Rubiaceae	MIRE	*Mitchella repens* L.
Phytolaccaceae	PHAM4	*Phytolacca americana* L.
Pinaceae	PIRI	*Pinus rigida* Mill.
Pinaceae	PIST	*Pinus strobus* L.
Polytrichaceae	POCO38	*Polytrichum commune* Hedw.
Salicaceae	PODE3	*Populus deltoides* W. Bartram ex Marshall
Salicaceae	POGR4	*Populus grandidentata* Michx.
Poaceae	POPR	*Poa pratensis L.*

Continued…

Family	Code	Scientific name
Rosaceae	POSI2	*Potentilla simplex* Michx.
Rosaceae	PRSE2	*Prunus serotina* Ehrh.
Fagaceae	QUAL	*Quercus alba* L.
Fagaceae	QUCO2	*Quercus coccinea* Münchh.
Fagaceae	QUIL	*Quercus ilicifolia* Wangenh.
Fagaceae	QURU	*Quercus rubra* L.
Fagaceae	QUVE	*Quercus velutina* L.
Rosaceae	RUFL	*Rubus flagellaris* Willd.
Rosaceae	RUHI	*Rubus hispidus* L.
Rosaceae	RUOC	*Rubus occidentalis* L.
Smilacaceae	SMGL	*Smilax glauca* Walter
Smilacaceae	SMRO	*Smilax rotundifolia* L.
Anacardiaceae	TORA2	*Toxicodendron radicans* (L.) Kuntze
Primulaceae	TRBO2	*Trientalis borealis* Raf.
Ericaceae	VAAN	*Vaccinium angustifolium* Aiton
Ericaceae	VACO	*Vaccinium corymbosum* L.
Ericaceae	VAPA4	*Vaccinium pallidum* Aiton
Violaceae	VI	*Viola spp*. L.
Adoxaceae	VIDE	*Viburnum dentatum* L.

Nicholas Farm Management Area

Coventry, Rhode Island

A preliminary scouting trip was conducted on June 18, 2020, by Brian Maynard, Ph.D., and Emma Brown to note the variety of species observed in the general area of the transect. A pre-management survey was conducted on July 14, 2020, to accurately record the species, followed by a post-management vegetation survey conducted one year later on July 19, 2021, by Dr. Brian Maynard.

The area consisted of mature eastern white pine, *Pinus strobus*, with dense leaf litter of white pine needles forming a layer several inches thick serving as a natural mulch, limiting the understory vegetation to sparse herbaceous growth.

Transect Maps
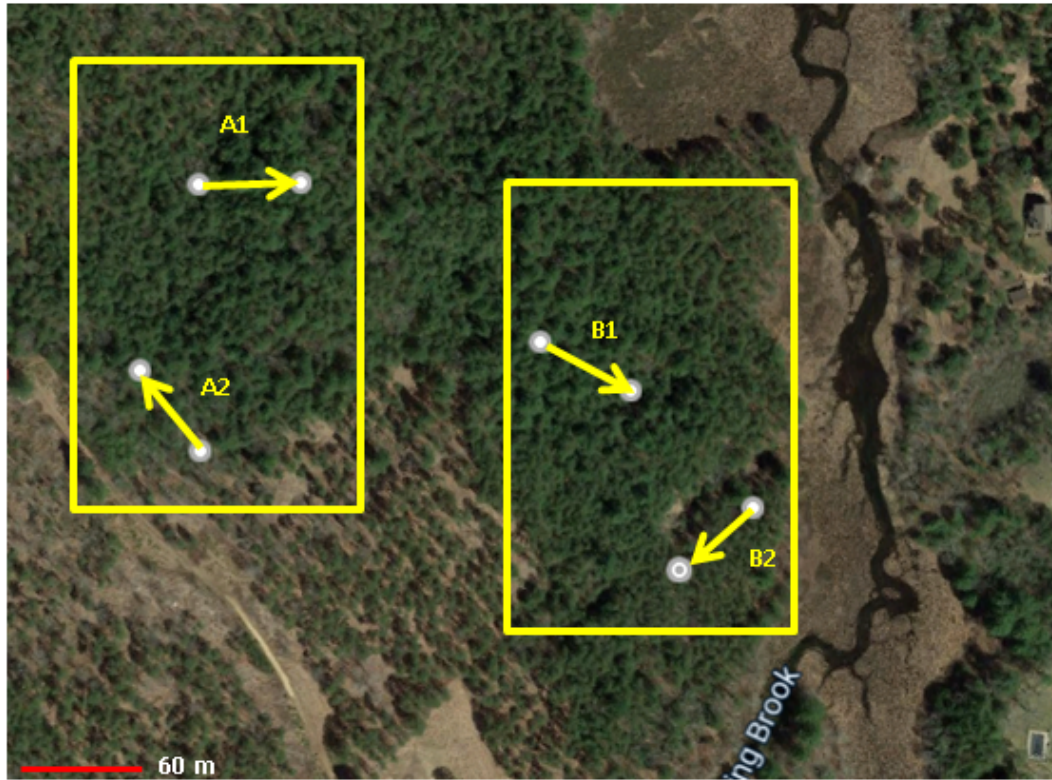
2021 transects use the original GPS survey points from the 2020 surveys. Data collected within these transects use starting points and follow a path as similar as possible to the original transect measurements.

Nicholas Farm Transect A1

NicA1:
Start Lat/Long: 41.68606002/ -71.77576999
End Lat/Long: 41.68606689/ -71.77515669
Elevation (m): 112m   Azimuth: 89° Aspect: E
Site Description: Xeric/**Mesic**/Hydric
Slope Shape: **Concave**/Convex/Straight
Landform: Valley bottom/ **Lower slope**/Midslope/ Upper slope/ Ridgetop

Pre-management: **Post-Management:**

NicA1

2021 spp.	2021 cover class	2020 spp.	2020 cover class
CA	2		
ERHI12	1		
PIRI	3	PIRI	3
PIST	2	PIST	6
PIST	2	PIST	6
		PIST	3
		PIST	6
		PIST	6
		PIST	6
		PRSE2	1
		QUAL	2
		QUIL	2
		QUIL	1
		QUIL	1
QURU	1		
QUVE	1	QUVE	1
		TRBO2	1
VAAN	2	VAAN	2
		VAAN	1
VACO	1		
VACO	1		
VACO	2		

Nicholas Farm Transect A2

NicA2:
Start Lat/Long: 41.68485001/-71.77576999
End Lat/Long: 41.6852137/ -71.77613192
Elevation (m): 113m   Azimuth: 323° Aspect: NW
Site Description: Xeric/Mesic/Hydric
Slope Shape: Concave/Convex/**Straight**
Landform: **Valley bottom**/ Lower slope/Midslope/ Upper slope/ Ridgetop

<div style="display:flex">

Pre-management:

Post-Management:

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NicA2

2021 spp.	2021 cover class	2020 spp.	2020 cover class
BEPO	2	BEPO	3
		CAPE6	1
		CYAC3	1
DIAC2	1		
ERHI12	1		
FIAU	5		
		GABA	1
PIRI	3	PIRI	6
PIST	1	PIST	2
		PIST	5
		PIST	1
		PIST	6
		PIST	3
		PIST	6
PODE3	2		
		POGR4	3
		QUAL	3
		QUCO2	2
QUIL	1	QUIL	1
		QUIL	1
		QUIL	1
QURU	2		
QURU	1		
QURU	1		
		VAAN	5
		VAAN	1
VACO	2		

Nicholas Farm Transect B1

NicB1:
Start Lat/Long: 41.68534731/ -71.77368022
End Lat/Long: 41.68512493/ -71.77313296
Elevation (m): NR   Azimuth: 119° Aspect: SE
Site Description: Xeric/Mesic/Hydric
Slope Shape: Concave/Convex/**Straight**
Landform: **Valley bottom**/ Lower slope/Midslope/ Upper slope/ Ridgetop

Pre-management:

Post-Management:

NicB1

2021 spp.	2021 cover class	2020 spp.	2020 cover class
CA	2		
		DRYOP	1
ERHI12	1		
		GABA	2
		GABA	1
PIRI	2		
PIRI	4		
PIST	1	PIST	6
PIST	3	PIST	6
		PIST	6
		PIST	6
		PIST	6
		PIST	6
POPR	1		
		PRSE2	2
		QUAL	2
QURU	1	QURU	1
TRBO2	1		
VAAN	2	VAAN	4
		VAAN	2
		VAAN	3
		VAAN	5
VACO	1		
VACO	1		
VACO	1		

Nicholas Farm Transect B2

NicB2:
Start Lat/Long: 41.68458371/ -71.77236702
End Lat/Long: 41.68430334/ -71.77281763
Elevation (m): NR   Azimuth: 230° Aspect: SW
Site Description: Xeric/Mesic/Hydric
Slope Shape: Concave/Convex/**Straight**
Landform: **Valley bottom**/ Lower slope/Midslope/ Upper slope/ Ridgetop

Pre-management:	**Post-Management:**

NicB2

2021 spp.	2021 cover class	2020 spp.	2020 cover class
ACRU	5	ACRU	6
ACRU	4	ACRU	5
ACRU	6	ACRU	5
ACRU	3	ACRU	5
		ACRU	6
		ACRU	6
		CAPE6	2
DEOB4	2	DEOB4	2
ERHI12	1		
MACA4	2	MACA4	3
PIRI	2	PIRI	6
PIRI	3	PIRI	3
PIRI	2		
PIST	6	PIST	2
PIST	6	PIST	1
PIST	3	PIST	1
PIST	1	PIST	2
		POCO38	4
QUAL	1	QUAL	1
		QURU	1
		QURU	1
SMRO	1		
SMRO	1		
TRBO2	2	TRBO2	2
TRBO2	2	TRBO2	2
TRBO2	1	TRBO2	2
TRBO2	1	TRBO2	1
TRBO2	1		
VAAN	1	VAAN	1
VAAN	2	VAAN	1
VAAN	2	VAAN	1
VAAN	2		
VACO	3		
VACO	3		
VACO	1		
		VAPA4	3
		VIDE	2

Data

Forest Composition

The change in percent distribution of vegetation types within the four Nicholas Farm transects is illustrated below.
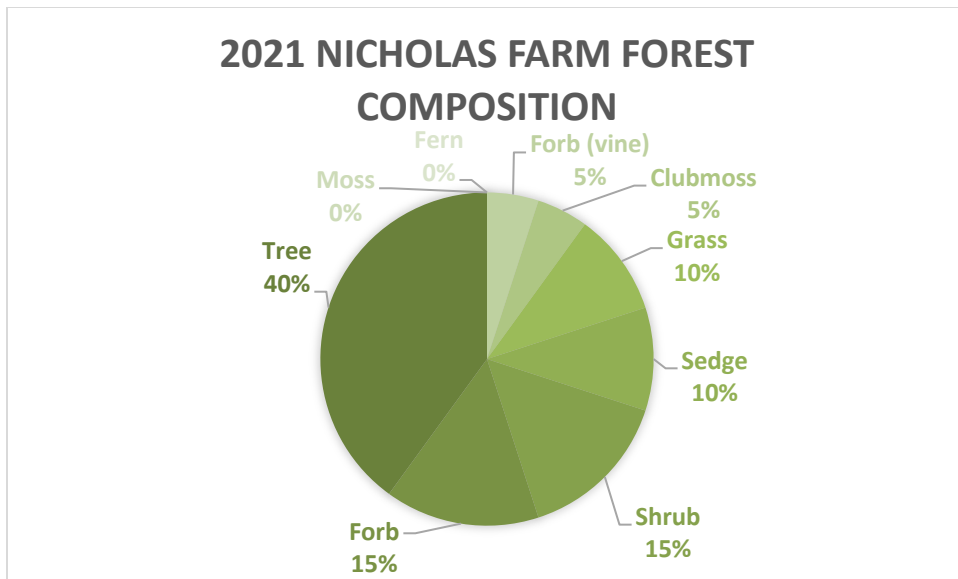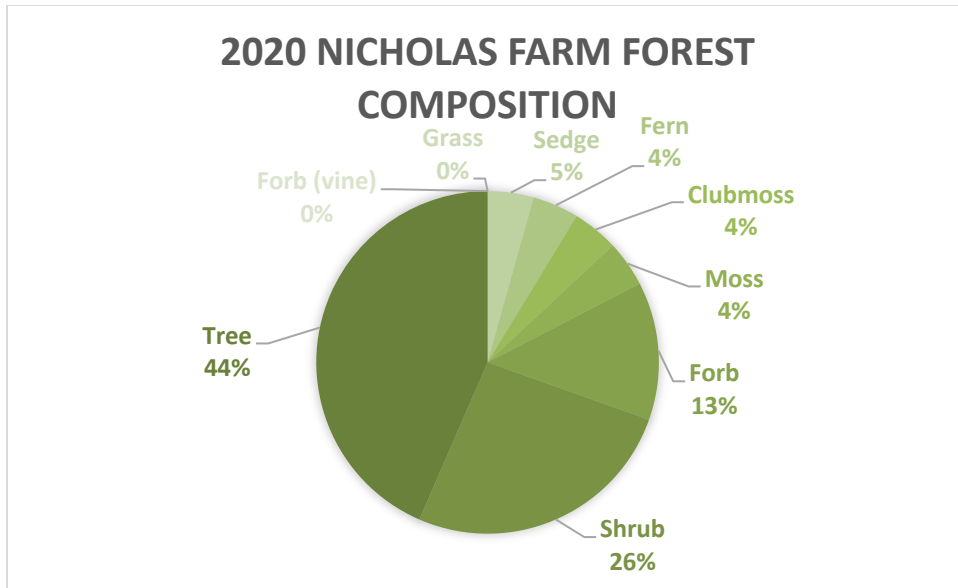
2020 NICHOLAS FARM FOREST COMPOSITION

Grass 0%, Sedge 5%, Fern 4%, Forb (vine) 0%, Clubmoss 4%, Moss 4%, Tree 44%, Forb 13%, Shrub 26%

2021 NICHOLAS FARM FOREST COMPOSITION

Fern 0%, Forb (vine) 5%, Moss 0%, Clubmoss 5%, Tree 40%, Grass 10%, Sedge 10%, Forb 15%, Shrub 15%

Cover Class

The proportion of each species per cover class is recorded below. USDA abbreviations represent each species. In the graphs, cover classes are color-coded and the number of individuals per cover class is displayed vertically. In the charts, the total number of individuals in a cover class recorded per species is highlighted in grey.

2020 Cover Classes

Code	<1%	1-4%	5-24%	25-49%	50-74%	75-100%
ACRU	0	0	0	0	3	3
BEPO	0	0	1	0	0	0
CAPE6	1	1	0	0	0	0
CYAC3	1	0	0	0	0	0
DEOB4	0	1	0	0	0	0
DRYOP	1	0	0	0	0	0
GABA	2	1	0	0	0	0
MACA4	0	0	1	0	0	0
PIRI	0	0	2	0	0	2
PIST	3	3	2	0	1	13
POCO38	0	0	0	1	0	0
POGR4	0	0	1	0	0	0
PRSE2	1	1	0	0	0	0
QUAL	1	2	1	0	0	0
QUCO2	0	1	0	0	0	0
QUIL	5	1	0	0	0	0
QURU	3	0	0	0	0	0

2021 Cover Classes

Code	<1%	1-4%	5-24%	25-49%	50-74%	75-100%
ACRU	0	0	1	1	1	1
BEPO	0	1	0	0	0	0
CA	0	2	1	1	1	1
DEOB4	0	1	0	0	0	0
DIAC2	1	0	0	0	0	0
ERHI12	4	0	0	0	0	0
FIAU	0	0	0	0	1	0
MACA4	0	1	0	0	0	0
PIRI	0	3	3	1	0	0
PIST	3	2	2	0	0	2
PODE3	0	1	0	0	0	0
POPR	1	0	0	0	0	0
QUAL	1	0	0	0	0	0
QUIL	1	0	0	0	0	0
QURU	4	1	0	0	0	0
QUVE	1	0	0	0	0	0
SMRO	2	0	0	0	0	0
TRBO2	4	2	0	0	0	0
VAAN	1	5	0	0	0	0
VACO	6	2	2	0	0	0

Data Interpretation

In 2020, 23 different plant species were recorded across the four transects and represented 16 genera and 15 families. In 2021, 20 different plant species were recorded across the four transects, within 15 genera and 13 families.

Quantity of plants recorded per cover class

Cover Class	2020 Quantity	2021 Quantity	Change in Quantity
<1%	18	62	+44
1-4%	11	32	+21
5-24%	8	8	0
25-49%	1	4	+3
50-74%	4	0	-4
75-100%	18	3	-15
SUM	*60*	*69*	*N/A*

Nine species were found across all transects in 2020 and 2021 (BEPO, DEOB4, MACA4, QUAL, ACRU, PIRI, PIST, QUIL, QURU). Eight species were only found in 2020 (CAPE6, CYAC3, DRYOP, GABA, POCO38, POGR4, PRSE2, QUCO2), and eleven species were found specifically in 2021 (CA, DIAC2, ERHI12, FIAU, PODE3, POPR, QUVE, SMRO, TRBO2, VAAN, VACO). The change in species present reflects a successional change that is reflective of management practices applied to the site. Along with the change in cover class greatly increasing individual plants with a cover class of less than 1% within the past year, and a reduced prevalence of PIST occupying larger cover classes, it appears that the management goal of removal of *Pinus strobus* to improve biodiversity is beginning to be achieved. Originally, *Pinus strobus* occupied the greatest number of different cover classes in the greatest quantity. Now, *Acer rubrum* and *Carex* species nearly match the current *Pinus strobus* forest cover.

Individual Plants in Nicholas Farm Transects

Family	Scientific name	Code	2020 Total	2021 Total	Change
Sapindaceae	*Acer rubrum* (L.)	ACRU	6	4	-2
Rosaceae	*Amelanchier canadensis* (L.) Medik	AMCA4	0	0	0
Apocynaceae	*Apocynum androsaemifolium* (L.)	APAN2	0	0	0
Rosaceae	*Aronia melanocarpa* (Michx.) Elliott	ARME6	0	0	0
Araliaceae	*Aralia nudicaulis* (L.)	ARNU2	0	0	0
Betulaceae	*Betula alleghaniensis* Britton	BELE	0	0	0
Betulaceae	*Betula populifolia* Marshall	BEPO	1	1	0
Cyperaceae	*Carex spp.*	CA	0	6	6
Cyperaceae	*Carex debilis* Michx.	CADE5	0	0	0
Cyperaceae	*Carex pensylvanica* Lam.	CAPE6	2	0	-2
Cyperaceae	*Carex swanii* (Fernald) Mack.	CASW	0	0	0
Ericaceae	*Chimaphila maculata* (L.) Pursh	CHMA3	0	0	0
Orchidaceae	*Cypripedium aucale* Aiton / L.	CYAC3	1	0	-1
Lycopodiaceae	*Dendrolycopodium obscurum* L. A. Haines	DEOB4	1	1	0
Dennstaedtiaceae	*Dennstaedtia punctilobula* (Michx.) T. Moore	DEPU2	0	0	0
Poaceae	*Dichanthelium acuminatum* (Sw.) Gould & C.A. Clark	DIAC2	0	1	1
Dryopteridaceae	*Dryopteris intermedia* (Muhl ex. Willd.) A. Gray	DRIN5	0	0	0
Dryopteridaceae	*Dryopteris marginalis* (L.) A. Gray	DRMA4	0	0	0
Dryopteridaceae	*Dryopteris* spp. Adans.	DRYOP	1	0	-1
Asteraceae	*Erechtites hieraciifolius* (L.) Raf. ex DC.	ERHI12	0	4	4
Fagaceae	*Fagus grandifolia* Ehrh.	FAGR	0	0	0
Poaceae	*Festuca ovina* L.	FEOV	0	0	0
Cyperaceae	*Fimbristylis autumnalis* (L.) Roem. & Schult.	FIAU	0	1	1
Ericaceae	*Gaylussacia baccata* (Wangenh.) K. Koch	GABA	3	0	-3
Orchidaceae	*Goodyera tesselata* Lodd.	GOTE	0	0	0
Primulaceae	*Lysimachia quadrifolia* (L.)	LYQU2	0	0	0
Asparagaceae	*Maianthemum canadense* Desf.	MACA4	1	1	0
Rubiaceae	*Mitchella repens* L.	MIRE	0	0	0
Phytolaccaceae	*Phytolacca americana* L.	PHAM4	0	0	0
Pinaceae	*Pinus rigida* Mill.	PIRI	4	7	3
Pinaceae	*Pinus strobus* L.	PIST	22	9	-13
Polytrichaceae	*Polytrichum commune* Hedw.	POCO38	1	0	-1

Family	Scientific name	Code	2020 Total	2021 Total	Change
Salicaceae	*Populus deltoides* W. Bartram ex Marshall	PODE3	0	1	1
Salicaceae	*Populus grandidentata* Michx.	POGR4	1	0	-1
Poaceae	*Poa pratensis L.*	POPR	0	1	1
Rosaceae	*Potentilla simplex* Michx.	POSI2	0	0	0
Rosaceae	*Prunus serotina* Ehrh.	PRSE2	2	0	-2
Fagaceae	*Quercus alba* L.	QUAL	4	1	-3
Fagaceae	*Quercus coccinea* Münchh.	QUCO2	1	0	-1
Fagaceae	*Quercus ilicifolia* Wangenh.	QUIL	6	1	-5
Fagaceae	*Quercus rubra* L.	QURU	3	5	2
Fagaceae	*Quercus velutina* L.	QUVE	0	1	1
Rosaceae	*Rubus flagellaris* Willd.	RUFL	0	0	0
Rosaceae	*Rubus hispidus* L.	RUHI	0	0	0
Rosaceae	*Rubus occidentalis* L.	RUOC	0	0	0
Smilacaceae	*Smilax glauca* Walter	SMGL	0	0	0
Smilacaceae	*Smilax rotundifolia* L.	SMRO	0	2	2
Anacardiaceae	*Toxicodendron radicans* (L.) Kuntze	TORA2	0	0	0
Primulaceae	*Trientalis borealis* Raf.	TRBO2	0	6	6
Ericaceae	*Vaccinium angustifolium* Aiton	VAAN	0	6	6
Ericaceae	*Vaccinium corymbosum* L.	VACO	0	10	10
Ericaceae	*Vaccinium pallidum* Aiton	VAPA4	0	0	0
Violaceae	*Viola spp*. L.	VI	0	0	0
Adoxaceae	*Viburnum dentatum* L.	VIDE	0	0	0

Pratt Farm

Arcadia Management Area, Exeter and Richmond, Rhode Island

A preliminary scouting trip was conducted on June 18, 2020 by Brian Maynard, Ph.D., and Emma Brown. A path was traversed through the general area of each transect and all species within sight were recorded in all stages of growth. The site consists of densely forested areas with minimal understory vegetation, and some edge habitat. The soil borders on areas of pine barrens as well as wetlands, with the dense forest mainly on upland slopes. A pre-management survey was conducted on July 15, 2020, followed by a post-management vegetation survey conducted one year later on July 20, 2021, by Dr. Brian Maynard.

Transect Maps

2021 transects use the original GPS survey points from the 2020 surveys. Data collected within these transects use starting points and follow a path as similar as possible to the original transect measurements.

Pratt Farm Transect A1:

PraA1:
Start Lat/Long: 41.55516797/ -71.70727903 (Exeter)
End Lat/Long: 41.55510795/ -71.70798462 (Exeter)
Elevation (m): 51.5m   Azimuth: 264° Aspect: WSW
Site Description: Xeric/**Mesic**/Hydric
Slope Shape: **Concave**/Convex/Straight
Landform: Valley bottom/ Lower slope/**Midslope**/ Upper slope/ Ridgetop

Pre-management: **Post-Management:**

PraA1

2021 spp.	2021 cover class	2020 spp.	2020 cover class
		APAN2	1
ARNU2	2	ARNU2	3
ARNU2	3	ARNU2	4
		BELE	6
		CAPE6	2
CADE5	1		
CASW	1		
		CHMA3	1
DRMA4	2		
ERHI12	1		
FEOV	6	FEOV	2
		GOTE	1
MACA4	2	MACA4	2
MACA4	1	MACA4	6
MIRE	2	MIRE	2
		MIRE	2
		MIRE	2
PHAM4	1		
		PIST	2
		PIST	4
		PIST	2
		PIST	6
		PIST	6
		PIST	5
PODE3	2		
PODE3	1		
PODE3	2		
PRSE2	2		
PRSE2	2		
PRSE2	2		
		QUAL	1
		QUAL	1
		QUIL	2
QUVE	1		
QUVE	1		
		RUFL	2
RUHI	1	RUHI	2
TORA2	1	TORA2	1
TORA2	1		
TRBO2	1	TRBO2	1

TRBO2	1	TRBO2	2
VAAN	2	VAAN	2

Pratt Farm Transect A2:

PraA2:
Start Lat/Long: 41.55517601/ -71.70650597 (Exeter)
End Lat/Long: 41.55560098/ -71.706613 (Exeter)
Elevation (m): 57m   Azimuth: 349° Aspect: NNW
Site Description: Xeric/**Mesic**/Hydric
Slope Shape: Concave/**Convex**/Straight
Landform: Valley bottom/ Lower slope/**Midslope**/ Upper slope/ Ridgetop

Pre-management: **Post-Management:**

PraA2

2021 spp.	2021 cover class	2020 spp.	2020 cover class
ACRU	1	ACRU	1
ACRU	1	ACRU	1
		ACRU	1
AMCA4	1		
APAN2	1		
		BELE	3
		CAPE6	5
DEPU2	6	DEPU2	4
DEPU2	3		
		FAGR	2
MACA4	2	MACA4	2
MACA4	1	MACA4	2
		MACA4	3
		MACA4	1
		MIRE	2
PIST	4	PIST	6
PIST	3	PIST	3
PIST	2	PIST	4
		PIST	4
		PIST	5
		PIST	6
POSI2	1		
PRSE2	1	PRSE2	1
QUAL	6	QUAL	3
QUAL	1	QUAL	5
QUAL	1	QUAL	4
QUAL	1	QUAL	5
QUVE	1		
RUHI	1	RUHI	3
		RUHI	2
SMGL	1		
SMGL	1		
TORA2	2	TORA2	2
TORA2	1		
TRBO2	1	TRBO2	1
TRBO2	1	TRBO2	2
		TRBO2	2

		TRBO2	2
		VAAN	2
		VAAN	1
VACO	1	VACO	4
VACO	3	VACO	1
VAPA4	2	VAPA4	3
VAPA4	2	VAPA4	2
		VAPA4	5
		VAPA4	3

Pratt Farm Transect B1:

PraB1:
Start Lat/Long: 41.55502799/ -71.70618704 (Exeter)
End Lat/Long: 41.55471903/ -71.70589803 (Richmond)
Elevation (m): 60m   Azimuth: 145° Aspect: SE
Site Description: Xeric/**Mesic**/Hydric
Slope Shape: Concave/Convex/**Straight**
Landform: Valley bottom/ Lower slope/**Midslope**/ Upper slope/ Ridgetop

Pre-management: **Post-Management:**

PraB1

2021 spp.	2021 cover class	2020 spp.	2020 cover class
ACRU	1		
CA	2		
		CAPE6	5
		CAPE6	6
		CHMA3	1
DEOB4	1		
DEPU2	1	DEPU2	3
FAGR	4	FAGR	6
FAGR	2		
FAGR	4		
		GABA	2
		GABA	1
LYQU2	1		
MACA4	2	MACA4	2
MACA4	2	MACA4	3
MACA4	2	MACA4	2
MIRE	2	MIRE	5
MIRE	1	MIRE	2
		MIRE	1
		MIRE	1
PIST	3	PIST	5
PIST	3	PIST	6
PIST	3	PIST	6
PIST	1	PIST	6
		PIST	6
		PRSE2	2
QUAL	2	QUAL	6
		QUAL	3
		QUCO2	3
SMRO	2		
TORA2	1		
TRBO2	1	TRBO2	2
VAAN	2	VAAN	3
VAAN	2		
VAPA4	4	VAPA4	3
VAPA4	1	VAPA4	4

Pratt Farm Transect B2:

PraB2:
Start Lat/Long: 41.55370499/ -71.70616499 (Richmond)
End Lat/Long: 41.55416499/ -71.70600398 (Richmond)
Elevation (m): 60m   Azimuth: 15° Aspect: NNE
Site Description: Xeric/Mesic/Hydric
Slope Shape: **Concave**/Convex/Straight
Landform: **Valley bottom/ Lower slope/Midslope/ Upper slope**/ Ridgetop
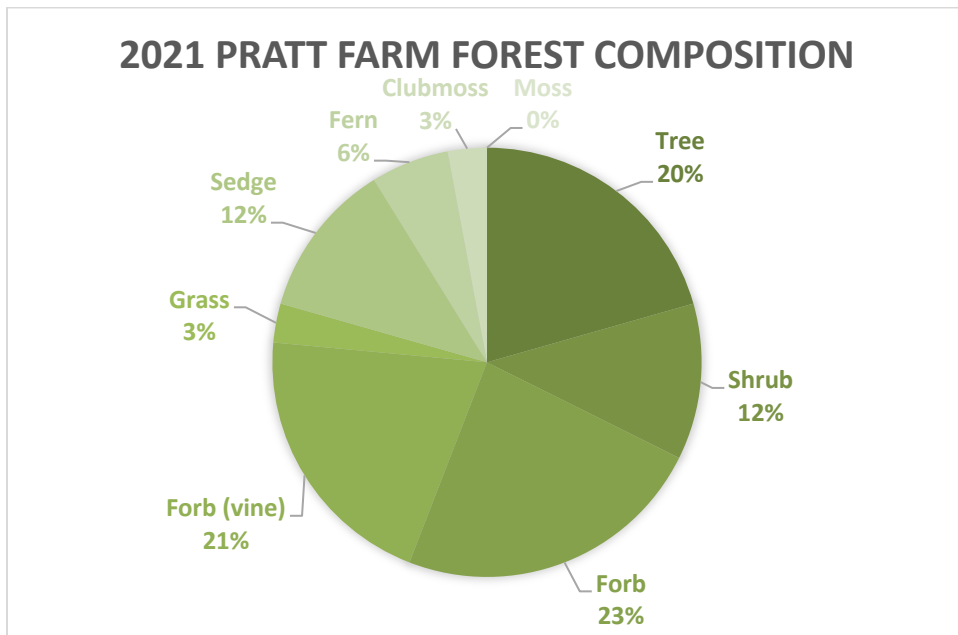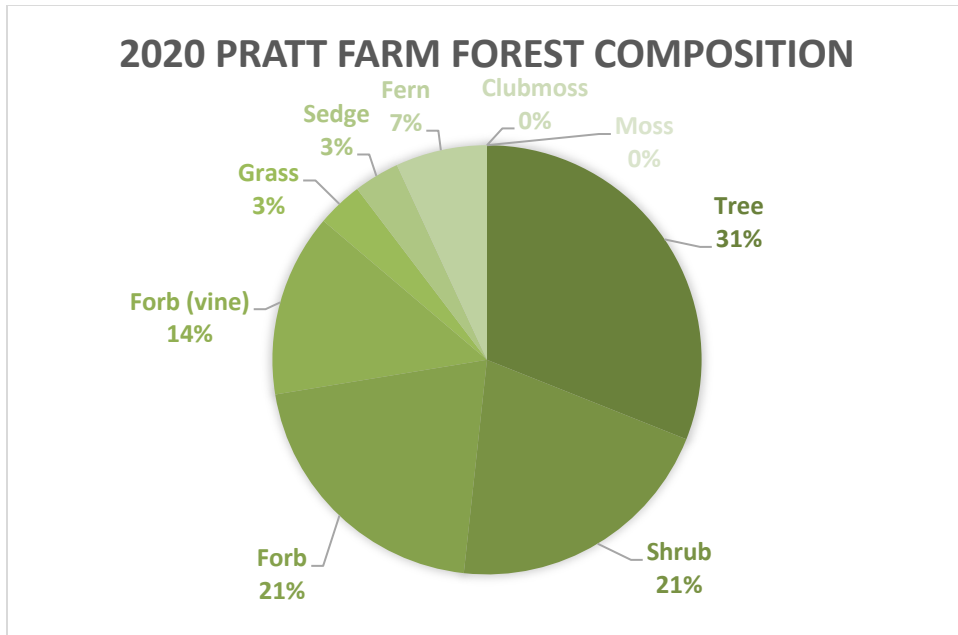
Pre-management:	Post-Management:

PraB2

2021 spp.	2021 cover class	2020 spp.	2020 cover class
ACRU	1	ACRU	3
		ACRU	6
		ACRU	4
		ACRU	1
		ARNU2	2
CA	2		
CA	1		
CA	1		
CA	2		
CA	2		
CA	1		
DEPU2	1	DEPU2	1
		DEPU2	3
		DRIN5	6
		DRIN5	4
		DRIN5	3
		DRIN5	2
ERHI12	1		
ERHI12	1		
		GABA	1
LYQU2	1		
MACA4	1	MACA4	1
		MACA4	2
		MACA4	1
		MACA4	2
		MACA4	1
		MIRE	2
		MIRE	2
		MIRE	3
		MIRE	3
PHAM4	1		
PHAM4	1		
PHAM4	1		
PHAM4	1		
PIST	3	PIST	6
		PIST	4
		PIST	6

|			
		PIST	6
		PIST	6
		PIST	6
POSI2	1		
PRSE2	1	PRSE2	1
QUAL	1	QUAL	1
		QURU	1
RUOC	1		
		RUHI	2
TORA2	2	TORA2	2
TORA2	1		
TRBO2	1	TRBO2	1
		TRBO2	1
		TRBO2	2
		TRBO2	2
		TRBO2	1
VAAN	2	VAAN	1
		VAAN	2
		VAAN	3
		VAAN	1
		VAAN	2
VACO	1		
VACO	1		
VAPA4	2	VAPA4	1
VI	1		

Data

Forest Composition

The change in percent distribution of vegetation types within the four Pratt Farm transects is illustrated below.

2020 PRATT FARM FOREST COMPOSITION

- Clubmoss 0%
- Fern 7%
- Sedge 3%
- Moss 0%
- Grass 3%
- Tree 31%
- Forb (vine) 14%
- Forb 21%
- Shrub 21%

2021 PRATT FARM FOREST COMPOSITION

- Clubmoss 3%
- Moss 0%
- Fern 6%
- Sedge 12%
- Tree 20%
- Grass 3%
- Shrub 12%
- Forb (vine) 21%
- Forb 23%

Cover Class

The proportion of each species per cover class is recorded below. USDA abbreviations represent each species. In the graphs, cover classes are color-coded and the number of individuals per cover class is displayed vertically. In the charts, the total number of individuals in a cover class recorded per species is highlighted in grey.
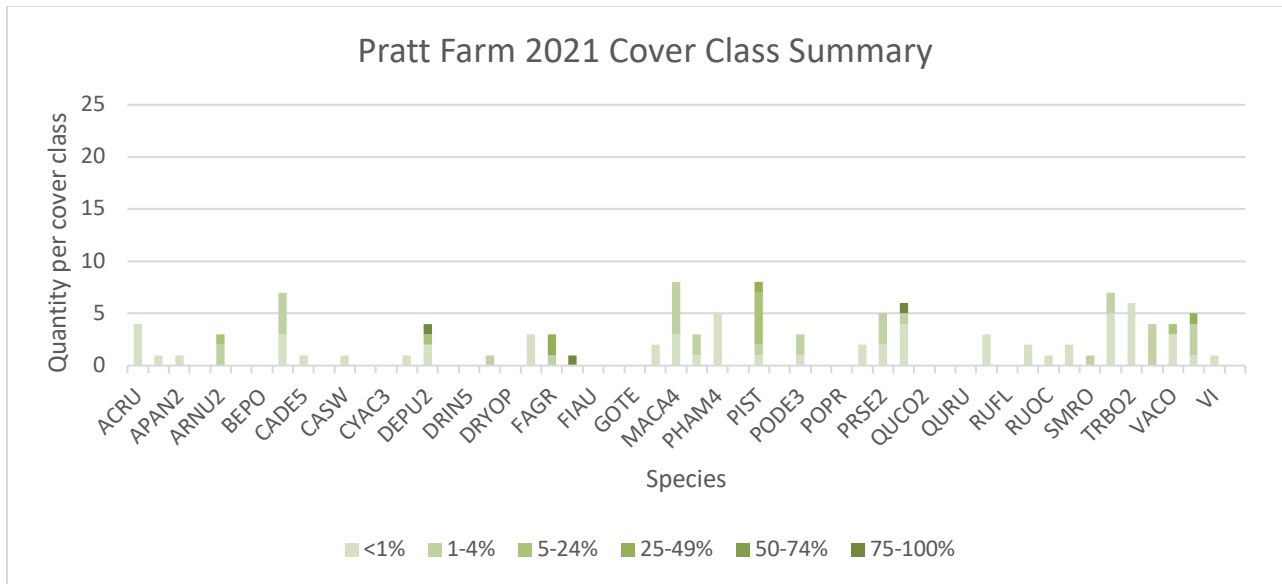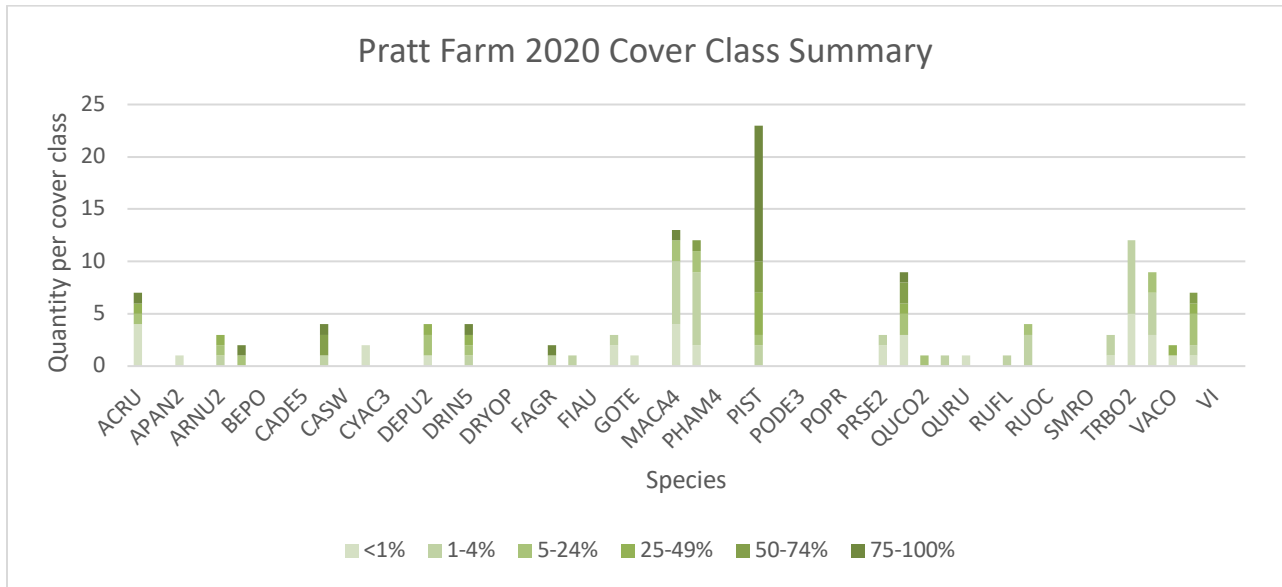
2020 Cover Classes

Code	<1%	1-4%	5-24%	25-49%	50-74%	75-100%
APAN2	1	0	0	0	0	0
FEOV	0	1	0	0	0	0
GOTE	1	0	0	0	0	0
QUCO2	0	0	1	0	0	0
QUIL	0	1	0	0	0	0
QURU	1	0	0	0	0	0
RUFL	0	1	0	0	0	0
BELE	0	0	1	0	0	1
CHMA3	2	0	0	0	0	0
FAGR	0	1	0	0	0	1
VACO	1	0	0	1	0	0
ARNU2	0	1	1	1	0	0
GABA	2	1	0	0	0	0
PRSE2	2	1	0	0	0	0
TORA2	1	2	0	0	0	0
CAPE6	0	1	0	0	2	1
DEPU2	1	0	2	1	0	0
DRIN5	0	1	1	1	0	1
RUHI	0	3	1	0	0	0
ACRU	4	0	1	1	0	1
VAPA4	1	1	3	1	1	0
QUAL	3	0	2	1	2	1
VAAN	3	4	2	0	0	0
MIRE	2	7	2	0	1	0
TRBO2	5	7	0	0	0	0
MACA4	4	6	2	0	0	1
PIST	0	2	1	4	3	13

2021 Cover Classes

Code	<1%	1-4%	5-24%	25-49%	50-74%	75-100%
ACRU	4	0	0	0	0	0
AMCA4	1	0	0	0	0	0
APAN2	1	0	0	0	0	0
ARNU2	0	2	1	0	0	0
CA	3	4	0	0	0	0
CADE5	1	0	0	0	0	0
CASW	1	0	0	0	0	0
DEOB4	1	0	0	0	0	0
DEPU2	2	0	1	0	0	1
DRMA4	0	1	0	0	0	0
ERHI12	3	0	0	0	0	0
FAGR	0	1	0	2	0	0
FEOV	0	0	0	0	0	1
LYQU2	2	0	0	0	0	0
MACA4	3	5	0	0	0	0
MIRE	1	2	0	0	0	0
PHAM4	5	0	0	0	0	0
PIST	1	1	5	1	0	0
PODE3	1	2	0	0	0	0
POSI2	2	0	0	0	0	0
PRSE2	2	3	0	0	0	0
QUAL	4	1	0	0	0	1
QUVE	3	0	0	0	0	0
RUHI	2	0	0	0	0	0
RUOC	1	0	0	0	0	0
SMGL	2	0	0	0	0	0
SMRO	0	1	0	0	0	0
TORA2	5	2	0	0	0	0
TRBO2	6	0	0	0	0	0
VAAN	0	4	0	0	0	0
VACO	3	0	1	0	0	0
VAPA4	1	3	0	1	0	0
VI	1	0	0	0	0	0

Data Interpretation

In 2020, 29 species recorded represented 23 genera and 18 families. In 2021, 33 different plant species representing 26 genera and 22 families were recorded across the 4 transects:

Quantity of plants recorded per cover class

Cover Class	2020 Quantity	2021 Quantity	Change in Quantity
<1%	34	62	+28
1-4%	41	32	-9
5-24%	20	8	-12
25-49%	11	4	-7
50-74%	9	0	-9
75-100%	20	3	-17
SUM	*135*	*109*	*N/A*

Seventeen species were found across all transects in 2020 and 2021 (ACRU, APAN2, ARNU2, DEPU2, FAGR, FEOV, MACA4, MIRE, PIST, PRSE2, QUAL, RUHI, TORA2, TRBO2, VAAN, VACO, VAPA4). Ten species were found only in 2020 (BELE, CAPE6, CHMA3, DRIN5, GABA, GOTE, QUCO2, QUIL, QURU, RUFL) and sixteen were found in 2021 (AMCA4, CA, CADE5, CASW, DEOB4, DRMA4, ERHI12, LYQU2, PHAM4, PODE3, POSI2, QUVE, RUOC, SMGL, SMRO, VI). In 2020, the cover class with the most species was the second cover class, with 1-4% cover, while most species in 2021 covered less than 1% of the space within the transects. It is clear that the management of these areas has shifted the cover class ratings within the site, with the greatest change manifesting as a decrease in percent coverage of individual plants that exceeded 75% cover of the transects and increasing the number of individual plants falling within the smallest cover class of less than one percent. These changes reflect the removal of large trees and the utilization of this space by newly sprouted young plants taking advantage of the newly opened space and sunlight conditions. Cover class diagrams show a very large decrease in *Pinus strobus* of higher cover classes. The pie charts of forest composition show a decrease in trees and shrubs with marked increase in forb, vine and sedge presence.

Individual Plants in Pratt Farm Transects

Family	Scientific name	Code	2020 Total	2021 Total	Difference
Sapindaceae	*Acer rubrum* (L.)	ACRU	7	4	-3
Rosaceae	*Amelanchier canadensis* (L.) Medik	AMCA4	0	1	1
Apocynaceae	*Apocynum androsaemifolium* (L.)	APAN2	1	1	0
Rosaceae	*Aronia melanocarpa* (Michx.) Elliott	ARME6	0	0	0
Araliaceae	*Aralia nudicaulis* (L.)	ARNU2	3	3	0
Betulaceae	*Betula alleghaniensis* Britton	BELE	2	0	-2
Betulaceae	*Betula populifolia* Marshall	BEPO	0	0	0
Cyperaceae	*Carex spp.*	CA	0	7	7
Cyperaceae	*Carex debilis* Michx.	CADE5	0	1	1
Cyperaceae	*Carex pensylvanica* Lam.	CAPE6	4	0	-4
Cyperaceae	*Carex swanii* (Fernald) Mack.	CASW	0	1	1
Ericaceae	*Chimaphila maculata* (L.) Pursh	CHMA3	2	0	-2
Orchidaceae	*Cypripedium aucale* Aiton / L.	CYAC3	0	0	0
Lycopodiaceae	*Dendrolycopodium obscurum* L. A. Haines	DEOB4	0	1	1
Dennstaedtiaceae	*Dennstaedtia punctilobula* (Michx.) T. Moore	DEPU2	4	4	0
Poaceae	*Dichanthelium acuminatum* (Sw.) Gould & C.A. Clark	DIAC2	0	0	0
Dryopteridaceae	*Dryopteris intermedia* (Muhl ex. Willd.) A. Gray	DRIN5	4	0	-4
Dryopteridaceae	*Dryopteris marginalis* (L.) A. Gray	DRMA4	0	1	1
Dryopteridaceae	*Dryopteris* spp. Adans.	DRYOP	0	0	0
Asteraceae	*Erechtites hieraciifolius* (L.) Raf. ex DC.	ERHI12	0	3	3
Fagaceae	*Fagus grandifolia* Ehrh.	FAGR	2	3	1
Poaceae	*Festuca ovina* L.	FEOV	1	1	0
Cyperaceae	*Fimbristylis autumnalis* (L.) Roem. & Schult.	FIAU	0	0	0
Ericaceae	*Gaylussacia baccata* (Wangenh.) K. Koch	GABA	3	0	-3
Orchidaceae	*Goodyera tesselata* Lodd.	GOTE	1	0	-1
Primulaceae	*Lysimachia quadrifolia* (L.)	LYQU2	0	2	2

Continued…

Family	Scientific name	Code	2020 Total	2021 Total	Difference
Asparagaceae	*Maianthemum canadense* Desf.	MACA4	13	8	-5
Rubiaceae	*Mitchella repens* L.	MIRE	12	3	-9
Phytolaccaceae	*Phytolacca americana* L.	PHAM4	0	5	5
Pinaceae	*Pinus rigida* Mill.	PIRI	0	0	0
Pinaceae	*Pinus strobus* L.	PIST	23	8	-15
Polytrichaceae	*Polytrichum commune* Hedw.	POCO38	0	0	0
Salicaceae	*Populus deltoides* W. Bartram ex Marshall	PODE3	0	3	3
Salicaceae	*Populus grandidentata* Michx.	POGR4	0	0	0
Poaceae	*Poa pratensis* L.	POPR	0	0	0
Rosaceae	*Potentilla simplex* Michx.	POSI2	0	2	2
Rosaceae	*Prunus serotina* Ehrh.	PRSE2	3	5	2
Fagaceae	*Quercus alba* L.	QUAL	9	6	-3
Fagaceae	*Quercus coccinea* Münchh.	QUCO2	1	0	-1
Fagaceae	*Quercus ilicifolia* Wangenh.	QUIL	1	0	-1
Fagaceae	*Quercus rubra* L.	QURU	1	0	-1
Fagaceae	*Quercus velutina* L.	QUVE	0	3	3
Rosaceae	*Rubus flagellaris* Willd.	RUFL	1	0	-1
Rosaceae	*Rubus hispidus* L.	RUHI	4	2	-2
Rosaceae	*Rubus occidentalis* L.	RUOC	0	1	1
Smilacaceae	*Smilax glauca* Walter	SMGL	0	2	2
Smilacaceae	*Smilax rotundifolia* L.	SMRO	0	1	1
Anacardiaceae	*Toxicodendron radicans* (L.) Kuntze	TORA2	3	7	4
Primulaceae	*Trientalis borealis* Raf.	TRBO2	12	6	-6
Ericaceae	*Vaccinium angustifolium* Aiton	VAAN	9	4	-5
Ericaceae	*Vaccinium corymbosum* L.	VACO	2	4	2
Ericaceae	*Vaccinium pallidum* Aiton	VAPA4	7	5	-2
Violaceae	*Viola spp.* L.	VI	0	1	1
Adoxaceae	*Viburnum dentatum* L.	VIDE	0	0	0

Summary

Data collected at both sites in 2020 affirmed the need for management of the respective areas within Nicholas Farm and Pratt Farm. Both locations had a high concentration of *Pinus strobus* suppressing the growth and potential biodiversity of other species. Nicholas Farm Management Area had previously utilized controlled burning as a management technique in other areas of the site, and Nicholas Farm was intended to receive another controlled burn while Pratt Farm would be logged. Instead, both sites were logged, with Pratt Farm logged in November of 2020 and Nicholas Farm logged in March of 2021. In the initial report, we recommended the comparison of species between managed transects and unmanaged areas of each site once management occurred. This year, a transect of Nicholas Farm was kept unmanaged and contributes knowledge pertaining to the success of management practices.

The comparisons between pre- and post-management data show the beginnings of increase in biodiversity at each site. It is recommended to continue to survey the site in subsequent years to determine the long-term success of catalyzing forest succession through controlled management.

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