OXFORD COUNTY
TERRESTRIAL ECOSYSTEMS STUDY:

LIFE SCIENCES REPORT

prepared by

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INTRODUCTION

This report presents the major results of a life sciences survey of vegetation patches in eight Trial Landscapes in Oxford County, Ontario. The survey was completed during June, July and August, 1996 as part of the Oxford County Terrestrial Ecosystems Study (OCTES). The OCTES was conducted by the Upper Thames River Conservation Authority (UTRCA) to provide information towards creating a natural heritage framework for Oxford County. Such a natural heritage framework, incorporated into county planning goals, will allow the terrestrial ecosystems to be self sustaining.

The UTRCA final report (UTRCA, 1997) and other background documents provide information on the broader OCTES methodologies, the physical background of Oxford County, the landowner contact and stewardship concerns and Geographic Information System (GIS) methods. As part of the background study, eight Trial Landscapes were selected to represent the range of physical and landscape conditions in the county. The life sciences survey targeted vegetation patches within the trial landscapes.

The purpose of the life sciences survey was to assess the current conditions, or health, of the terrestrial ecosystems of Oxford County, and relate those conditions to the physical landscape. The survey concentrated on two groups of organisms: birds and vascular plants. The rationale for selecting these groups included the wealth of previous studies relating to breeding bird populations in fragmented habitats and the relative ease of collecting information for these groups (including the skills of the surveyors) given the limited time and resources. The OCTES survey also provided an ideal opportunity to apply and test the Floristic Quality Assessment System for southern Ontario, which has recently been developed (Oldham *et al.*, 1995).

METHODS

Selection of Patches

In each of eight trial landscapes, vegetation patches were selected to represent the range of patch size classes present. Landowner permission was sought to survey the selected patches. When landowner permission was not obtained for all or most of a patch, an alternate patch was substituted.

Some patches originally identified as single units were divided, for the purpose of the life sciences surveys, along gaps such as roads, railways, service corridors and rivers. This allowed patches to be surveyed at a finer level of detail as smaller units. For logistic reasons, some larger patches were also surveyed in separate areas, such as single properties, but were later combined for analysis.

Although all but one of the same patches were visited for the bird surveys and floral surveys in this study, division of the patches into sub-units was not always consistent between the two observers. The number of patches and size class distribution therefore differed slightly between the bird and floral surveys. Bird and plant survey results were analysed separately.

Field surveys

Birds:

Each patch, or portion of a patch was visited once by a single surveyor for the specific purpose of breeding bird surveys. Patches were surveyed on nineteen dates between June 3 and July 10, 1996. Patches were surveyed at approximately the same level of effort, based on time per unit area. Patches were surveyed either by circling inside the perimeter of smaller patches or criss-crossing larger sites. Stops of 3-5 minutes were made at intervals. The entire area of each patch was covered to ensure that during the surveys the observer came within about 100 m of every portion of the patch.

Bird species seen or heard in the patch were recorded on standard field cards (Figure 1). For each species, evidence codes were used to indicate the type of observation and to provide a level of breeding evidence (possible, probable, confirmed). Evidence codes were adapted from those used for the Atlas of Breeding Birds of Ontario (Cadman *et al.*, 1981) and are listed in Figure 1. The number of breeding territories for each species in each patch was estimated by the number of male birds or pairs observed. Weather conditions and time were also recorded on the field cards. Four-letter codes based on the common name were used for all bird records (e.g. American Robin = AMRO). A list breeding of bird species recorded in this study and the codes used is given in Appendix A. Species codes were entered into a database and linked to a master list containing additional information about each species.

Some additional records of bird species were made during the floral surveys for each patch. Bird species seen or heard were recorded, but no attempt was made to estimate number of territories during the floral surveys.

Vascular Plants:

Patches were surveyed by a single surveyor on 31 dates between June 13 and August 27, 1996. Each patch was visited once for the specific purpose of floral survey. Patches were surveyed by walking in a criss-cross fashion across the patch over its entire length in an attempt to apply a uniform level of effort per unit area. During each visit a running list of all vascular plant species encountered was maintained. Standard field forms were used to record the information. Seven letter codes were used to record species, based on scientific names. Most codes employed the first three letters of the genus name and the first four letters of the species name (e.g. *Trillium grandiflorum* (Large-flowered Trillium) = TRIGRAN). Where a plant was identified to genus only, up to the first six letters of the genus name was used, followed by one or more dots to make up seven characters (e.g. *Crataegus* sp. (Hawthorn) = CRATAE.). The database contains links to a master list with additional ecological, taxonomic and status information about each species. A list of vascular plant species recorded in this study and the codes used is given in Appendix C.

Specimens of unknown species, or species difficult to identify were collected for later identification. Specimens will be deposited permanently in the herbarium of the University of Western Ontario (UWO).

Figure 1: Standard field card used to record bird species during the OCTES survey.

BIRDS:

TRIAL LANDSCAPE: . . . .   **PATCH:** . . . .

SURVEYOR:. . . . .   DATE: . . . .   START TIME: . . . . FINISH TIME: . . . .

TEMP(°C): . . . . .   WIND (Beaufort): . . . . .   CLOUD (1/10ths): . . . . .   PRECIP: . . . .

SPECIES	EV	NOTES	#	SPECIES	EV	NOTES	#	SPECIES	EV	NOTES	#
....	...	....	....	....	...	....	....	....	...	....	....
....	...	....	....	....	...	....	....	....	...	....	....
....	...	....	....	....	...	....	....	....	...	....	....
....	...	....	....	....	...	....	....	....	...	....	....
....	...	....	....	....	...	....	....	....	...	....	....
....	...	....	....	....	...	....	....	....	...	....	....
....	...	....	....	....	...	....	....	....	...	....	....
....	...	....	....	....	...	....	....	....	...	....	....
....	...	....	....	....	...	....	....	....	...	....	....
....	...	....	....	....	...	....	....	....	...	....	....

BREEDING EVIDENCE:

Possible:	SH = suitable habitat	SM = singing ♂	P = pair		
Probable:	T = territory	D = display	V = visiting nest	A = anxiety	N = nest building
Confirmed:	DD = distraction	NU = used nest	FY = fledgling	AE = nest entry	FS = food/faecal
	NE = eggs	NY = young			

OTHER EVIDENCE:

	OB = observed	VO = vocalization	CA = carcass	TK = tracks
	DP = distinctive parts	SI = other signs (specify)		

= estimated number of territories   PAGE ____ of _____

Figure 2: Standard field cards used to record vegetation communities.

COMMUNITY TYPES

TRIAL LANDSCAPE: ..... PATCH: .....

DATE: ..... **OBSERVER(S): .....**

START TIME: ..... **END TIME: .....**

LEVEL I: T= TREES; S= SHRUBS; H= HERBS; N=NON-VASCULAR

LEVEL II: D= DECIDUOUS; E= EVERGREEN; M=MIXED; H=HERB; G=GRAMINOID; B=BRYOPHYTE

LEVEL III: C=CLOSED; O=OPEN; S=SPARSE

LEVEL IV: TREES: >25; 15-25;3-15;<3A;<3E SHRUBS: >5; >3-5; >1-3; 0.2-1 HERB:>3-5; >1-3; 0.2-1 <0.2

#	I	II	III	IV	DOMINANT(S):	UNDERSTOREY	(CVR)	MOISTURE	AGE	TOPO
1										
2										
3										
4										
5										
6										
7										
8										
9										
10										
11										
12										
13										
14										
15										

Vegetation Communities:

During the floral survey of each patch, major vegetation community types were noted and described on standard field cards (Figure 2). Community descriptions were adapted from the hierarchical approach used in the Canadian Vegetation Classification System (Strong *et al*., 1990). The following codes and descriptors were used.

I. Dominant life form:

TREES; SHRUBS; HERBS; NON-VASCULAR SPECIES

II. Type:

DECIDUOUS; EVERGREEN; MIXED; HERB (=FORB); GRAMINOID; BRYOPHYTE

III. Degree of closure (of the dominant stratum):

CLOSED (>60% cover); OPEN (>30-60% cover); SPARSE (<30% cover)

IV. Height:

TREES: VERY TALL (>25 m); TALL (>15-25 m); MEDIUM (>3-15 m); SHORT DUE TO AGE (A) or ENVIRONMENT (E) (<3 m)

SHRUBS: VERY TALL (>5 m); TALL (>3-5 m); MEDIUM (>1-3 m); SHORT (<0.2-1 m)

HERBS: VERY TALL (>3 m); TALL (>1-3 m); MEDIUM (>0.2-1 m); SHORT (<0.2 m)

Dominant(s):

One to three species which dominate and characterize the vegetation community. Species were listed in order of importance based on a visual estimate. Importance combines both the size and abundance of species. Relative abundance was indicated by », > or =. Species in separate strata were divided by /. A list of species codes is given in Appendix C.

Understorey:

One to three important species in a secondary stratum, which help to characterize the vegetation community.

***(CVR)** Degree of closure of the understorey:*

CLOSED (>60% cover); OPEN (>30-60% cover); SPARSE (<30% cover).

Moisture:

Soil moisture regime estimated based on plant species assemblages and soil characteristics. Soil moisture regime terminology follows Maycock (1979). Descriptors in the OCTES survey included:

DRY MESIC; MESIC; WET MESIC; WET; VERY WET; AQUATIC

Age:

The estimated successional stage of the community as follows (based on Strong *et al.,* 1990):

PIONEER - (PNR) a community which has invaded disturbed or newly created sites, and represents the early stages of either primary or secondary succession.

YOUNG - (YNG) a community which has not undergone a series of natural thinnings. Plants are essentially growing as independent individuals rather than as members of a phyto-sociological community.

MID-AGED - (MID) a seral community which has undergone natural thinning as a result of species interaction and may contain some climax species as well as seral species.

SUB-CLIMAX - (SCX) a successionally maturing community dominated primarily by climax species, but significant remnants of early seral stages may be present.

CLIMAX - (CLX) a self-perpetuating community which is composed primarily of climax species and showing uneven stand age distribution.

Topo:

An overall descriptor of the community type or its setting in the landscape, to be used for description purposes only:

FOREST - a community dominated by a closed to open canopy of trees.

UPLAND - indicating an upland forest (usually with a mesic or drier soil moisture regime).

VALLEY - indicating a community on a valley slope.

SAVANNAH - a community characterized by a sparse tree cover and a closed herbaceous or graminoid understorey.

THICKET - a community dominated by shrubs.

MEADOW - a community devoid of significant tree or shrub cover, and dominated by herbaceous species (forbs or graminoids or a mixture of the two).

SWAMP - a community with a wet-mesic or wetter moisture regime and a closed or open tree cover.

MARSH - a wetland community dominated by graminoids or emergent wetland species.

PLANTATION - a community dominated by coniferous or deciduous tree species which have been planted.

Vegetation communities were described to provide additional and supporting information about each patch. Because of time constraints, no effort was made to map the vegetation community types described.

Disturbances:

Disturbance events may have an important influence on overall site quality. During the floral survey, major disturbances evident in each patch were listed and assessed for both intensity and extent. The disturbance events recorded were considered to be perturbations of the natural community dynamics and, therefore, a negative influence on overall patch health. Using a standard field card (Figure 3), a maximum level of intensity and the estimated level of extent (how widespread in the patch) were recorded for each type of disturbance. Scoring of disturbances is, to some extent, subjective and depends on the regional land use history and on the experience of the observer. An attempt was made to maintain consistent scoring throughout the study. Disturbances recorded were as follows:

Logging: Intensity was based on evidence of the most recent logging practices in the patch. Fuel wood cutting was assumed when occasional trees, especially dead or diseased individuals, had been removed. Evidence of selective cutting included a more intensive level of tree removal, signs of skidding operations, one or more tree species targeted, and so on. A diameter limit cut was indicated by heavy removal of large trees resulting in an even-aged sapling response. Time since logging was also estimated from clues such as the condition of stumps and the size of released saplings.

Livestock: Historic livestock grazing was inferred from the condition of the ground layer flora and the tree species composition [such as the abundance of Hop-hornbeam (*Ostrya virginiana*) or Hawthorn (*Crataegus* spp.), both species tolerant of livestock impacts]. Clues to previous grazing influences include the presence of old fences and open-grown trees in the forest canopy. Other indications

Figure 3: **Standard field card used to record patch disturbances.**

TRIAL LANSCAPE:..... **PATCH**.....

DATE: ..... OBSERVER: .....

DISTURBANCE:	**0**	**1**	**2**	**3**	**TOTAL**
Time since logging	>30 years	15-30	5-15	0-5	
Intensity of logging	none	fuel wood	selective	diameter limit	
Extent of logging	none	local	widespread	extensive/throughout	
Livestock	none	historic	5-15 years	present	
Extent of livestock	none	local	widespread	extensive/throughout	
Alien species	none	occasional	important	dominant	
Extent of alien species	none	local	widespread	extensive/throughout	
Gaps in forest canopy	none	small	moderate	large	
Extent of gaps	none	local	widespread	extensive/throughout	
Disease/death of trees	none	occasional	moderate	many	
Extent of disease	none	local	widespread	extensive/throughout	
Plantation plantings	none	few	moderate	heavy	
Extent of plantation	none	local	widespread	extensive/throughout	
Tracks and trails	none	faint trails	well marked	tracks or roads	
Extent of tracks and trails	none	local	widespread	extensive/throughout	
Dumping	none	light	moderate	major	
Extent of dumping	none	local	widespread	extensive/throughout	
Windstorm (blowdown)	none	light	moderate	heavy	
Extent of wind damage	none	local	widespread	extensive/throughout	
Earth displacement	none	light	moderate	heavy	
Extent of earth movement	none	local	widespread	extensive/throughout	
Noise	none	slight	moderate	intense	
Extent of noise	none	rare	occasional	frequent/continuous	
Recreation use	none	light	moderate	heavy	
Extent of recreational use	none	local	widespread	extensive/throughout	
Sugar bush operation	none	light	moderate	heavy	
Extent of sugar bush	none	local	widespread	extensive/throughout	
Other.....	none	1	2	3	
Extent	none	local	widespread	extensive/throughout	
Other.....	none	1	2	3	
Extent	none	local	widespread	extensive/throughout	

of livestock grazing in the last 5-15 years are damage and compaction around tree roots and evidence of old browse lines.

Alien species: The presence of non-native (adventive) species in a patch is an indicator of non-pristine conditions. Some alien species, such as Common Buckthorn (*Rhamnus cathartica*) and Garlic Mustard (*Alliaria petiolaris*) can be highly invasive and dominate woodland areas to the detriment of the native flora. Intensity was judged from the number of alien species and abundance of individual species.

Gaps in forest canopy: Only gaps caused by disturbance events such as logging, windstorm or disease were recorded. Intensity was judged by the number and size of gaps. The vegetation in established gaps is generally quite distinct because gaps are frequently occupied by shade-intolerant species rather than shade tolerant woodland species. Shade-intolerant species tend to replace slower growing woodland species when light levels are high. Gap dynamics are part of a healthy ecosystem, but in small patches large or frequent gaps may affect the long term health of a woodlot.

Disease/death of trees: This disturbance category was applied to generalized events, not the senescence and death of individuals in the forest canopy. Generalized tree death can occur, for example, as a result of changes in site drainage, or disease such as Dutch Elm Disease.

Plantations/plantings: For this survey the presence of planted non-native or native species (usually, but not exclusively, coniferous trees) was treated as a disturbance event. Planting intensities range from individuals planted amongst existing vegetation to closed canopy plantations.

Tracks and trails: Only roads, paths and trails made and maintained by humans were considered disturbances. Animal trails resulting from wildlife movement were not included. Faint trails are visible mostly as compacted and vegetation-free strips on the ground surface. Well marked trails are usually actively managed, the trail itself is wider and some brush may be cut at the side of the trail. Often there are signs of erosion on the trail itself and there may be a change in the trail-side vegetation. Tracks or roads are, or have been, used by vehicles. There is commonly a gap in the canopy above the trail and a distinct flora along the trail.

Dumping: Any dumping of material including field stone or top-soil was recorded as a disturbance.

Windstorm (blowdown): Evidence that trees had been uprooted or broken by wind was recorded under this category. Isolated, single tree falls or damage to small branches were not noted.

Earth displacement: Excavation of soil for any reason was recorded, including extraction of sand and drainage operations.

Noise: Persistent or repeated noise, for example from highways, railways or manufacturing operations was recorded. Occasional noise such as from farm machinery was not recorded.

Recreation use: Signs of recreation use included tracks and recreational vehicle trails, signs of hunting (deer platforms, large numbers of spent cartridges), fire pits, empty bottles and drink cans, forts and so on.

Sugar bush operations: Light or occasional sugar bush operations included historic evidence, tapping of occasional trees and instances where there was little recent evidence of selective cutting for sugar bush. Heavy impacts included the presence of a permanent network of sap tubes, and forest management towards the sugar bush operation.

Data Analysis

Birds:

Field data was entered into a database as recorded by each surveyor. Species lists were then compiled for

each patch. In cases where a bird species was recorded more than once for a patch, the best breeding evidence was used. Birds recorded during the floral survey were included in the breeding bird list only if the record was made during the breeding season (June to late July). Records from later visits (August) once fall migration was under way were not included. If a patch was surveyed in two or more sections, the number of territories in all the sections was combined for the entire patch. The number of territories was assumed to be 1 for birds recorded during the floral surveys only.

Species were distinguished as either "forest interior species" or "non-interior" species using a list compiled for southern Ontario by Freemark and Collins (1992). Forest interior bird species are indicated in Appendix A. For each patch the number of forest interior species, the total number of species and the number of territories in each group was calculated.

Floristic Quality Assessment:

Floristic Quality Assessment (FQA) was employed in this study. The methodology for FQA was first developed in the Chicago region (Wilhelm and Ladd, 1988) and has been employed more recently in Ohio (Andreas and Lichvar, 1995) and Michigan (Herman *et al.*, 1996). In 1995 a similar system was developed for Ontario (Oldham *et al.*, 1995). The system relies on a conservatism coefficient, between 0 and 10, which is assigned to each native plant species. The coefficient reflects each species' fidelity to a particular habitat type, or the likelihood that any plant will be found in a pristine, undisturbed site. A plant with a high conservatism score (9-10) is considered very conservative, with a low probability that it will be found in a disturbed habitat, whereas a plant with a low score (0-3) might be found in a range of habitats, either disturbed or not. FQA was applied to the complete native plant species list recorded for each patch during this study.

Mean conservatism coefficient:

For each patch a mean conservatism coefficient (MCC) was calculated from the conservatism coefficients for all native species recorded from the patch. A Floral Quality Index (FQI) was then calculated from:

$$FQI = MCC \times \sqrt{N},$$

where MCC = mean conservatism coefficient and N = number of native species. In the Chicago Region the FQI has been found to be a robust indicator of community quality, but Francis *et al.*, (in prep.) argue that mean conservatism and native species richness may be more useful as separate measures. Both MCC and FQI were examined for patches in this study. Both may be useful measurements to assess site quality in long term monitoring.

Mean Weediness:

Oldham *et al.* (1995) similarly presented weediness coefficients for non-native species. Non-invasive adventive (non-native) species were given a score of -1. Highly invasive weedy species, which have a potential for invading natural habitats and displacing the native flora, were assigned a weediness coefficient of -3. Mean weediness was also calculated for all patches in this study.

Mean Wetness:

A coefficient of wetness was assigned to plant species by Oldham *et al.*, 1995. Wetness scores range from 5 for obligate upland species (UPL) to -5 to obligate wetland species (OBL). The mean coefficient of wetness

for a site is an indicator of the overall soil moisture regime. Mean wetness coefficients were calculated for all patches in this study.

Vegetation Communities:
The number of vegetation communities described in each patch was used as a measure of overall habitat diversity. The successional age of the oldest community in each patch (pioneer, young, mid-successional, sub-climax) was recorded as an estimate of patch maturity.

For each trial landscape the number of communities in each broad soil moisture regime category (wet, wet-mesic, mesic) was recorded as well as the number of communities in forest type categories (evergreen, mixed, deciduous). Treed communities were further broken down based on the main dominant species, and the total number of each type of treed community was recorded for each trial landscape.

Disturbances:
Each disturbance type except time since the last logging event was scored from 0 to 3 for intensity and 0 to 3 for extent. Intensity and extent scores were then multiplied together to produce a score for each disturbance type. A total disturbance index for each patch was calculated from the sum of disturbance scores. Estimated time since the last logging event (in years) was also recorded for each patch.

Landscape variables:
In addition to intrinsic patch characteristics, certain landscape variables taken from GIS information were measured for each patch. Landscape variables used in analysis included patch area, patch core area after a 100 m buffer was removed from around the patch perimeter, edge (buffer) area to total area ratio, and local forest cover calculated by the total amount of forest cover within a 2 km circle of the patch centroid. Edge area to total area ratio (based on a 100 m buffer) was used in preference to a more conventional perimeter to area ratio or shape index (as described, for example, in Forman and Godran, 1991) because for small patches the perimeter measurements from the GIS database appeared to be affected by pixilation.

RESULTS AND DISCUSSION

Patch size and distribution

The number of patches surveyed for 1) breeding birds and 2) flora in each size class in each Trial Landscape is presented in Table 1. Although most of the patches are the same for both surveys, some differences are apparent among the smaller patches. These differences are because linked patches originally mapped as a single patch were broken down into separate sections more often for the floral survey. All the patches which were originally listed in the >30-40 ha size class were divided by a road or service corridor and were thus surveyed as smaller patches. Therefore, no patches of this size class were surveyed in the study.

Birds

OCTES bird list:

A total of 90 species of breeding birds was recorded in this study. An annotated list of bird species is presented in Appendix A. Sixteen species (17%) are considered to be "forest interior species" which require extensive blocks of forest habitat in order to breed.

The most frequent breeding bird species was Song Sparrow, recorded in 64 patches (94%). Twenty-four species (26%) were recorded from all trial landscapes, but none of these are forest interior species. Three interior forest species, White-breasted Nuthatch, Hairy Woodpecker and American Redstart, were recorded in seven of the eight trial landscapes, but none was recorded in all eight trial landscapes. Twenty-one species (23%), including five forest interior species, were recorded in only one patch during the OCTES survey. Eight patches contained species found nowhere else in the study. Most patches where these unique species were found were large, but some patches were less than 20 ha. The frequency of unique species emphasizes the importance of individual patches in maintaining overall bird species diversity in Oxford County.

Effects of landscape and patch variables:

The total number of breeding bird species recorded per patch varied from 7 to 53 and the number of forest interior bird species ranged from 0 to 11. The number of breeding bird species and the number of forest interior species were compared with landscape variables (patch area, core area, edge/total area ratio and local forest cover) and patch characteristics (community richness, disturbance, time since logging and age of oldest community) in multiple regressions. The purpose of multiple regression is to determine which of a set of independent variables (in this case the patch and landscape characteristics) have a significant influence in determining the value of a dependent variable (total breeding bird species richness or number of forest interior species). For patch area, core area and edge to total area ratio, values were transformed in order to linearize the data so that they conformed to the linear multiple regression model.

Results in statistical analysis are considered significant when the probability (p) that the result could have been obtained from random variation in the data is less than 5% ($p<0.05$). In regression analysis, the F-statistic takes the number of observations into account and measures the ratio of the amount of variation in the data which is accounted for by the relationship between the dependent and independent variables, and the remaining variation in the data. If the F value is low, the probability that the variation seen is due to chance is high. For a regression involving 63 observations (patches) and 8 independent variables, an F ratio of larger than about 2.5 would be considered significant. The R^2 value measures the proportion of the total variation in the data which is accounted for by the regression relationship. In multiple regression the contribution of each independent variable to the regression is also measured. Regression

Table 1: Number of patches surveyed for birds and flora in each size class in each Trial Landscape. Totals in parentheses represent the original target number of patches.

Birds:

	Patch Size Class						
Trial Landscape	**<4**	**4-10**	**>10-20**	**>20-30**	**>30-40**	**>40 ha**	**TOTAL**
1	1	3	2			3	9
2A	3	4	1	2			10
2B	2	5	2	1			10
2C	6	1	1			1	9
3	1	1	1	2		1	6
4	2	2	1			1	6
5	1	4	2	2			9
6	4	2	2			1	9
TOTAL	20	22	12	7	0	7	68
	(22)	(19)	(16)	(5)	(5)	(9)	

Flora:

	Patch Size Class						
Trial Landscape	**<4**	**4-10**	**>10-20**	**>20-30**	**>30-40**	**>40 ha**	**TOTAL**
1	4	3	1			3	11
2A	3	4	1	2			10
2B	2	5	2	1			10
2C	6	1	1			1	9
3	1	1	1	2		1	6
4	2	2	1			1	6
5	1	4	2	2			9
6	4	2	2			1	9
TOTAL	23	22	11	7	0	7	70
	(22)	(19)	(16)	(5)	(5)	(9)	

coefficients measure the direction and strength of the relationship, while the significance of the relationship (based on the strength and amount of variation) is given by probability of the t-statistic.

The data of bird species numbers and patch and landscape variables are presented in Appendix B. Results of the multiple regressions of breeding bird richness and forest interior bird richness against landscape and patch variables are presented in Table 2. Multiple regressions for both the total number of breeding birds species and the number of forest interior species were significant (F=43.82 and F=18.97 respectively). Levels of significance (p) and R^2, the proportion of information accounted for by the regression (87% and 74% respectively), are given in Table 2. The total number of breeding bird species was significantly positively related to total patch area, core area and habitat diversity measured as by the number of communities per patch, but the relationships with the other variables were not significant. The number of forest interior species was significantly related to the same three variables, but core area and habitat diversity were stronger predictors of forest interior bird species than was total patch area.

These results indicate that, while patch size is an important factor in maintaining bird populations, more sensitive species also require a site that provides suitable habitat, such as interior forest, or range of habitats.

Differences between trial landscapes:

Number of bird species:

The total number of breeding bird species recorded in all patches in each landscape ranged from 34 in Trial Landscape 2A to 67 in Trial Landscape 1 (Table 3). A regression analysis of the number of bird species recorded in a trial landscape against the percent forest cover for the trial landscape (Figure 4) was significant (F=7.18, p=0.04) and 54% of the variation was accounted for by the regression. This result indicates that regional forest cover, as measured by the amount of forest in the trial landscape, is important for maintaining overall bird species diversity in the landscape. In Figure 4, Trial Landscape 4 stands out as having a higher than expected number of species. Although forest cover is generally quite low in Trial Landscape 4, a single large patch, the Zenda Tract County Forest, (Patch #114) contains a large number of breeding bird species. The Zenda Tract also has high community richness.

Differences in the number of breeding bird species between patches within a trial landscape were large compared with differences among landscapes, but when the mean numbers of breeding birds per patch were compared among trial landscapes using Analysis of Covariance, taking patch size into account, there were significant differences among the landscapes (F=2.651; p=0.02). The adjusted mean number of bird species per patch is given in Table 3.

The highest number of breeding bird species per patch was in Trial Landscape 4. The high species richness and habitat diversity of the Zenda Tract account for this result. The mean number of bird species per patch in Trial Landscape 4, which has low forest cover, is surprisingly high compared with the total bird species richness for the same trial landscape. This suggests that the low diversity is at the landscape

Table 2: Results of multiple regression of a) total number of breeding bird species and b) number of forest interior bird species against landscape and patch variables.

2a. **Total number of breeding bird species**

Multiple R	0.93
R Square	0.87
Observations	63
F	43.82
p	0.06×10^{-19}

	Coefficients	Standard Error	t Statistic	P-value
Intercept	-2.796	8.890	-0.314	0.754
PATCH AREA	14.419	2.683	5.373	0.000****
CORE AREA	62.117	23.350	2.660	<0.001***
LOCAL FOREST COVER	0.452	0.486	0.931	0.356
EDGE/TOTAL AREA RATIO	3.281	5.087	0.645	0.521
COMMUNITY RICHNESS	0.684	0.281	2.438	0.018*
DISTURBANCE	0.025	0.073	0.337	0.737
TIME SINCE LOGGING	0.076	0.045	1.670	0.100
PATCH AGE	-1.125	0.678	-1.658	0.102

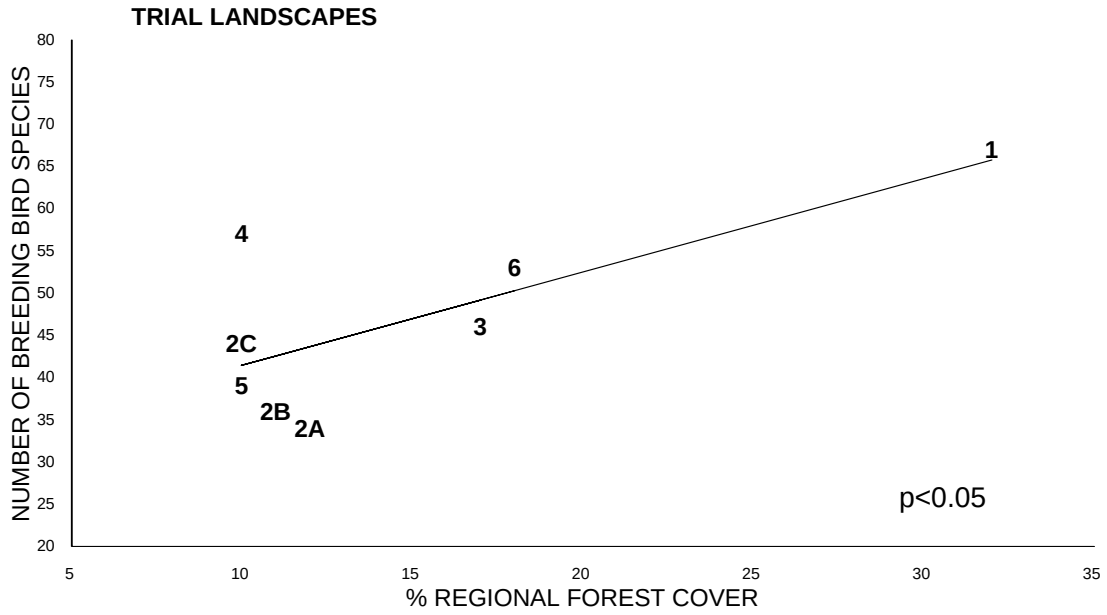
2b. **Number of forest interior bird species**

Multiple R	0.86
R Square	0.74
Observations	63
F	18.97
p	0.03×10^{-11}

	Coefficients	Standard Error	t Statistic	P-value
Intercept	-5.214	2.835	-1.839	0.071
PATCH AREA	2.004	0.856	2.342	0.022
CORE AREA	24.033	7.447	3.227	0.002***
LOCAL FOREST COVER	0.050	0.155	0.323	0.748
EDGE/TOTAL AREA RATIO	1.939	1.622	1.195	0.237
COMMUNITY RICHNESS	0.241	0.090	2.696	0.009**
DISTURBANCE	-0.012	0.023	-0.515	0.608
TIME SINCE LOGGING	0.006	0.014	0.417	0.678
PATCH AGE	0.354	0.216	1.638	0.106

* = p<0.05; ** = p<0.01; *** = p<0.001; **** = p<0.0001

Figure 4: Regression plot of bird species richness against regional forest cover for eight trial landscapes in the OCTES study.



level, rather than at the patch level. Some individual patches with large size and high habitat diversity may contain a high proportion of all the birds species in the landscape.

Number of forest interior species:

The number of forest interior species recorded in each trial landscape varied from 5 in Trial Landscapes 2A, 2B and 3 to 12 in Trial Landscape 4. A regression analysis of interior forest bird species against percent regional forest cover showed no significant effect, and an analysis of covariance showed no significant differences between the mean number of forest interior birds per patch among trial landscapes. These results suggest that, while regional forest cover is important for overall breeding bird diversity (as shown in Figure 4), factors other than regional forest cover govern the presence of forest interior species in a patch. Results from the multiple regression (Table 2) suggest that the core area and habitat (community) diversity of individual patches are the most important features which support forest interior birds, and intrinsic patch characteristics vary among landscapes.

Table 3: Total breeding bird species richness and forest interior species richness, and mean number of breeding bird species and forest interior species per patch in eight trial landscapes.

Trial Landscape	1	2a	2b	2c	3	4	5	6	
Total number of bird species	67	34	36	44	46	57	39	53	
Number of forest interior species	10	5	5	8	5	12	6	9	
Mean number of species per patch	21.8	16.8	19.8	21.8	19.8	24.4	17.9	19.3	*
Mean forest interior species per patch	2.5	1.5	1.5	1.2	2.3	2.6	1.6	1.2	NS

* Analysis of covariance $P<0.05$; NS no significant differences.

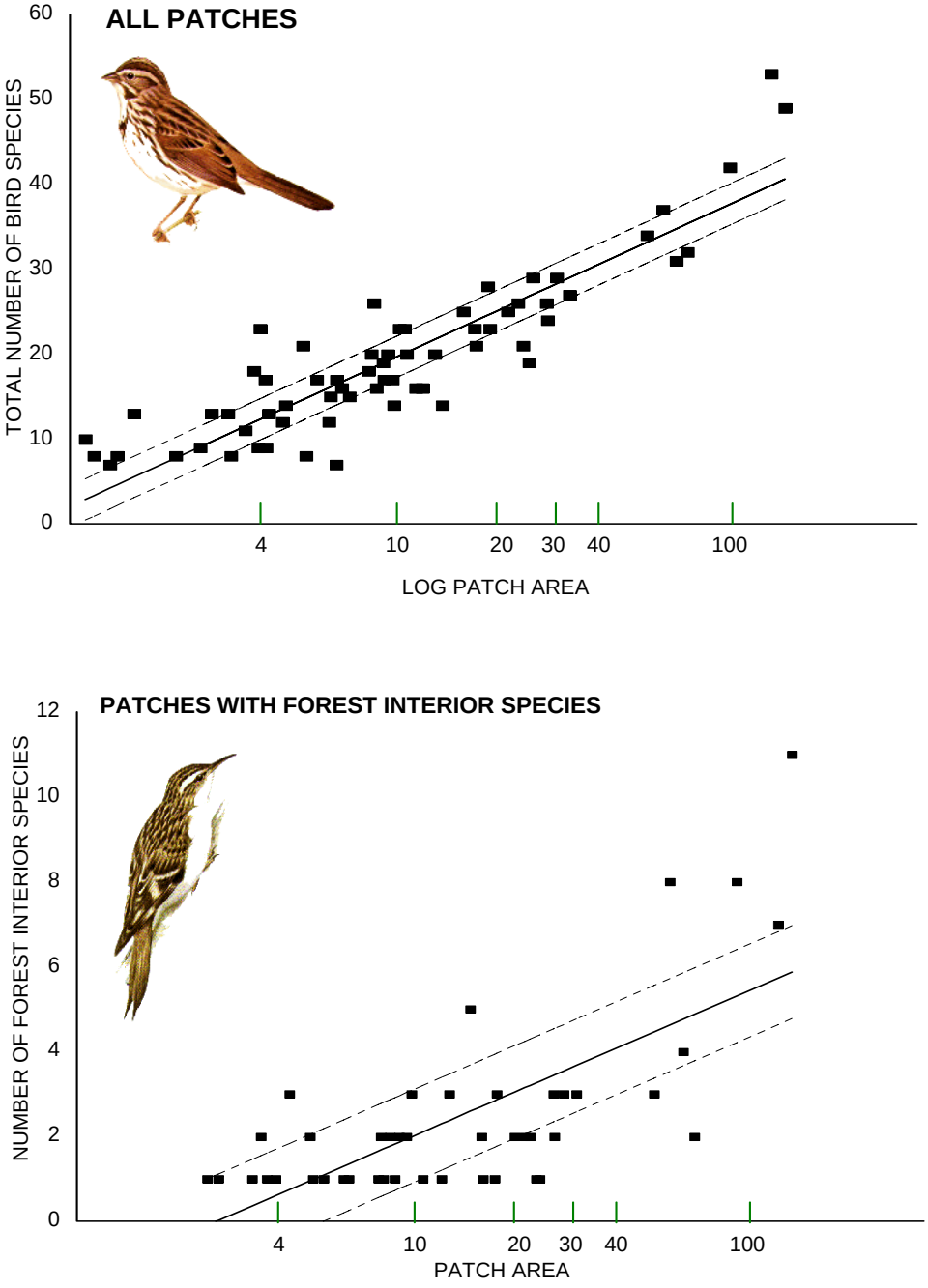
Effects of patch size:

Multiple regression of all patches in all trial landscapes suggest that patch size is a strong predictor of both total breeding bird species richness and interior forest species richness (Table 2). In order to demonstrate the effects of patch size in more detail, plots of total breeding bird richness and forest interior bird richness against patch size as a single independent variable are shown in Figure 5. Both individual regressions are significant and the total amount of variation accounted for by the regressions (R^2) are 75% and 49% respectively (Table 4). For forest interior birds, the largest patches show higher than expected numbers of species. The deviation from a linear model is significant, but a log scale was not used to linearize species richness in order that the two graphs can be more easily compared. The exponential trend suggests that as patch size increases, there is an increasing benefit for forest interior birds. Very small

Table 4 Regression results for total breeding bird species richness against patch size for all patches and forest interior species richness against patch size for patches containing forest interior species.

Variable	Regression R^2	F	Significance	n
Total breeding bird richness	0.75	190.5	$p< 0.01x10^{-18}$	65
Forest interior species richness	0.49	40.5	$p=0.01x10^{-5}$	44

Figure 5: **Plot of breeding bird species richness against patch size for all patches in the OCTES survey, and plot of forest interior species richness against patch size for patches containing forest interior species. Lines are regression lines and 95% confidence limits.**



patches (most patches less than 4 ha, and all patches less than about 2.5 ha) have no forest interior birds at all, and they have not been plotted in Figure 5b. Analysis of variance of bird species numbers in patches of different size classes confirms that the numbers of birds in large and medium sized patches are significantly higher than in small patches (Table 5). These results support the existence of a size threshold for small patches below which not only bird species richness is always low, but birds with certain specialized habitat requirements (interior forest) will not be found.

Models of island biogeography, originally pioneered by McAurthur and Wilson (1967) for oceanic islands, but which also have been applied to studies of fragmented forest patches, predict that species richness will increase with patch size up to the regional species diversity. Small islands, or forest patches, will have fewer species. Small islands have fewer habitats and therefore can support fewer species and colonization of small islands will be balanced by local extinctions so that the species composition changes over time, but is always lower than in larger patches. The results in this study indicate that patch size has a major influence on overall species richness, but that patch shape (specifically core area) is also important for some species.

Table 5: Comparison of mean numbers of breeding bird species and forest interior species among patches of different size classes in eight trial landscapes.

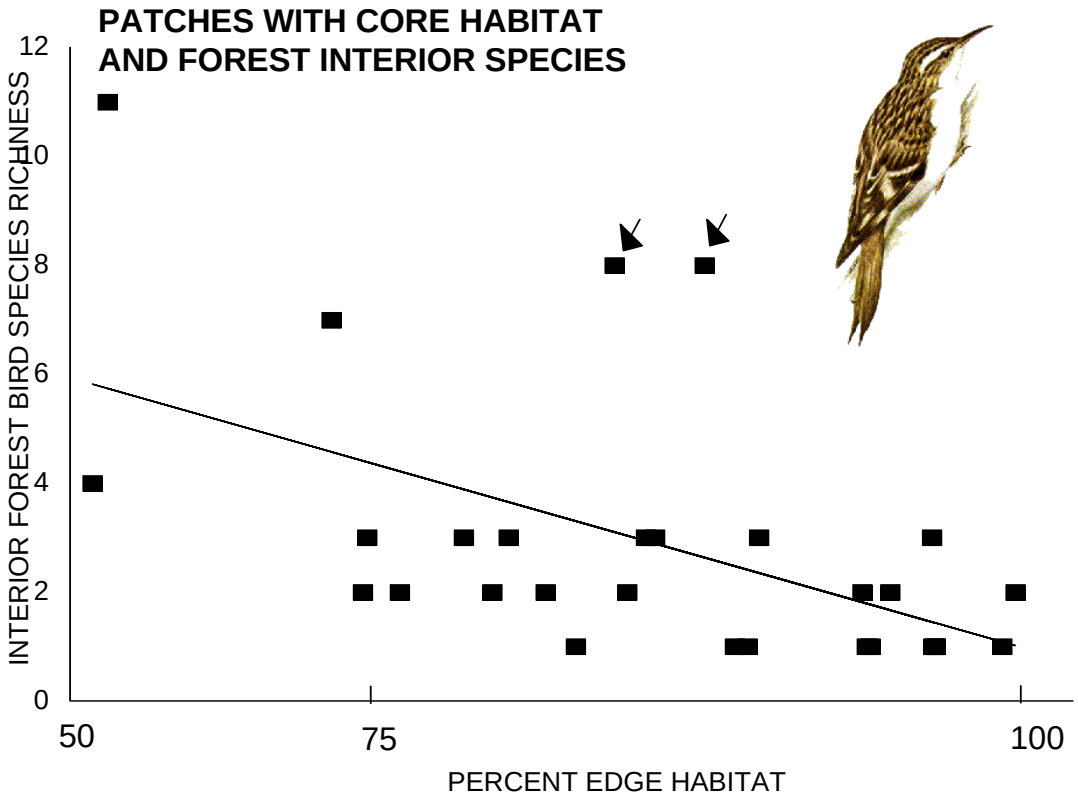
Variable	Patch Size Class					F	Significance
	<4	>4-10	>10-20	>20-30	>40 ha		
Mean number of breeding birds per patch	11.1[a]	16.4[ab]	20.3[bc]	25.1[c]	34.8	18.88	<0.0001
Mean number of forest interior species per patch	0.5[a]	1.3[ab]	2.8[ab]	4.7[b]	5.4[b]	4.14	<0.01
n	18	23	12	9	8		

Means in the same row, followed by the same letter are not significantly different from one another at p= 0.05.

Supply of interior habitat:

Thirty patches (46%) surveyed during the study contained no interior habitat more than 100 m from a forest edge. All forest patches in the study were composed of at least 52% edge habitat. Edge area/total area ratio did not have a significant effect on the number of forest interior birds when patches were compared in a multiple regression analysis (Table 2). However, a regression analysis of the number of forest interior species against the proportion of edge habitat for patches which contained at least some

Figure 6: **Plot of forest interior species richness against proportion of edge habitat for patches in the OCTES survey containing forest interior habitat and forest interior species.**



interior habitat and some forest interior bird species was significant (F=11.6, p=0.02) (Figure 6). Thirty percent of the variation was accounted for by the regression. Two patches in Trial Landscape 1 (arrowed in Figure 6) stood out as having a larger number of forest interior species than expected from the proportion of edge habitat. Both of these patches are large and have significant core areas. They lie along Horner Creek and have long, narrow and complex shapes. It can be reasoned that the core area of these large patches is large enough to support forest interior species even though the patches also contain a high proportion of edge habitat. Thus for large patches, overall size and supply of core habitat may be more important than patch shape alone.

Flora and Vegetation

Comparison of OCTES and Oxford County plant lists:

The number of native plant species recorded for this study was 491. This represents 70% of the native flora recorded for Oxford County. Overall mean conservatism for all species in the study was 5.0 compared with 5.4 for the County flora. Frequency distributions of conservatism scores for native species in Oxford County and for patches surveyed in the OCTES survey are shown in Figure 7. The two frequency distributions are significantly different from each other (Chi-squared 28.5, $p<0.01$). The main difference between the two frequency distributions is fewer species with high conservatism coefficients of (8-10) in the OCTES survey compared with the County flora. This difference reflects the fact that the OCTES survey focussed on typical woodlots. Pristine sites and special areas, where very conservative plants are most likely to be found, were not specifically targeted in the OCTES survey, but plants from such areas are represented in the overall county list.

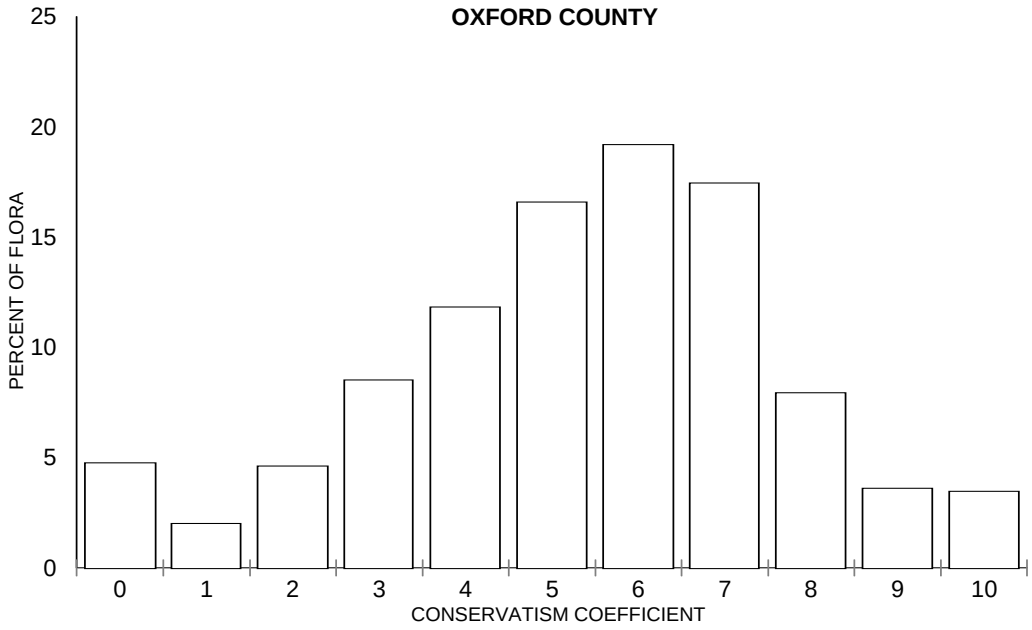
Only eleven native species (2% of the total) occurred in more than 90% of all the patches, and only 15% of native species occurred in more than half the patches. Most species were recorded in fewer than 10% of the patches surveyed. An annotated list of plant species found in the study, including the number of trial landscapes and patches where each was found, is given in Appendix C. Seventy-nine native species (16%) were recorded in only one patch in the survey. Table 6 shows the distribution of unique species (found only once during the study) among landscapes and patch size classes. Although most unique species were found in large patches, some unique species were found in all trial landscapes and in patches of all size classes. As with the results from the bird surveys, this emphasizes the importance of individual patches, including small patches, in maintaining native plant species diversity across the landscape in Oxford County. There were differences among trial landscapes in the number of unique species. Thirty-two unique species (40%) were found in Trial Landscape 1. Trial Landscape 1 also had the highest total number of native species, and differed from the other trial landscapes in several other landscape and patch features which are discussed below.

Differences between Trial Landscapes:

Number of native plant species:

The number of native plant species recorded per patch varied from 33 to 282. The number of native plant species per patch was tested against landscape and patch characteristics in a multiple regression. The regression was significant ($F=47.59$; $p=0.02\times10^{-21}$). The number of native plant species was significantly positively related to patch area, the number of communities in a patch and the amount of forest cover within 2 km (Table 7). Relationships with other landscape and patch variables were not significant at the 95% level. Analysis of covariance was used to compare the number of species per patch among the trial landscapes, taking patch size into account. Differences among landscapes were significant ($F=2.310$; $p=0.037$). Trial Landscapes 3, 1 and 4 had the most diverse patches with the highest native species richness per patch (127.4, 120.6 and 119.9 respectively). Trial Landscape 2C had the least diverse patches with an average of only 82.3 species per patch (Table 8). Data used for flora and vegetation analyses is presented in Appendix D. Mean conservatism per patch was not significantly different among the trial landscapes.

Figure 7: Histograms of conservatism score frequencies for the complete flora of Oxford County and for patches covered in the OCTES survey.



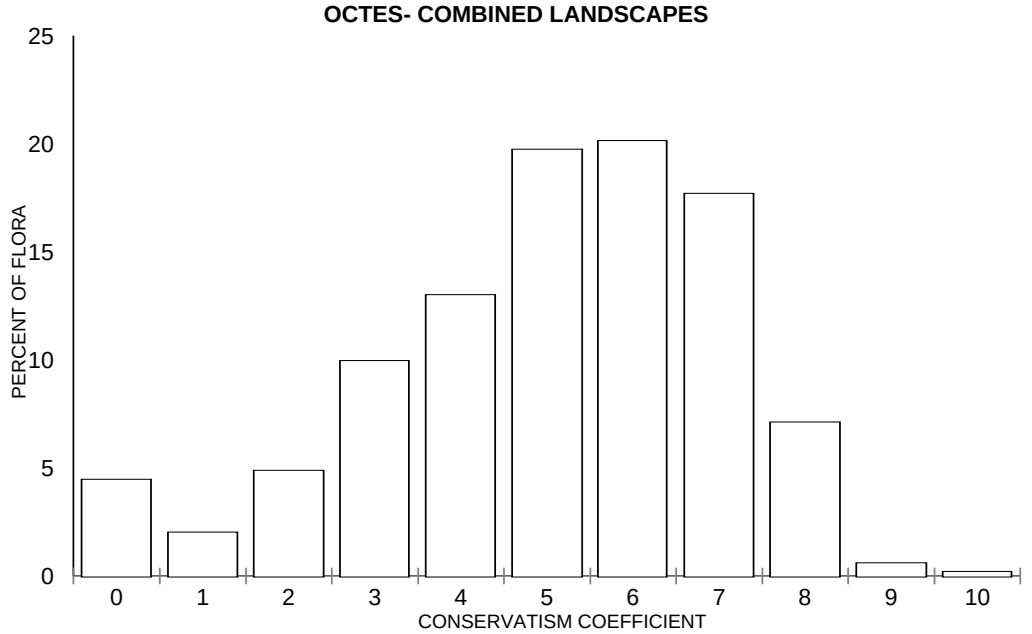
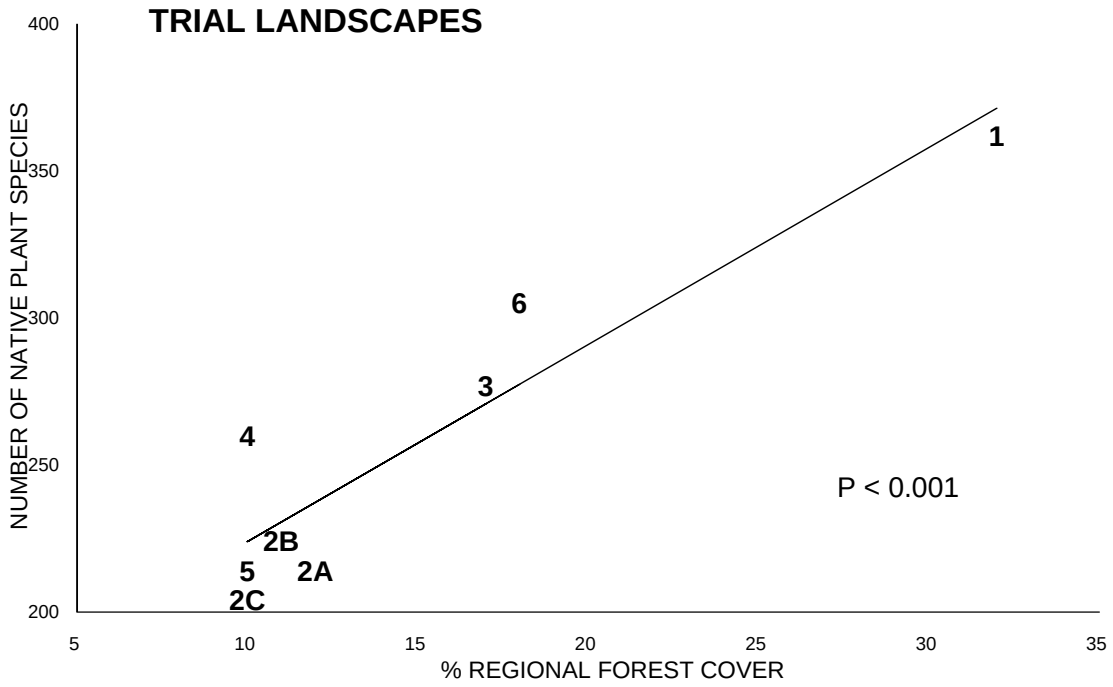


Figure 8: Regression of native plant species richness against regional forest cover for eight trial landscapes.



Differences were also found among trial landscapes in the total number of native species per landscape. The number of native species recorded in each trial landscape ranged from 362 in Trial Landscape 1 to 204 in Trial Landscape 2c. A regression analysis of native species richness by landscape against the percent forest cover in each trial landscape (Figure 8) was significant (F=33.20, p=0.001), and 85% of the variation in the total number of species per trial landscape was accounted for by the regression. As with the results of the bird survey, this result emphasizes that regional forest cover is of great importance in maintaining overall plant species richness at the general landscape level.

Conservatism:

Mean conservatism scores for individual patches ranged from 3.0 to 4.8. Mean conservatism for the different trial landscapes ranged from 4.0 to 4.3. Multiple regression of patch mean conservatism against landscape and patch variables was significant (F=2.28; p=0.011) (Table 9). Age of the oldest community in the patch was the only independent variable with a significant relationship with mean conservatism. Results from Analysis of Covariance indicated that mean conservatism values per patch, corrected for the age of the oldest community, were not significantly different among trial landscapes (F=0.37; p=0.915) (Table 8).

Floristic Quality Index:

Floristic Quality Index is a measure of site quality calculated using mean conservatism and native species richness. Multiple regression of FQI against landscape and patch variables reflected the relationships of the two components of FQI. The regression was significant ($F = 25.23$; $p = 0.012 \times 10^{-14}$), and FQI was significantly positively related to community richness, patch size and the age of the oldest community in the patch.

Weediness:

There was no difference among landscapes when the mean number of weeds per patch was tested with Analysis of Covariance correcting for community richness ($F=1.14$; $p=0.345$) (Table 8). There was also no difference in the number of weeds ranked -3, -2 or -1 distributed among the landscapes (Chi-squared 6.13, $p>0.05$). This can be interpreted to mean that although individual patches varied among the trial landscapes in the degree to which they were occupied by weedy species, the level of invasion was not significantly different among trial landscapes, but rather related to the characteristics of the individual patches, such as community diversity and degree of disturbance.

Table 7: Results of multiple regression analysis of native species richness per patch against patch and landscape variables.

Multiple R	0.93			
R Square	0.86			
Observations	70			
F	47.59			
p	0.02×10^{-21}			
Independent variables	**Coefficients**	**Standard Error**	**t Statistic**	**P-value**
Intercept	-61.678	60.901	-1.013	0.315
PATCH AREA	43.657	11.151	3.915	0.000 ****
CORE AREA	103.521	168.228	0.615	0.540
LOCAL FOREST COVER	5.772	2.404	2.401	0.019 *
EDGE/TOTAL AREA RATIO	0.660	0.587	1.124	0.265
COMMUNITY RICHNESS	10.777	1.557	6.923	0.000 ****
DISTURBANCE	-0.303	0.361	-0.840	0.404
TIME SINCE LOGGING	0.348	0.227	1.533	0.130
PATCH AGE	3.414	3.398	1.005	0.318

* = $p<0.05$; **** = $p<0.0001$

Mean Wetness:

Mean wetness coefficients for individual patches ranged from -3.4 to 2.0. Mean scores appear skewed toward the wet end of the range because even upland patches contained at least some depressions where wetland species were present. Patch mean wetness scores were significantly different among trial landscapes ($F=9.24$; $p<0.09 \times 10^{-6}$), with Trial Landscape 1 containing the wettest patches and Trial Landscape 2C the most mesic patches. A difference in moisture regime among landscapes is reflected in the number of community types in each landscape assessed as being wet, wet mesic or mesic (Figure 9). Trial Landscapes 1 and 4 show higher proportions of wet and wet-mesic community types than the other trial landscapes, whereas Trial Landscapes 6 and 3 have more mesic communities. Differences in community moisture regimes are significantly different among the trial landscapes (Chi-squared 38.07; $p<0.01$).

Table 8: Total native plant species richness and adventive plant species richness, mean number of native plant species per patch and mean conservatism per patch in eight trial landscapes .

Variable	Trial Landscape								
	1	2a	2b	2c	3	4	5	6	
Total number of native plant species	362	214	224	204	277	260	214	305	
Total number of adventive plant species	78	50	40	31	64	40	45	75	
Mean number of native species per patch	120.6	90.7	101.0	82.3	127.4	119.9	90.6	103.7	p=0.04
Mean number of adventive species per patch	16.9	14.6	11.8	12.8	18.8	11.4	14.4	18.5	NS
Mean conservatism per patch	4.02	4.13	4.16	4.12	4.24	4.32	4.05	4.26	NS

Figure 9: Proportion of mesic, wet mesic and wet community moisture regimes for eight trial landscapes.

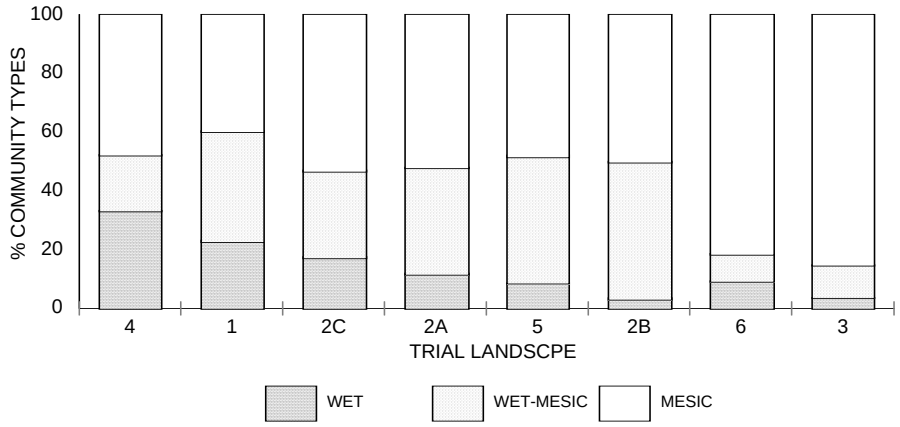


Table 9: Results of multiple regression analysis of number of mean conservatism per patch against patch and landscape variables.

Multiple R	0.51			
R Square	0.27			
Observations	70			
F	2.28			
p	0.011			
	Coefficients	**Standard Error**	**t Statistic**	**P-value**
Intercept	3.628	0.804	4.512	0.000
PATCH AREA	0.214	0.225	0.954	0.343
CORE AREA	-0.294	2.189	-0.134	0.894
LOCAL FOREST COVER	0.020	0.043	0.457	0.649
EDGE/TOTAL AREA RATIO	-0.100	0.467	-0.215	0.830
COMMUNITY RICHNESS	0.010	0.027	0.361	0.719
DISTURBANCE	-0.008	0.006	-1.267	0.210
TIME SINCE LOGGING	0.002	0.004	0.392	0.696
PATCH AGE	0.176	0.060	2.912	0.005 **

** = $p<0.01$

Differences in wetness coefficient and moisture regime can be related to physical differences among the trial landscapes. Trial Landscape 1 contains a diverse topography of kame moraines and spillways, and is dominated by Horner Creek and its tributaries. The topography and soils appear to combine to provide wetter-than-normal and cooler-than-normal habitats. The community types recorded in Trial Landscape 1 were generally more boreal in composition compared with those in other trial landscapes.

Vegetation types:

In 70 patches surveyed for flora and vegetation, 224 communities were described. Over half (54%) of the communities described had a moisture regime which was assessed as mesic. Most other community types were wet-mesic (28%) or wet (14%). As previously described there were significant differences between the moisture regimes among the trial landscapes.

Table 10: Results of multiple regression analysis of weed richness per patch against patch and landscape variables.

Multiple R	0.78				
R Square	0.61				
Observations	70				
F	11.83				
p	0.05×10^{-8}				
Independent variables	**Coefficients**	**Standard Error**	**t Statistic**	**P-value**	
Intercept	18.465	21.242	0.869	0.388	
PATCH AREA	0.274	3.889	0.071	0.944	
CORE AREA	-27.735	58.677	-0.473	0.638	
LOCAL FOREST COVER	1.629	0.838	1.943	0.056	
EDGE/TOTAL AREA RATIO	-0.172	0.205	-0.841	0.403	
COMMUNITY RICHNESS	2.125	0.543	3.915	0.000	****
DISTURBANCE	0.446	0.126	3.538	0.001	**
TIME SINCE LOGGING	0.028	0.079	0.360	0.720	
PATCH AGE	-2.013	1.185	-1.690	0.094	

**** = $p<0.0001$; ** = $p<0.01$

Community age across all trial landscapes in the study was generally young, with only 77 communities (34%) described as mid-aged or older. Seventy-six (34%) communities were described as young and 71 (32%) were described as pioneer. This suggests that the forests of Oxford County, as represented in the OCTES survey, are mainly in a disturbed successional condition, either still recovering from heavy logging or forming second growth from previously cleared land, and that more mature community types appear to be under represented.

Most (88%) of the communities were described as deciduous, with only 16 (7%) mixed and 13 (6%) evergreen types. Several of the evergreen communities described were plantations. In all, 145 communities (65%) described were treed communities other than plantations. The dominant tree type overall was Ash (either White Ash, Red Ash or Green Ash), with 36% of the communities having Ash as the dominant or secondary tree. In contrast, Sugar Maple and American Beech were recorded as dominants or secondary trees in only 28% and 9% of the communities respectively. Sugar Maple - Beech dominated communities are generally considered to be the normal climax community type in the region
of Oxford County (Rowe, 1972). Ash species, on the other hand, are generally considered to be more early

successional trees. The fact that Ash appears to dominate many of the forest communities in the OCTES survey emphasises the immature nature of many of the forests surveyed. Based on the results from this study, mean conservatism was significantly higher in patches which contained older communities. This suggests that the generally young and immature communities found in this survey may be limiting survival of the most conservative species. A breakdown of treed communities by type (deciduous, mixed, evergreen) and main dominant species is given in Table 11 for each trial landscape.

Treed communities dominated by Sugar Maple (ACESACC), Red or Green Ash (FRAPENN) and Trembling Aspen (POPTREM) occurred in all landscapes, as did communities dominated by soft maples (Red Maple (ACERUBR) or Silver Maple (ACESACN) or their hybrids). Other community dominants varied among the landscapes. Trial Landscape 6 is distinguished by treed communities dominated by Apple (MALPUMI) and Hybrid Willow (SALXRUB). Both these trees are introduced species which invade early successional habitats. This reflects the influence of two large patches in Trial Landscape 6 which were dominated by early successional community types. Trial Landscape 2C had the fewest treed communities recorded (11) and tied with Trial Landscape 4 in the fewest treed community types (6).

Trial Landscape 1 had more mixed and evergreen community types than other landscapes. This reflects the cooler and wetter microhabitats in this trial landscape. Trial Landscape 1 was also distinguished in having more treed communities dominated by Red/Green Ash and Trembling Aspen than by Sugar Maple, compared with other landscapes. Similarities between Trial Landscape 3 and Trial Landscape 1, and unique communities in Trial Landscape 3, such as communities dominated by Hemlock (TSUCANA), Manitoba Maple (ACENEGU) or American Elm (ULMAMER), reflect the presence of river valley habitats in these two trial landscapes, where these species are most commonly found. Trial Landscapes 1 and 3 are the only two influenced by substantial rivers.

Effects of patch size:

In order to examine the importance of patch size to the flora of individual patches, native plant species richness, mean conservatism and Floral Quality Index (FQI) were plotted individually against log of patch area for all patches surveyed. A log scale was used to linearize the relationships so that regression lines, and 95% confidence limits could be added to the plots (Figure 10). All individual regressions are significant. Patch size difference accounts for much of the variation observed in native species richness (63%) and FQI (59%), but only accounts for 14% of the variation observed in mean conservatism. As with bird species richness, plant species richness was expected to increase with patch size based on established models. Since FQI is based on the square root of species richness, this value was also expected to increase with patch size.

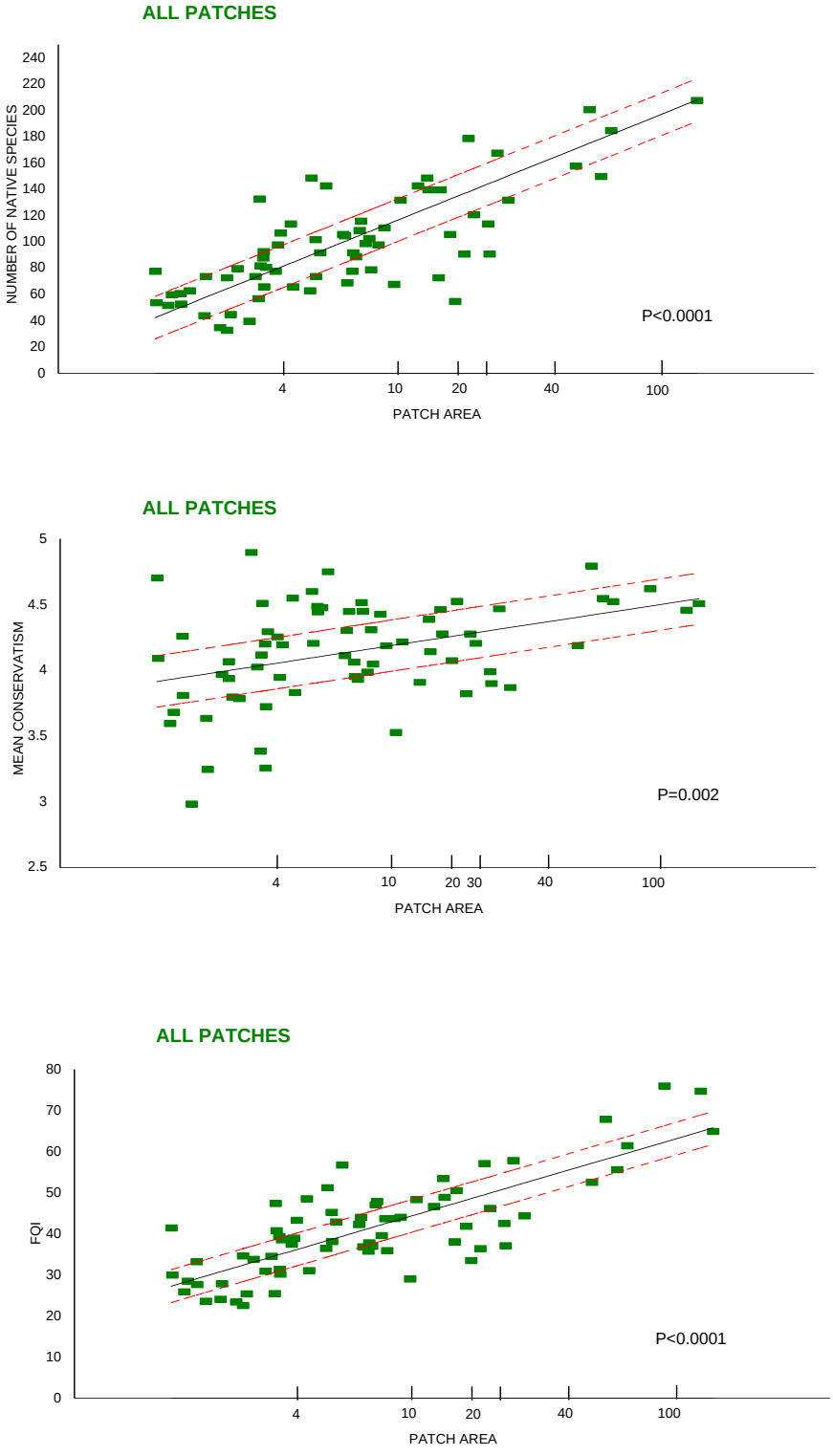
Analysis of Variance of each variable among patch size classes also showed that native species richness, mean conservatism and FQI were all significantly different among the different patch size classes (Table

Table 11: Frequency of community types and major dominants for treed communities in eight trial landscapes.

VEGETATION COMMUNITY	TRIAL LANDSCAPE								
	3	1	2C	2A	2B	5	4	6	TOTAL
D_ULMAMER	1								1
D_ACENEGU	1								1
E_TSUCANA	1								1
D_FRANIGR		1							1
M_LARLARI		1							1
D_BETALLE		1							1
M_POPTREM	1	1							2
M_TSUCANA	2	2							3
E_THUOCCI		2	2						3
D_FRAPENN	3	8	1	1	3	3	1	1	21
D_ACERUBR	2	2	2	3	1	2		1	13
D_POPTREM	4	5	1	2	2	3	2	3	22
D_ACESACC	4	3	3	5	3	3	3	5	29
D_ACESACN		3	2	2	1	3	5	2	18
M_ACESACC		1		1				1	3
M_THUOCCI		1						1	2
D_FRAAMER				2	4	2	1	1	10
D_FAGGRAN					1	1	2		4
D_CARCORD						1		2	3
D_MALPUMI								2	2
D_TILAMER								1	1
D_SALXRUB								1	1
NUMBER OF TYPES	9	13	6	7	7	8	6	12	22
NUMBER OF COMMUNITIES	19	31	11	16	15	18	14	21	145
SHANNON DIVERSITY	1.2	1.5	0.9	1.0	1.0	1.2	0.8	1.4	

Community type prefixes: D_ = DECIDUOUS; M_ = MIXED; E_ = EVERGREEN
A legend to community dominant species codes is given in Appendix C.

Figure 10: Regressions of native plant species richness, mean conservatism and FQI against patch size.



12). Native species richness and FQI consistently increased with increasing patch size, but mean conservatism was higher in patches of size class 4-10 ha than in any other size class except patches >40 ha. This result suggests that most small patches of 4-10 ha are supporting populations of plants with moderately high conservatism scores. These populations are being retained even though total species richness is low relative to larger sites.

Table 12: Comparison of mean native plant species richness, mean conservatism and mean FQI amongst forest patches in different size classes.

Variable	Patch Size Class					F	Significance
	<4	>4-10	>10-20	>20-30	>40 ha		
Native Species Richness	66.0	96.9[a]	110.5[a]	128.0[a]	207.9	32.73	<0.001
Mean Conservatism	3.91[a]	4.27[b]	4.20[ab]	4.08[ab]	4.52[b]	5.58	<0.05
Floral Quality Index	31.4	43.6[a]	46.0[a]	46.0[a]	64.8	31.33	<0.001

Means in the same row foloowed by the same letter are not significantly different from one another at p=0.05.

Many patches of this size class are retained, and have been managed as, farm woodlots. Many of them have been only selectively logged for many years, and the community age is often older than in larger patches which have been commercially logged or are regrown from abandoned agricultural land. Since mean conservatism is related to community age, past management history could account for the high mean conservatism values.

From Figure 10 it is evident that some of the smallest patches (<4 ha) have mean conservatism scores close or equal to that for many larger patches, while other small patches have much lower mean conservatism scores. In general mean conservatism scores of patches less than about 4 ha are much more variable than the scores for larger sites. As already shown, of the patch and landscape variables measured, community age is the best predictor of mean conservatism, and some small patches contain only young or pioneer community types.

Differences in mean conservatism among the small sites are masked when FQI is used as an overall measure of site quality. Small patches containing conservative species score lower for FQI than patches of equivalent size which have a large number of non-conservative species. These results suggests that before very small

patches (<4 ha) can be assessed for their contribution to biodiversity at the landscape level, they should be examined individually for community characteristics and conservative species. Whether small patches composed of young communities will support more conservative species as they become older may depend on landscape factors such as proximity and linkage to other patches and surrounding land uses.

The number of vegetation communities was also significantly different among different patch size classes ($F=26.37$; $p<0.001$). This result is expected because large patches are likely to be more diverse since they have more chance of containing a greater range of soil types, moisture regimes, disturbance histories and so on.

FQI and local forest cover:

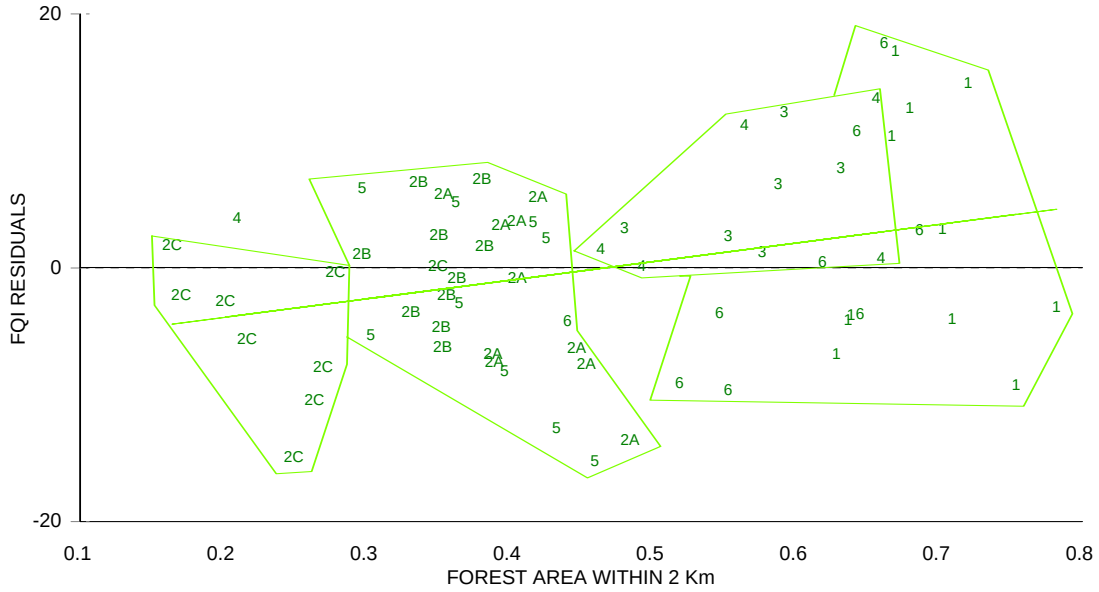
In order to examine the effects of local forest cover on the overall floral quality of patches, independently from patch size, the residuals of the regression analysis of FQI against patch size (Figure 10) were calculated. The residuals measure the difference between the FQI values calculated for each patch and the expected value for that patch size, based on the regression. Residuals were plotted against local forest cover measured as the amount of forest cover within a circle of 2 km radius from the patch centroid. The results are shown in Figure 11. Patches are labelled by trial landscape and polygons have been drawn by hand to outline the main swarm of patches in each trial landscape. The regression is significant ($F=7.22$; $p=0.009$), but R^2 is only 0.09. Thus, local forest cover affects FQI for plots of all sizes, but factors other than local forest cover appear to account for most of the variation in FQI residuals. Nevertheless, patterns among the trial landscapes are evident in Figure 11. Most patches in Trial Landscape 2C have FQI values lower than expected and these patches have generally low local forest cover. Most patches in Trial Landscape 2C are small and isolated, and the topography and soil types are quite uniform on till plain. This gives little scope for habitat diversity in this landscape. Patch size and land use history reflect the uniform conditions, and most of the trial landscape has been cleared for agriculture. In general local forest cover is lowest in Trial Landscape 2C.

The highest local forest cover is generally found in Trial Landscape 1 where most of the forest cover lies along the creek systems. Patches in Trial Landscape 1, like those of most other landscapes, vary in their FQI values, with an even distribution of patches with FQI higher and lower than expected. Patches in Trial Landscapes 3 and 4 have FQI values which are consistently higher than expected based on patch size alone.

Linkage between patches:

Patches in the smallest size class (<4 ha) were examined for their linkage to other patches. Small patches contiguous with other patches, or separated from adjacent patches by only a road or utility corridor were placed in linked size classes based on the total area of the adjacent patches, to which they were linked. These linked patches represent the area of the original patches identified in the OCTES patch analysis.

Figure 11: **Plot of FQI vs patch size residuals against local forest cover. Labels represent trial landscapes. Polygons are hand drawn to demonstrate major trial landscape groupings.**



Native plant species richness and FQI were significantly related to the size of linked patches, but the mean conservatism was not (Table 13). Thus small isolated patches appear to contain fewer native species than similar patches associated with or linked to larger patches. However, the quality of the patch, based on mean conservatism, is unrelated to linked size. As already discussed, floral conservatism of patches appears to be more related to intrinsic patch qualities, such as age, rather than to extrinsic landscape variables. The conservation implications of these results are that biodiversity of individual patches is related to patch connectedness within the landscape, but mean conservatism is not predictable based on linked patch size in small patches. Mean conservatism is generally low in the small patches and in young communities.

Disturbance:

Multiple regressions of native species richness, mean conservatism and weed species richness against landscape and patch variables indicated that only weed species richness was significantly related to patch disturbance as measured in this study (Tables 7, 9 and 10). Mean weediness also showed a significant positive relationship with disturbance ($F=6.07$; $p<0.02$). Mean conservatism and native species richness had negative associations with disturbance, but the relationships were not significant.

Table 13: **Regression results for native species richness, mean conservatism and FQI against linked patch size class for patches < 4 ha.**

Variable	Regression R^2	F	Significance
Native species richness	0.45	17.12	p< 0.0005 ***
Mean conservatism	0.01	0.16	p=0.7
Floral Quality Index	0.30	8.85	p<0.007 **

These results indicate that the major effect of disturbance, as measured by the disturbance index in this study, is to increase the abundance of non-native (weed) plant populations in a patch. The effect on the native flora is less clear from these results. One factor to be taken into consideration is the measures of disturbance used to create the disturbance index. Disturbances were assessed as they applied to the whole patch, not to the individual portions of the patch where they occurred. Also the disturbance index is a composite of several kinds of disturbance which may have had conflicting impacts on particular variables.

Multiple regression of weed species richness against the individual disturbance factors indicated that the individual disturbance events most associated with an increase in weed species diversity were the presence of alien species, plantations and earth movement, while logging appeared to have a significant negative effect on the number of weed species. These results need to be treated with great caution. For example the presence of alien species is logically connected with the number of weed species, and plantations were present most often in large sites, which are more diverse, and tend to have more species of both native and non-native plants. In general the disturbance index as applied in this study was found to be a poor predictor of patch quality as measured by other factors such as native species diversity or mean conservatism, but it was related to invasion by weed species.

CONCLUSIONS AND CONSERVATION IMPLICATIONS

Since the development of agriculture, the natural vegetation of every continent except Antarctica has been extensively modified (Saunders, *et al.*, 1991). In southern Ontario most of the major modifications have occurred since European settlement some 200 years ago. The most obvious modification of the landscape has been clearing of the native forests. The legacy of this clearing is that conservation of the regional biota depends entirely on the retention and management of scattered remnant woodlands. One of the major goals of conservation management is to maintain native species diversity. Management of the landscape for conservation of the remaining biota therefore depends on both the conservation values of the remnants and

on how those remnants are managed.

Saunders *et al.* (1991) point out that management of fragmented ecosystems has two basic components: 1) management of the natural systems, or the internal dynamics of remnant areas and 2) management of external influences. For large remnant areas they suggest that, even though external influences are always important, the emphasis should be on managing the internal dynamics. For small areas, however, management should be directed at controlling the external influences. Many detrimental impacts on small remnants come from external influences, hence integrated landscape management is clearly important.

One of the important first steps in landscape management for conservation is determining the minimum subset of existing remnants that is required to represent regional biodiversity, and this is the main purpose of this study.

Results from this survey indicate that at the regional (trial landscape) level, biodiversity of both birds and vascular plants in Oxford County is related to the amount of remaining forest cover in the landscape. Mean forest cover of the abiotic groups represented by the trial landscapes ranges from about 10% to just over 30%. Current wisdom suggests that a southern Ontario landscape should have a forest cover of at least 30% in order to be healthy. The primary goal of landscape management should therefore be to retain or restore the overall forest cover in the landscape.

A large proportion of both the bird (21%) and plant (16%) species found in this study were recorded only once during the survey. Unique species were found in all trial landscapes and in all patch size classes. Regional biodiversity therefore depends on all components of the ecosystem, and *a priori* management decisions cannot be made about the conservation value of individual components based on external characteristics alone.

At the level of individual patches, total bird species richness increased with patch area and community (habitat) diversity. The number of sensitive forest interior species, however, depended more on the supply of forest interior habitat and community diversity than on patch size *per se*. Forest interior bird species require large blocks of habitat in order to breed successfully. Such birds, exposed to edge conditions, are vulnerable to high rates of predation and nest parasitism. Very small patches, those less than about 4 ha, and patches which contained no core habitat (forest more than 100 m from the edge of the patch), did not support forest interior birds, but some forest interior species were found in most other patches. Only 54% of all patches surveyed contained core habitat. Management at the landscape level should be aimed at retaining existing core areas by preventing further fragmentation of existing patches. At the patch level, core habitat can be increased by restoring patch buffers, especially in patches of irregular shape. Such management options should concentrate on larger patches with the greatest potential for increasing core areas.

Native plant species diversity was also related to patch size and community diversity, but plant species diversity was also significantly influenced by local forest cover. Very small patches which were close to or linked to larger patches also had more plant species than similar sized patches that were more isolated, although this relationship was not found for bird species. Birds are able to move through the landscape more easily than plants, which rely on the transport of propagules from one site to another. Patch isolation relative

to other patches in the landscape may therefore be more important to plants than to birds. At the level of landscape management, this implies that patches which are close to or connected to other patches may have more potential for long term conservation value for plants than patches which are isolated. Management goals at both the landscape and the patch level should be directed at retaining and enhancing connectivity between clusters and groups of patches.

Floral quality, as measured by mean conservatism, was significantly related to the age of the oldest community in the patch. Large patches, because they are likely to be more diverse, often contain older communities, but small patches of about 4-10 ha had higher mean conservatism than some large patches. Community age across all patches in all landscapes was generally young suggesting that mean conservatism may be repressed by land use practices. Management for community age (and therefore floral quality), although a landscape goal, is an internal patch dynamic requiring management at the patch level. Allowing communities to mature and provide habitat for conservative species is a "hands-off" rather than "hands-on" management technique.

The average mean conservatism for very small patches (<4 ha) was lower than for larger patches. Mean conservatism for individual small patches, however was quite variable. Small patches which contained mid-age or older communities had mean conservatism values which were within the range of those for larger sites. Many small patches contained only young communities. Very small patches which contain only young or pioneer communities, but that are close to or linked to larger patches, may have long term potential to harbour conservative species once the communities mature. Whereas most patches larger than about 4 ha make a positive contribution to overall landscape diversity and floral quality, assessment for conservation value of very small sites should be made on an individual patch basis.

Disturbance factors, as they were measured in this study, were found to be related to an increase in alien species rather than to changes in native floras. Other studies have reported an increase in weediness related to disturbance (Francis *et al.*, in prep.). Expectations for this study were that there would also be an increase in the number of native species and a drop in mean conservatism related to disturbance. This expectation was based on an assumption that less conservative species, as well as weeds, would invade the disturbed site. Invasive alien species have the potential to occupy forest sites and displace the local flora. Although very few heavily invaded sites were noted during this study, patch management should have regard to the potential for invasion by weeds in disturbed sites.

GLOSSARY

Adventive:
An alien or introduced plant growing without human aid or intervention.

Alien:
An organism that has originated in another region and is not native to the area in question.

Associate:
A species which is a normal component of a vegetation community, but which does not have sufficient importance to rank dominant, co-dominant or secondary.

Bryophytes:
Mosses and liverworts.

Canopy:
The aerial branches of terrestrial plants together with their complement of leaves. Said to be a complete canopy when the ground is completely hidden by the leaves when viewed from above (Curtis, 1959).

Centroid:
The geometric or gravitational centre.

Co-dominant:
Two or more species which share, more or less equally, the greatest importance in the community (see Dominant).

Community:
A naturally occurring group of different organisms that live together and interact with one another.

Density:
A specialized term to indicate the number of plant individuals per unit area. May be expressed in absolute terms or as a relative density, which is the number of individuals of a certain species as a percentage of the total number of individuals of all species in the same area (Curtis, 1959).

Dominance:
A measure of the total size, bulk or weight of the individuals of a particular species in a particular area.

Dominant:
A species which is of greatest importance in a community through size or other characteristics which enable it to receive the brunt of external environmental forces and modify them before they affect lesser members of the community (Curtis, 1959).

Edaphic:
Having to do with soil, particularly with respect to its influence on vegetation.

Emergent:
A plants which is taller than the surrounding canopy, for example isolated trees in a shrub thicket. In aquatic communities it refers to a plant with photosynthetic surfaces carried above the surface of the water.

Facultative:

Adjective referring to an organism capable of adopting alternative habitat conditions from the normal ones.

Flora:
The entire complement of plant species which grows spontaneously in a particular region. The size of the flora is determined by the number of such species and is influenced by the number of individuals of each (Curtis, 1959).

Floristic:
Having to do with the flora.

Forb:
A pasture herb. In this context, a non-woody ground layer plant which is not a graminoid or fern.

Graminoid:
Grass-like. Generic term for narrow-leaved monocot plants with a grass-like morphology, including grasses, sedges, rushes, etc.

Ground Layer:
Stratum of vegetation closest to, and covering the ground. It may be continuous or patchy to absent. It may include bryophytes, herbs or low shrubs.

Mesic:
Soil moisture regime that is intermediate between wet and dry. The mid point of a five point scale of moisture regimes capable of supporting forest growth (Maycock, 1979).

Naturalized Land:
Used to describe areas which are not maintained in their current state through intervention by humans. It implies that natural changes and processes, such as succession, are allowed to occur. It may include land which has been greatly altered by humans in the past, provided the processes and changes which now occur are largely undirected. It excludes agricultural land, pasture, and managed plantations, but includes woodlots and old field savannahs.

Obligate:
Adjective referring to an organism which is only able to live in a restricted range of habitat conditions.

Occasional:
Status of a species which is found rarely, or as scattered individuals in a community.

Open grown:
Referring to trees which have a wide crown and low, spreading branches as a result of having matured in the open, outside a forest.

Patch:
A relatively homogeneous area that differs from its surroundings.

Phytosociological:
Referring to a recognizable and repeatable community of interacting plant species which occurs across a landscape under the same conditions.

Pixilation:
A degree of fuzziness in some computer images caused by the fact that the image is composed by a number

of square dots. At high magnifications the individual squares are visible.

Propagule:
Any part of an organism which, when liberated from the adult form, can give rise to a new individual.

Remnant:
A portion or fragment of an original plant community remaining after the destruction of the bulk of the community by the agricultural or exploitive actions of man (Curtis, 1959).

Secondary:
Status of a species which is not dominant or co-dominant, but has greater importance than most other species in a community.

Senescent:
Referring to the period in the life of a plant or plant part between maturity and death, during which a gradual deterioration occurs.

Seral:
Having to do with a sere.

Sere:
Any plant community which is in a succession leading to a climax condition. It is influenced by the preceding seres and itself influences the development of succeeding seres.

Site:
A place or location. Not used here in the special sense employed by foresters.

Stand:
A particular homogeneous example of a plant community. The sampling unit in community studies.

Stratum (pl. Strata): A recognizable layer in the structure of a plant community, for example canopy, understorey and ground layer.

Understorey:
Tall plants under the main canopy. It may include tall shrubs, small trees and/or saplings of the canopy trees.

Vegetation:
The total of the plant communities of a region. Differs from the flora because quantitative aspects are considered in that numerous large species are given more attention than rare and inconspicuous species (Curtis, 1959).

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APPENDIX A: LIST OF BIRD SPECIES RECORDED IN THE OCTES SURVEY

The following list contains all species of breeding birds recorded during the OCTES survey. Species are listed in alphabetical order according to their common names. The four letter species code for each species is also given. Annotations include an indication of whether the species is considered a forest interior bird species, requiring large blocks of forest habitat. The list of forest interior bird species is based on Freemark and Collins (1995). The number of trial landscapes (out of eight) and the number of patches (out of 68) in which the species was recorded is also indicated.

SP_CODE	COMMON NAME	INTERIOR FOREST SP.	NUMBER OF LANDSCAPES	NUMBER OF PATCHES
ALFL	Alder Flycatcher		3	3
AMCR	American Crow		8	46
AMGO	American Goldfinch		8	52
AMRE	American Redstart	X	7	14
AMRO	American Robin		8	54
AMWO	American Woodcock		2	2
BAWW	Black-and-white Warbler	X	3	3
BBCU	Black-billed Cuckoo		4	4
BCCH	Black-capped Chickadee		8	50
BEKI	Belted Kingfisher		2	3
BGGN	Blue-gray Gnatcatcher		2	2
BHCO	Brown-headed Cowbird		8	45
BKSW	Bank Swallow		1	1
BLWA	Blackburnian Warbler		1	1
BLJA	Blue Jay		8	53
BRCR	Brown Creeper	X	4	6
BRSW	Barn Swallow		1	1
BRTH	Brown Thrasher		3	3
BWHA	Broad-winged Hawk	X	1	1
BWWA	Blue-winged Warbler		2	2
CAWA	Canada Warbler	X	1	1
CEWA	Cerulean Warbler	X	1	1
CEWX	Cedar Waxwing		8	34
CHSP	Chipping Sparrow		6	11
CLSW	Cliff Swallow		1	1
COGR	Common Grackle		8	47
COHA	Cooper's Hawk	X	1	2
COSN	Common Snipe		1	1
COYE	Common Yellowthroat		8	25
CSWA	Chestnut-sided Warbler		2	2
DOWO	Downy Woodpecker		8	54
EABL	Eastern Bluebird		1	1
EAKI	Eastern Kingbird		3	4

continued ...

SP_CODE	COMMON NAME	INTERIOR FOREST SP.	NUMBER OF LANDSCAPES	NUMBER OF PATCHES
EAPH	Eastern Phoebe		2	2
EMPI	Empidonax Flycatcher		1	1
EUST	European Starling		8	29
EWPE	Eastern Wood-Pewee		8	57
FISP	Field Sparrow		2	6
GBHE	Great Blue Heron		3	5
GCFL	Great Crested Flycatcher		8	50
GHOW	Great Horned Owl		1	1
GRCA	Gray Catbird		8	43
GRHE	Green Heron		1	1
GWWA	Golden-winged Warbler		1	1
HAWO	Hairy Woodpecker	X	7	15
HOSP	House Sparrow		1	1
HOWR	House Wren		8	52
INBU	Indigo Bunting		8	34
LEFL	Least Flycatcher		3	5
MALL	Mallard		3	6
MAWA	Magnolia Warbler	X	1	1
MODO	Mourning Dove		8	15
MOWA	Mourning Warbler		7	9
NOCA	Northern Cardinal		8	43
NOFL	Northern Flicker		8	25
NOOR	Northern Oriole		8	47
NOWA	Northern Waterthrush	X	1	2
OSFL	Olive-sided Flycatcher		1	1
OVEN	Ovenbird	X	6	8
PIWA	Pine Warbler	X	2	3
PIWO	Pileated Woodpecker	X	4	4
PUFI	Purple Finch		1	1
RBGR	Rose-breasted Grosbeak		8	42
RBNU	Red-breasted Nuthatch	X	1	1
RBWO	Red-bellied Woodpecker		2	4
REVI	Red-eyed Vireo		8	48
RHWO	Red-headed Woodpecker		3	3
RSTO	Rufous-sided Towhee		2	2
RTHA	Red-tailed Hawk		6	13
RTHU	Ruby-throated Hummingbird		4	4
RUGR	Ruffed Grouse		5	6
RWBL	Red-winged Blackbird		4	9
SCTA	Scarlet Tanager	X	6	8
SOSP	Song Sparrow		8	64
SOVI	Solitary Vireo		1	1
SPSA	Spotted Sandpiper		1	1
SWSP	Swamp Sparrow		3	7

continued ...

SP_CODE	COMMON NAME	INTERIOR FOREST SP.	NUMBER OF LANDSCAPES	NUMBER OF PATCHES
TRES	Tree Swallow		2	3
TUVU	Turkey Vulture		3	7
VEER	Veery	X	6	10
VIRA	Virginia Rail		1	1
WAVI	Warbling Vireo		6	14
WBNU	White-breasted Nuthatch	X	7	29
WIFL	Willow Flycatcher		2	2
WODU	Wood Duck		1	1
WOTH	Wood Thrush		8	33
WTSP	White-throated Sparrow		2	2
YBCU	Yellow-billed Cuckoo		1	2
YBSA	Yellow-bellied Sapsucker		2	2
YEWA	Yellow Warbler		6	19
YTVI	Yellow-throated Vireo		1	2

APPENDIX B: DATA USED IN BIRD SURVEY ANALYSIS

TRIAL LANDSCAPE	PATCH	BIRD SPP. RICHNESS	FOREST INTERIOR SPP. RICHNESS	LOG PATCH AREA	LOG CORE AREA	LOCAL FOREST AREA (2 Km)	EDGE/ TOTAL RATIO	COMMUNITY RICHNESS	DISTURBANCE INDEX	YEARS SINCE LOGGING	OLDEST COMMUNITY
1	297	15	0	0.886	0.0006	3.679	1.4	2	20	3	3
1	307	34	3	1.713	0.0436	4.125	1.1	6	22	3	2
1	308	15	0	0.838	0.0000	3.783	1.6	4	25	35	3
1	317	37	8	1.759	0.0291	3.650	1.2	9	12	13	3
1	322	18	0	0.935	0.0000	3.300	1.6	2	10	3	1
1	336S	7	0	0.364	0.0000	5.057	1.6	1	9	2	3
1	338	42	8	1.953	0.0307	4.256	1.3	14	19	35	3
1	348	26	2	0.950	0.0000	4.045	1.6	3	10	35	1
1	351	28	1	1.259	0.0047	4.681	1.3	1	8	3	2
2A	167	8	1	0.777	0.0000	1.798	1.6	3	15	13	3
2A	169N	17	1	0.853	0.0003	1.546	1.5	1	8	35	1
2A	169S	14	0	1.002	0.0010	1.261	1.4	3	11	35	3
2A	175	8	0	0.485	0.0000	1.453	1.6	1	21	22	2
2A	176	20	0	1.036	0.0012	1.447	1.4	2	15	35	3
2A	177	14	3	1.133	0.0058	1.544	1.2	4	19	35	3
2A	218	27	3	1.490	0.0229	1.842	1.1	5	28	35	3
2A	232	24	2	1.427	0.0208	2.052	1.1	2	21	35	4
2B	241	23	3	1.030	0.0025	0.983	1.3	4	14	13	3
2B	255	19	1	1.376	0.0012	1.144	1.5	3	13	22	3
2B	260	14	0	0.728	0.0000	1.244	1.6	3	14	13	3
2B	268	8	0	0.376	0.0000	1.310	1.6	1	10	22	3
2B	269	13	1	0.559	0.0000	1.415	1.6	1	16	22	3
2B	270	23	2	1.221	0.0078	1.404	1.2	6	16	35	3
2B	274	20	1	0.986	0.0004	1.253	1.5	4	16	22	2
2B	277	29	1	1.385	0.0055	1.256	1.3	3	24	35	2
2B	293	12	0	0.834	0.0000	1.272	1.6	1	20	13	3

TRIAL LANDSCAPE	PATCH	BIRD SPP. RICHNESS	FOREST INTERIOR SPP. RICHNESS	LOG PATCH AREA	LOG CORE AREA	LOCAL FOREST AREA (2 Km)	EDGE/ TOTAL RATIO	COMMUNITY RICHNESS	DISTURBANCE INDEX	YEARS SINCE LOGGING	OLDEST COMMUNITY
2C	137	31	4	1.797	0.1122	0.592	0.8	5	15	3	2
2C	151	18	2	0.653	0.0000	0.899	1.6	2	10	35	3
2C	153	25	2	1.314	0.0208	0.776	1.0	1	18	35	3
2C	154	13	0	0.594	0.0000	1.242	1.6	1	14	35	3
2C	156	10	0	0.324	0.0000	0.461	1.6	1	12	35	3
2C	157	13	0	0.406	0.0000	0.482	1.6	2	9	35	2
2C	160	19	2	0.974	0.0007	0.647	1.4	3	24	35	4
2C	166E	17	1	0.803	0.0000	0.850	1.6	1	40	35	3
3	101	32	2	1.830	0.0761	2.571	1.0	6	14	35	3
3	29	23	3	1.265	0.0077	2.024	1.2	5	8	22	3
3	53	21	2	1.357	0.0000	3.283	1.6	6	16	35	3
3	54	23	1	0.667	0.0000	2.909	1.6	6	17	13	2
3	55	12	3	0.719	0.0000	2.774	1.6	1	8	13	3
3	56	29	3	1.453	0.0015	2.872	1.5	3	15	35	3
4	108	20	1	0.943	0.0009	1.910	1.4	2	12	22	3
4	114	49	11	2.115	0.2048	2.108	0.8	10	25	22	4
4	120	25	5	1.191	0.0001	3.569	1.5	4	18	35	4
4	130	21	2	0.769	0.0000	2.668	1.6	2	25	35	3
4	3	17	0	0.678	0.0000	0.622	1.6	2	10	35	3
5	12	17	2	0.998	0.0010	1.306	1.4	3	11	13	3
5	16	23	2	1.018	0.0000	1.316	1.6	1	34	35	3
5	18	26	3	1.424	0.0292	1.494	1.0	5	16	22	3
5	19	20	1	1.112	0.0001	1.882	1.5	2	11	22	1
5	23E	16	1	0.867	0.0000	1.612	1.6	2	16	13	3
5	23W	21	1	1.226	0.0097	1.665	1.2	4	20	13	3
5	24	9	0	0.681	0.0000	1.009	1.6	1	10	35	2
5	27	26	2	1.344	0.0145	1.710	1.2	2	20	35	2
5	335	7	0	0.852	0.0006	0.983	1.4	3	12	22	3
6	179	16	1	1.061	0.0000	3.679	1.6	1	19	35	3
6	180	9	0	0.663	0.0000	2.574	1.6	2	35	3	1
6	182	11	1	0.632	0.0000	2.525	1.6	2	18	22	4
6	183	9	1	0.536	0.0000	2.303	1.6	1	21	22	3
6	184	16	1	0.956	0.0009	1.759	1.4	3	19	13	3
6	188	17	0	0.977	0.0000	3.419	1.6	5	19	22	4
6	189	16	0	1.079	0.0044	3.160	1.3	3	18	35	3
6	198	53	7	2.074	0.1305	3.395	1.0	15	24	22	3
6	200	13	1	0.687	0.0000	3.861	1.6	3	9	35	2

APPENDIX C: LIST OF VASCULAR SPECIES RECORDED IN THE OCTES SURVEY

Information in the following checklist, including scientific and common species names is taken from Oldham *et al.*, 1995. Species are listed in alphabetical order according to their species code.
The following codes are used in the annotations:

SP_CODE Seven letter species code used on field sheets.

CC Conservatism coefficient for native species.

WEED Weediness coefficient for adventive species.

CW and WETNESS

Codes representing the moisture preferences of each species as follows:

Code	Coefficient	Definition
UPL	5	Almost never occurs in wetlands under natural conditions.
FACU-	4	
FACU	3	Occasionally occurs in wetlands, but usually found in non-wetland conditions.
FACU+	2	
FAC-	1	
FAC	0	Equally likely to occur in wetlands or non-wetlands.
FAC+	-1	
FACW-	-2	
FACW	-3	Usually occurs in wetlands, but occasionally found in non-wetlands.
FACW+	-4	
OBL	-5	Almost always occurs in wetlands under natural conditions.

TYPE A descriptive code for species native (N) or adventive (A) status and life form (Fern, Tree, Grass, Sedge, Shrub, Forb, etc).

 # OF LNDS The number of trial landscapes (out of eight) in which the species was recorded.

 # OF PTCH The number of patches (out of 67) in which the species was recorded.

SP_CODE	SCIENTIFIC NAME	COMMON NAME	FAMILY	CC	WEED	CW	WETNESS	TYPE	# OF LNDS	# OF PTCH
ACARHOM	Acalypha rhomboidea	THREE-SEEDED MERCURY	Euphorbiaceae	0		3	FACU	N Forb	1	1
ACENEGU	Acer negundo	BOX ELDER	Aceraceae	0		-2	FACW-	N Tree	6	11
ACENIGR	Acer saccharum ssp. nigrum	BLACK MAPLE	Aceraceae	7		3	FACU	N Tree	4	7
ACEPLAT	ACER PLATANOIDES	NORWAY MAPLE	Aceraceae		-3	5	UPL	A Tree	1	1
ACERUBR	Acer rubrum	RED MAPLE	Aceraceae	4		0	FAC	N Tree	8	49
ACESACC	Acer saccharum ssp. saccharum	SUGAR MAPLE	Aceraceae	4		3	FACU	N Tree	8	58
ACESACN	Acer saccharinum	SILVER MAPLE	Aceraceae	5		-3	FACW	N Tree	8	49
ACESPIC	Acer spicatum	MOUNTAIN MAPLE	Aceraceae	6		3	FACU	N Tree	5	7
ACHMILL	ACHILLEA MILLEFOLIUM	YARROW	Asteraceae		-1	3	FACU	A Forb	4	12
ACTAEA.	Actaea sp.	UNSPECIFIED BANEBERRY	Ranunculaceae	5		5	UPL	N Forb	7	8
ACTPACH	Actaea pachypoda	WHITE BANEBERRY	Ranunculaceae	6		5	UPL	N Forb	8	43
ACTRUBR	Actaea rubra	RED BANEBERRY	Ranunculaceae	5		5	UPL	N Forb	8	33
ACTXLUD	Actaea x ludovici	HYBRID BANEBERRY	Ranunculaceae	5		5	UPL	N Forb	1	1
ADIPEDA	Adiantum pedatum	MAIDENHAIR FERN	Pteridaceae	7		1	FAC-	N Fern	5	9
AGRGIGA	AGROSTIS GIGANTEA	REDTOP	Poaceae		-2	0	FAC	A Grass	8	18
AGRGRYP	Agrimonia gryposepala	TALL AGRIMONY	Rosaceae	2		2	FACU+	N Forb	8	49
AGRSTOL	Agrostis stolonifera	CREEPING BENT	Poaceae	0		-3	FACW	N Grass	8	26
ALIPLAN	Alisma plantago-aquatica	WATER-PLANTAIN	Alismataceae	3		-5	OBL	N Forb	6	11
ALLCANA	Allium canadense	WILD GARLIC	Liliaceae	8		3	FACU	N Forb	1	1
ALLPETI	ALLIARIA PETIOLATA	GARLIC MUSTARD	Brassicaceae		-3	0	FAC	A Forb	6	25
ALLTRIC	Allium tricoccum	WILD LEEK	Liliaceae	7		2	FACU+	N Forb	7	35
ALOAEQU	Alopecurus aequalis	SHORT-AWNED FOXTAIL	Poaceae	7		-5	OBL	N Grass	2	3
AMARAN.	AMARANTHUS SP.	PIGWEED	Amaranthaceae		-1	3	FACU	A Forb	1	1
AMBARTE	Ambrosia artemisiifolia	COMMON RAGWEED	Asteraceae	0		3	FACU	N Forb	5	9
AMEARBO	Amelanchier arborea	JUNEBERRY	Rosaceae	5		3	FACU	N Tree	2	2
AMELAEV	Amelanchier laevis	SMOOTH SHADBUSH	Rosaceae	5		5	UPL	N Tree	2	2
AMELAN.	Amelanchier sp.	SERVICEBERRY (UNSPECIFIED)	Rosaceae	5		3		N Tree	6	8
AMPBRAC	Amphicarpaea bracteata	HOG-PEANUT	Fabaceae	4		0	FAC	N Forb	2	2
ANECANA	Anemone canadensis	CANADA ANEMONE	Ranunculaceae	3		-3	FACW	N Forb	5	9
ANEQUIN	Anemone quinquefolia	WOOD ANEMONE	Ranunculaceae	7		0	FAC	N Forb	2	3
ANEVIRG	Anemone virginiana	THIMBLEWEED	Ranunculaceae	4		5	UPL	N Forb	4	12
ANTNEGL	Antennaria neglecta	CAT'S FOOT	Asteraceae	3		5	UPL	N Forb	1	1
APIAMER	Apios americana	GROUNDNUT	Fabaceae	6		-3	FACW	N Forb	8	22
APOANDR	Apocynum androsaemifolium	SPREADING DOGBANE	Apocynaceae	3		5	UPL	N Forb	5	10
APOCANN	Apocynum cannabinum	INDIAN HEMP	Apocynaceae	3		0	FAC	N Forb	3	6
APOSIBI	Apocynum cannabinum	INDIAN HEMP	Apocynaceae	3		0	FAC	N Forb	1	2
AQUCANA	Aquilegia canadensis	WILD COLUMBINE	Ranunculaceae	5		1	FAC-	N Forb	2	5
ARAGLAB	Arabis glabra	TOWER MUSTARD	Brassicaceae	4		5	UPL	N Forb	3	3
ARALAEV	Arabis laevigata	SMOOTH BANK CRESS	Brassicaceae	5		5	UPL	N Forb	1	1
ARANUDI	Aralia nudicaulis	WILD SARSAPARILLA	Araliaceae	4		3	FACU	N Forb	8	20
ARARACE	Aralia racemosa	SPIKENARD	Araliaceae	7		5	UPL	N Forb	5	7
ARCMINU	ARCTIUM MINUS	COMMON BURDOCK	Asteraceae		-2	5	UPL	A Forb	8	45
ARITRIP	Arisaema triphyllum	JACK-IN-THE-PULPIT	Araceae	5		-2	FACW-	N Forb	8	64

SP_CODE	SCIENTIFIC NAME	COMMON NAME	FAMILY	CC	WEED	CW	WETNESS	TYPE	# OF LNDS	# OF PTCH
AROMELA	Aronia melanocarpa	BLACK CHOKEBERRY	Rosaceae	7		-3	FACW	N Shrub	2	2
ASACANA	Asarum canadense	WILD-GINGER	Aristolochiaceae	6		5	UPL	N Forb	8	27
ASCINCA	Asclepias incarnata	SWAMP MILKWEED	Asclepiadaceae	6		-5	OBL	N Forb	5	11
ASCSYRI	Asclepias syriaca	COMMON MILKWEED	Asclepiadaceae	0		5	UPL	N Forb	6	24
ASPOFFI	ASPARAGUS OFFICINALIS	ASPARAGUS	Liliaceae		-1	3	FACU	A Forb	2	3
ASTCILI	Aster ciliolatus	NORTHERN HEART-LEAVED ASTER	Asteraceae	6		4	FACU-	N Forb	1	1
ASTCORD	Aster cordifolius	HEART-LEAVED ASTER	Asteraceae	5		5	UPL	N Forb	1	1
ASTERIC	Aster ericoides	HEATH ASTER	Asteraceae	4		4	FACU-	N Forb	2	2
ASTLAEV	Aster laevis	SMOOTH ASTER	Asteraceae	7		5	UPL	N Forb	2	2
ASTLANC	Aster lanceolatus	EASTERN LINED ASTER	Asteraceae	3		-3	FACW	N Forb	8	40
ASTLATE	Aster lateriflorus	SIDE-FLOWERING ASTER	Asteraceae	3		-2	FACW-	N Forb	8	52
ASTMACR	Aster macrophyllus	BIG-LEAVED ASTER	Asteraceae	5		5	UPL	N Forb	5	14
ASTNOVA	Aster novae-angliae	NEW ENGLAND ASTER	Asteraceae	2		-3	FACW	N Forb	6	8
ASTPILO	Aster pilosus var. pilosus	HAIRY ASTER	Asteraceae	4		2	FACU+	N Forb	3	5
ASTPUNI	Aster puniceus	SWAMP ASTER	Asteraceae	6		-5	OBL	N Forb	8	19
ASTUMBE	Aster umbellatus	TALL FLAT-TOP WHITE ASTER	Asteraceae	6		-3	FACW	N Forb	5	8
ASTUROP	Aster urophyllus	ARROW-LEAVED ASTER	Asteraceae	6		5	UPL	N Forb	3	7
ATHFILI	Athyrium filix-femina	LADY FERN	Dryopteridaceae	4		0	FAC	N Fern	8	53
ATHTHEL	Athyrium thelypterioides	SILVERY SPLEENWORT	Dryopteridaceae	8		0	FAC	N Fern	3	3
BARVULG	BARBAREA VULGARIS	YELLOW ROCKET	Brassicaceae		-1	0	FAC	A Forb	6	8
BERVULG	BERBERIS VULGARIS	COMMON BARBERRY	Berberidaceae		-2	3	FACU	A Shrub	1	1
BETALLE	Betula alleghaniensis	YELLOW BIRCH	Betulaceae	6		0	FAC	N Tree	8	35
BETPAPY	Betula papyrifera	PAPER BIRCH	Betulaceae	2		2	FACU+	N Tree	2	7
BIDCERN	Bidens cernua	NODDING BUR-MARIGOLD	Asteraceae	2		-5	OBL	N Forb	5	10
BIDFRON	Bidens frondosa	COMMON BEGGAR-TICKS	Asteraceae	3		-3	FACW	N Forb	7	19
BOECYLI	Boehmeria cylindrica	FALSE NETTLE	Urticaceae	4		-5	OBL	N Forb	8	55
BOTVIRG	Botrychium virginianum	RATTLESNAKE FERN	Ophioglossaceae	5		3	FACU	N Fern	4	7
BRAEREC	Brachyelytrum erectum	LONG-AWNED WOOD GRASS	Poaceae	7		5	UPL	N Grass	4	10
BROCILI	Bromus ciliatus	FRINGED BROME	Poaceae	6		-3	FACW	N Grass	1	1
BROINER	BROMUS INERMIS	SMOOTH BROME	Poaceae		-3	5	UPL	A Grass	4	7
BROLATI	Bromus latiglumis	EAR-LEAVED BROME	Poaceae	7		-2	FACW-	N Grass	2	4
CALCANA	Calamagrostis canadensis	BLUE-JOINT GRASS	Poaceae	4		-5	OBL	N Grass	5	14
CALPALU	Caltha palustris	MARSH-MARIGOLD	Ranunculaceae	5		-5	OBL	N Forb	6	14
CAMAMER	Campanula americana	TALL BELLFLOWER	Campanulaceae	8		0	FAC	N Forb	1	1
CAMAPAR	Campanula aparinoides	MARSH BELLFLOWER	Campanulaceae	7		-5	OBL	N Forb	4	5
CAMRAPU	CAMPANULA RAPUNCULOIDES	EUROPEAN BELLFLOWER	Campanulaceae		-2	5	UPL	A Forb	1	1
CANSATI	CANNABIS SATIVA	MARIJUANA	Cannabaceae		-1	0	FAC	A Forb	1	1
CAPBURS	CAPSELLA BURSA-PASTORIS	SHEPHERD'S PURSE	Brassicaceae		-1	1	FAC-	A Forb	1	1
CARALBU	Carex albursina	SEDGE	Cyperaceae	7		5	UPL	N Sedge	8	21
CARAQUA	Carex aquatilis	SEDGE	Cyperaceae	7		-5	OBL	N Sedge	1	2
CARARCT	Carex arctata	SEDGE	Cyperaceae	5		5	UPL	N Sedge	5	13
CARAURE	Carex aurea	SEDGE	Cyperaceae	4		-4	FACW+	N Sedge	1	1
CARBEBB	Carex bebbii	SEDGE	Cyperaceae	3		-5	OBL	N Sedge	4	5
CARBLAN	Carex blanda	SEDGE	Cyperaceae	3		0	FAC	N Sedge	8	43

SP_CODE	SCIENTIFIC NAME	COMMON NAME	FAMILY	CC	WEED	CW	WETNESS	TYPE	# OF LNDS	# OF PTCH
CARBROM	Carex bromoides	SEDGE	Cyperaceae	7		-4	FACW+	N Sedge	8	31
CARBRUN	Carex brunnescens	SEDGE	Cyperaceae	7		-3	FACW	N Sedge	1	1
CARCANE	Carex canescens	SEDGE	Cyperaceae	7		-5	OBL	N Sedge	2	4
CARCARO	Carpinus caroliniana	BLUE-BEECH	Betulaceae	6		0	FAC	N Tree	8	36
CARCEPD	Carex cephaloidea	SEDGE	Cyperaceae	6		2	FACU+	N Sedge	3	5
CARCEPH	Carex cephalophora	SEDGE	Cyperaceae	5		3	FACU	N Sedge	5	10
CARCOMM	Carex communis	SEDGE	Cyperaceae	6		5	UPL	N Sedge	5	10
CARCOMO	Carex comosa	SEDGE	Cyperaceae	5		-5	OBL	N Sedge	3	3
CARCORD	Carya cordiformis	BITTERNUT HICKORY	Juglandaceae	6		0	FAC	N Tree	8	43
CARCRIN	Carex crinita	SEDGE	Cyperaceae	6		-4	FACW+	N Sedge	6	25
CARCRIS	Carex cristatella	SEDGE	Cyperaceae	3		-4	FACW+	N Sedge	7	36
CARDEWE	Carex deweyana	SEDGE	Cyperaceae	6		4	FACU-	N Sedge	7	14
CARDIAN	Carex diandra	SEDGE	Cyperaceae	7		-5	OBL	N Sedge	2	2
CARDIGI	Carex digitalis	SEDGE	Cyperaceae	7		5	UPL	N Sedge	3	4
CARDISP	Carex disperma	SEDGE	Cyperaceae	8		-5	OBL	N Sedge	1	2
CAREBUR	Carex eburnea	SEDGE	Cyperaceae	6		4	FACU-	N Sedge	1	1
CARFLAV	Carex flava	SEDGE	Cyperaceae	5		-5	OBL	N Sedge	1	1
CARFORM	Carex formosa	SEDGE	Cyperaceae	6		-2	FACW-	N Sedge	1	2
CARGRAC	Carex gracillima	SEDGE	Cyperaceae	4		3	FACU	N Sedge	8	48
CARGRAN	Carex granularis	SEDGE	Cyperaceae	3		-4	FACW+	N Sedge	2	3
CARGRAY	Carex grayi	SEDGE	Cyperaceae	8		-4	FACW+	N Sedge	3	3
CARHIRF	Carex hirtifolia	SEDGE	Cyperaceae	5		5	UPL	N Sedge	6	14
CARHITC	Carex hitchcockiana	SEDGE	Cyperaceae	6		5	UPL	N Sedge	6	10
CARHYST	Carex hystericina	SEDGE	Cyperaceae	5		-5	OBL	N Sedge	6	8
CARINTE	Carex interior	SEDGE	Cyperaceae	6		-5	OBL	N Sedge	4	6
CARINTU	Carex intumescens	SEDGE	Cyperaceae	6		-4	FACW+	N Sedge	8	40
CARJAME	Carex jamesii	JAMES' SEDGE	Cyperaceae	8		5	UPL	N Sedge	1	1
CARLACU	Carex lacustris	SEDGE	Cyperaceae	5		-5	OBL	N Sedge	7	24
CARLAXC	Carex laxiculmis	SEDGE	Cyperaceae	7		5	UPL	N Sedge	4	6
CARLAXF	Carex laxiflorae sensu lato	LAXIFLORAE SEDGE (UNSPECIFIED)	Cyperaceae	3				N Sedge	5	8
CARLEPN	Carex leptonervia	SEDGE	Cyperaceae	5		0	FAC	N Sedge	4	6
CARLEPT	Carex leptalea	SEDGE	Cyperaceae	8		-5	OBL	N Sedge	3	6
CARLUPU	Carex lupulina	SEDGE	Cyperaceae	6		-5	OBL	N Sedge	6	27
CARNORM	Carex normalis	SEDGE	Cyperaceae	6		-3	FACW	N Sedge	5	8
CAROVAL	Carex ovales sensu lato	SEDGE	Cyperaceae	5				N Sedge	5	13
CAROVAT	Carya ovata	SHAGBARK HICKORY	Juglandaceae	6		3	FACU	N Tree	5	10
CARPEDU	Carex pedunculata	SEDGE	Cyperaceae	5		5	UPL	N Sedge	8	35
CARPENS	Carex pensylvanica	SEDGE	Cyperaceae	5		5	UPL	N Sedge	6	15
CARPLAN	Carex plantaginea	SEDGE	Cyperaceae	7		5	UPL	N Sedge	4	6
CARPRAS	Carex prasina	SEDGE	Cyperaceae	10		-5	OBL	N Sedge	1	1
CARPROJ	Carex projecta	SEDGE	Cyperaceae	5		-4	FACW+	N Sedge	7	10
CARPSEU	Carex pseudo-cyperus	SEDGE	Cyperaceae	6		-5	OBL	N Sedge	3	6
CARRADI	Carex radiata	SEDGE	Cyperaceae	4		5	UPL	N Sedge	8	49
CARROSE	Carex rosea	WOOD SEDGE	Cyperaceae	5		5	UPL	N Sedge	8	30

SP_CODE	SCIENTIFIC NAME	COMMON NAME	FAMILY	CC	WEED	CW	WETNESS	TYPE	# OF LNDS	# OF PTCH
CARSCAB	Carex scabrata	SEDGE	Cyperaceae	8		-5	OBL	N Sedge	4	9
CARSPAR	Carex sparganioides	SEDGE	Cyperaceae	5		0	FAC	N Sedge	3	4
CARSPIC	CAREX SPICATA	SEDGE	Cyperaceae		-1	5	UPL	A Sedge	3	3
CARSTIP	Carex stipata	SEDGE	Cyperaceae	3		-5	OBL	N Sedge	8	30
CARSTRI	Carex stricta	SEDGE	Cyperaceae	4		-5	OBL	N Sedge	7	21
CARTENE	Carex tenera	SEDGE	Cyperaceae	4		-1	FAC+	N Sedge	8	24
CARTRIB	Carex tribuloides	SEDGE	Cyperaceae	5		-4	FACW+	N Sedge	7	15
CARTUCK	Carex tuckermanii	SEDGE	Cyperaceae	7		-5	OBL	N Sedge	4	5
CARUTRI	Carex utriculata	SEDGE	Cyperaceae	7		-5	OBL	N Sedge	7	20
CARVESI	Carex vesicaria	SEDGE	Cyperaceae	7		-5	OBL	N Sedge	2	3
CARVULP	Carex vulpinoidea	SEDGE	Cyperaceae	3		-5	OBL	N Sedge	7	26
CARWOOD	Carex woodii	SEDGE	Cyperaceae	6		0	FAC	N Sedge	1	6
CAUTHAL	Caulophyllum thalictroides	BLUE COHOSH	Berberidaceae	6		5	UPL	N Forb	8	47
CELOCCI	Celtis occidentalis	HACKBERRY	Ulmaceae	8		1	FAC-	N Tree	1	2
CELSCAN	Celastrus scandens	CLIMBING BITTERSWEET	Celastraceae	3		3	FACU	N Vine	2	5
CENJACE	CENTAUREA JACEA	BROWN KNAPWEED	Asteraceae		-1	5	UPL	A Forb	1	1
CEPOCCI	Cephalanthus occidentalis	BUTTONBUSH	Rubiaceae	7		-5	OBL	N Shrub	4	10
CHEALBU	CHENOPODIUM ALBUM	LAMB'S QUARTERS	Chenopodiaceae		-1	1	FAC-	A Forb	5	6
CHEGLAB	Chelone glabra	TURTLEHEAD	Scrophulariaceae	7		-5	OBL	N Forb	8	31
CHEMAJU	CHELIDONIUM MAJUS	CELANDINE	Papaveraceae		-3	5	UPL	A Forb	1	1
CHRAMER	Chrysosplenium americanum	GOLDEN SAXIFRAGE	Saxifragaceae	8		-5	OBL	N Forb	3	6
CICBULB	Cicuta bulbifera	WATER HEMLOCK	Apiaceae	5		-5	OBL	N Forb	4	9
CICMACU	Cicuta maculata	WATER HEMLOCK	Apiaceae	6		-5	OBL	N Forb	6	19
CINARUN	Cinna arundinacea	WOOD REEDGRASS	Poaceae	7		-3	FACW	N Grass	6	9
CINLATI	Cinna latifolia	WOOD REEDGRASS	Poaceae	7		-4	FACW+	N Grass	1	1
CIRALPI	Circaea alpina	SMALL ENCHANTER'S-NIGHTSHADE	Onagraceae	6		-3	FACW	N Forb	3	6
CIRARVE	CIRSIUM ARVENSE	CANADIAN-THISTLE	Asteraceae		-1	3	FACU	A Forb	6	9
CIRLUTE	Circaea lutetiana	ENCHANTER'S-NIGHTSHADE	Onagraceae	3		3	FACU	N Forb	8	67
CIRVULG	CIRSIUM VULGARE	BULL-THISTLE	Asteraceae		-1	4	FACU-	A Forb	7	11
CLAVIRG	Claytonia virginica	SPRING-BEAUTY	Portulacaceae	5		3	FACU	N Forb	3	4
CLEVIRG	Clematis virginiana	VIRGIN'S BOWER	Ranunculaceae	3		0	FAC	N Vine	4	12
CLIBORE	Clintonia borealis	BLUEBEAD-LILY	Liliaceae	7		-1	FAC+	N Forb	4	7
CLIVULG	Clinopodium vulgare	WILD BASIL	Lamiaceae	4		5	UPL	N Forb	6	8
CLLPALU	Calla palustris	WILD CALLA	Araceae	8		-5	OBL	N Forb	2	3
CLTPALT	Callitriche palustris	WATER-STARWORT	Callitrichaceae	6		-5	OBL	N Forb	1	1
COLCANA	Collinsonia canadensis	HORSEBALM	Lamiaceae	8		0	FAC	N Forb	4	7
CONCANA	Conyza canadensis	HORSEWEED	Asteraceae	0		1	FAC-	N Forb	2	2
COPTRIF	Coptis trifolia	GOLDTHREAD	Ranunculaceae	7		-3	FACW	N Forb	4	7
CORALTE	Cornus alternifolia	ALTERNATE-LEAVED DOGWOOD	Cornaceae	6		5	UPL	N Tree	8	48
CORAMER	Corylus americana	HAZELNUT	Betulaceae	5		4	FACU-	N Shrub	2	3
CORAMOM	Cornus amomum	SILKY DOGWOOD	Cornaceae	5		-4	FACW+	N Shrub	8	23
CORCANA	Cornus canadensis	BUNCHBERRY	Cornaceae	7		0	FAC	N Shrub	2	3
CORCORN	Corylus cornuta	BEAKED HAZELNUT	Betulaceae	5		5	UPL	N Shrub	4	5
CORFLOR	Cornus florida	FLOWERING DOGWOOD	Cornaceae	7		4	FACU-	N Tree	1	1

SP_CODE	SCIENTIFIC NAME	COMMON NAME	FAMILY	CC	WEED	CW	WETNESS	TYPE	# OF LNDS	# OF PTCH
CORFOEM	Cornus foemina	GRAY DOGWOOD	Cornaceae	2		-2	FACW-	N Shrub	8	51
CORRUGO	Cornus rugosa	ROUND-LEAVED DOGWOOD	Cornaceae	6		5	UPL	N Shrub	1	1
CORSTOL	Cornus stolonifera	RED-OSIER DOGWOOD	Cornaceae	2		-3	FACW	N Shrub	8	43
CRAMONO	CRATAEGUS MONOGYNA	ENGLISH HAWTHORN	Rosaceae		-1	5	UPL	A Tree	3	5
CRAPUNC	Crataegus punctata	DOTTED HAWTHORN	Rosaceae	4		5	UPL	N Tree	7	16
CRATAE.	Crataegus sp.	UNSPECIFIED HAWTHORN	Rosaceae	4		5	UPL	N Tree	8	35
CRDCONC	Cardamine concatenata	CUT-LEAVED TOOTHWORT	Brassicaceae	6		3	FACU	N Forb	2	2
CRDDIPH	Cardamine diphylla	TWO-LEAVED TOOTHWORT	Brassicaceae	7		5	UPL	N Forb	7	14
CRDPENS	Cardamine pensylvanica	PENNSYLVANIA BITTER CRESS	Brassicaceae	6		-4	FACW+	N Forb	1	1
CRECAPI	CREPIS CAPILLARIS	HAWK'S BEARD	Asteraceae		-1	5	UPL	A Forb	1	1
CREPIS.	CREPIS SP.	HAWK'S REARD (UNSPECIFIED)	Asteraceae		-1	5	upl	A Forb	1	1
CRYCANA	Cryptotaenia canadensis	HONEWORT	Apiaceae	5		0	FAC	N Forb	5	7
CUSGRON	Cuscuta gronovii	COMMON DODDER	Convolvulaceae	4		-3	FACW	N Forb	3	3
CYNNIGR	VINCETOXICUM NIGRUM	BLACK SWALLOW-WORT	Asclepiadaceae		-2	5	UPL	A Forb	1	1
CYNOFFI	CYNOGLOSSUM OFFICINALE	HOUND'S TONGUE	Boraginaceae		-1	5	UPL	A Forb	1	1
CYPCALC	Cypripedium calceolus var. pubescens	LARGE YELLOW LADY'S-SLIPPER	Orchidaceae	5		-1	FAC+	N Forb	1	2
CYSBULB	Cystopteris bulbifera	BULBLET FERN	Dryopteridaceae	5		-2	FACW-	N Fern	3	8
CYSTENU	Cystopteris tenuis	FRAGILE FERN	Dryopteridaceae	6		5	UPL	N Fern	8	11
DACGLOM	DACTYLIS GLOMERATA	ORCHARD GRASS	Poaceae		-1	3	FACU	A Grass	7	19
DANSPIC	Danthonia spicata	POVERTY GRASS	Poaceae	5		5	UPL	N Grass	1	1
DAUCARO	DAUCUS CAROTA	WILD CARROT	Apiaceae		-2	5	UPL	A Forb	4	13
DESCANA	Desmodium canadense	SHOWY TICK-TREFOIL	Fabaceae	5		1	FAC-	N Forb	2	3
DESGLUT	Desmodium glutinosum	CLUSTERED-LEAVED TICK-TREFOIL	Fabaceae	6		5	UPL	N Forb	2	2
DIAARME	DIANTHUS ARMERIA	DEPTFORD PINK	Caryophyllaceae		-1	5	UPL	A Forb	2	2
DICCANA	Dicentra canadensis	SQUIRREL CORN	Fumariaceae	7		5	UPL	N Forb	1	1
DICCUCU	Dicentra cucullaria	DUTCHMAN'S BREECHES	Fumariaceae	6		5	UPL	N Forb	1	1
DIELONI	Diervilla lonicera	BUSH HONEYSUCKLE	Caprifoliaceae	5		5	UPL	N Shrub	1	3
DIOQUAT	Dioscorea quaternata	WILD YAM	Dioscoreaceae	7		1	FAC-	N Vine	2	2
DIPFULL	DIPSACUS SYLVESTRIS	COMMON TEASEL	Dipsacaceae		-1	5	UPL	A Forb	4	4
DIRPALU	Dirca palustris	LEATHERWOOD	Thymelaeaceae	7		0	FAC	N Shrub	2	2
DISLANU	Disporum lanuginosum	YELLOW MANDARIN	Liliaceae	8		5	UPL	N Forb	1	1
DRYCART	Dryopteris carthusiana	SPINULOSE WOODFERN	Dryopteridaceae	5		-2	FACW-	N Fern	8	56
DRYCLIN	Dryopteris clintoniana	CLINTON'S WOODFERN	Dryopteridaceae	7		-4	FACW+	N Fern	3	4
DRYCRIS	Dryopteris cristata	CRESTED SHIELD FERN	Dryopteridaceae	7		-5	OBL	N Fern	8	28
DRYINTE	Dryopteris intermedia	GLANDULAR WOODFERN	Dryopteridaceae	5		0	FAC	N Fern	7	16
DRYMARG	Dryopteris marginalis	MARGINAL WOODFERN	Dryopteridaceae	5		3	FACU	N Fern	5	10
DULARUN	Dulichium arundinaceum	THREE-WAY SEDGE	Cyperaceae	7		-5	OBL	N Sedge	1	1
ECHCRUS	ECHINOCHLOA CRUSGALLI	BARNYARD GRASS	Poaceae		-1	-3	FACW	A Grass	1	1
ECHLOBA	Echinocystis lobata	WILD CUCUMBER	Cucurbitaceae	3		-2	FACW-	N Vine	8	52
ELEERYT	Eleocharis erythropoda	SPIKE-RUSH	Cyperaceae	4		-5	OBL	N Sedge	5	9
ELESMAL	Eleocharis smallii	SPIKE-RUSH	Cyperaceae	6		-5	OBL	N Sedge	1	1
ELYRIPA	Elymus riparius	RIVERBANK WILD-RYE	Poaceae	7		-3	FACW	N Grass	1	4
ELYVILL	Elymus villosus	SILKY WILD-RYE	Poaceae	7		3	FACU	N Grass	1	1
ELYVIRG	Elymus virginicus	VIRGINIA WILD-RYE	Poaceae	5		-2	FACW-	N Grass	6	12

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EPICILI	Epilobium ciliatum ssp. ciliatum	WILLOW-HERB	Onagraceae	3		3	FACU	N Forb	1	1
EPICOLO	Epilobium coloratum	CINNAMON WILLOW-HERB	Onagraceae	3		-5	OBL	N Forb	7	14
EPIHELL	EPIPACTIS HELLEBORINE	HELLEBORINE	Orchidaceae		-2	5	UPL	A Forb	8	44
EPIHIRS	EPILOBIUM HIRSUTUM	GREAT HAIRY WILLOW-HERB	Onagraceae		-2	-4	FACW+	A Forb	7	18
EPILEPT	Epilobium leptophyllum	FEN WILLOW-HERB	Onagraceae	7		-5	OBL	N Forb	1	1
EPILOB.	Epilobium sp.	WILLOW-HERB (UNSPECIFIED)	Onagraceae	3				N Forb	1	1
EPIPARV	EPILOBIUM PARVIFLORUM	WILLOW-HERB	Onagraceae		-1	3	FACU	A Forb	1	1
EPIVIRG	Epifagus virginiana	BEECH DROPS	Orobanchaceae	6		5	UPL	N Forb	7	16
EQUARVE	Equisetum arvense	FIELD HORSETAIL	Equisetaceae	0		0	FAC	N Fern	8	60
EQUFLUV	Equisetum fluviatile	WATER HORSETAIL	Equisetaceae	7		-5	OBL	N Fern	1	1
EQUHYEM	Equisetum hyemale	SCOURING RUSH	Equisetaceae	2		-2	FACW-	N Fern	7	17
EQULAEV	Equisetum laevigatum	SMOOTH SCOURING RUSH	Equisetaceae	7		-3	FACW	N Fern	1	1
EQUPRAT	Equisetum pratense	MEADOW-HORSETAIL	Equisetaceae	8		-3	FACW	N Fern	2	2
EQUSCIR	Equisetum scirpoides	DWARF SCOURING RUSH	Equisetaceae	7		-1	FAC+	N Fern	2	2
EQUVARI	Equisetum variegatum	VARIEGATED SCOURING RUSH	Equisetaceae	5		-3	FACW	N Fern	1	1
ERIANNU	Erigeron annuus	ANNUAL FLEABANE	Asteraceae	0		1	FAC-	N Forb	8	34
ERIPHIL	Erigeron philadelphicus	MARSH FLEABANE	Asteraceae	1		-3	FACW	N Forb	8	32
ERISTRI	Erigeron strigosus	DAISY FLEABANE	Asteraceae	0		1	FAC-	N Forb	4	7
ERYAMER	Erythronium americanum	YELLOW TROUT LILY	Liliaceae	5		5	UPL	N Forb	4	14
ERYCHEI	ERYSIMUM CHEIRANTHOIDES	WORMSEED MUSTARD	Brassicaceae		-1	3	FACU	A Forb	1	1
EUOOBOV	Euonymus obovata	RUNNING STRAWBERRY BUSH	Celastraceae	6		5	UPL	N Shrub	8	47
EUPMACU	Eupatorium maculatum	JOE-PYE WEED	Asteraceae	3		-5	OBL	N Forb	8	24
EUPPERF	Eupatorium perfoliatum	COMMON BONESET	Asteraceae	2		-4	FACW+	N Forb	8	31
EUPRUGO	Eupatorium rugosum	WHITE SNAKEROOT	Asteraceae	5		3	FACU	N Forb	4	10
EUTGRAM	Euthamia graminifolia	GRASS-LEAVED GOLDENROD	Asteraceae	2		-2	FACW-	N Forb	8	18
FAGGRAN	Fagus grandifolia	AMERICAN BEECH	Fagaceae	6		3	FACU	N Tree	8	50
FESARUN	FESTUCA ARUNDINACEA	TALL FESCUE	Poaceae		-1	2	FACU+	A Grass	3	4
FESPRAT	FESTUCA PRATENSIS	MEADOW FESCUE	Poaceae		-1	4	FACU-	A Grass	3	5
FESSUBV	Festuca subverticillata	NODDING FESCUE	Poaceae	6		2	FACU+	N Grass	6	12
FRAAMER	Fraxinus americana	WHITE ASH	Oleaceae	4		3	FACU	N Tree	8	47
FRANIGR	Fraxinus nigra	BLACK ASH	Oleaceae	7		-4	FACW+	N Tree	7	26
FRAPENN	Fraxinus pennsylvanica	RED ASH	Oleaceae	3		-3	FACW	N Tree	8	54
FRAPROF	Fraxinus profunda	PUMPKIN ASH	Oleaceae	9		-5	OBL	N Tree	2	2
FRAVESC	Fragaria vesca	WOODLAND STRAWBERRY	Rosaceae	4		4	FACU-	N Forb	5	7
FRAVIRG	Fragaria virginiana	WILD STRAWBERRY	Rosaceae	2		1	FAC-	N Forb	8	54
GALAPAR	Galium aparine	ANNUAL BEDSTRAW	Rubiaceae	4		3	FACU	N Forb	4	9
GALASPR	Galium asprellum	ROUGH BEDSTRAW	Rubiaceae	6		-5	OBL	N Forb	4	7
GALBORE	Galium boreale	NORTHERN BEDSTRAW	Rubiaceae	7		0	FAC	N Forb	1	1
GALCIRC	Galium circaezans	WHITE WILD LICORICE	Rubiaceae	7		4	FACU-	N Forb	2	5
GALLANC	Galium lanceolatum	YELLOW WILD LICORICE	Rubiaceae	8		5	UPL	N Forb	1	1
GALMOLL	GALIUM MOLLUGO	WHITE BEDSTRAW	Rubiaceae		-2	5	UPL	A Forb	2	3
GALOBTU	Galium obtusum	WILD MADDER	Rubiaceae	6		-5	OBL	N Forb	5	7
GALPALU	Galium palustre	MARSH BEDSTRAW	Rubiaceae	5		-5	OBL	N Forb	8	28
GALTETR	GALEOPSIS TETRAHIT	COMMON HEMP NETTLE	Lamiaceae		-1	5	UPL	A Forb	2	2

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GALTRIF	Galium triflorum	FRAGRANT BEDSTRAW	Rubiaceae	4		2	FACU+	N Forb	8	32
GAUPROC	Gaultheria procumbens	WINTERGREEN	Ericaceae	6		3	FACU	N Shrub	1	1
GENANDR	Gentiana andrewsii	CLOSED GENTIAN	Gentianaceae	6		-3	FACW	N Forb	2	3
GERMACU	Geranium maculatum	WILD GERANIUM	Geraniaceae	6		3	FACU	N Forb	5	15
GERROBE	GERANIUM ROBERTIANUM	HERB ROBERT	Geraniaceae		-2	5	UPL	A Forb	8	53
GEUALEP	Geum aleppicum	YELLOW AVENS	Rosaceae	2		-1	FAC+	N Forb	8	38
GEUCANA	Geum canadense	WHITE AVENS	Rosaceae	3		0	FAC	N Forb	8	63
GEULACI	Geum laciniatum	ROUGH AVENS	Rosaceae	4		-3	FACW	N Forb	2	2
GEURIVA	Geum rivale	PURPLE AVENS	Rosaceae	7		-5	OBL	N Forb	1	1
GEUURBA	GEUM URBANUM	AVENS	Rosaceae		-1	5	UPL	A Forb	1	1
GLEHEDE	GLECHOMA HEDERACEA	GROUND IVY	Lamiaceae		-2	3	FACU	A Forb	6	8
GLYBORE	Glyceria borealis	NORTHERN MANNA GRASS	Poaceae	8		-5	OBL	N Grass	2	2
GLYGRAN	Glyceria grandis	REED MANNA GRASS	Poaceae	5		-5	OBL	N Grass	4	10
GLYSEPT	Glyceria septentrionalis	FLOATING MANNA GRASS	Poaceae	8		-5	OBL	N Grass	2	2
GLYSTRI	Glyceria striata	FOWL MANNA GRASS	Poaceae	3		-5	OBL	N Grass	8	63
GYMDRYO	Gymnocarpium dryopteris	OAK FERN	Dryopteridaceae	7		0	FAC	N Fern	3	4
HAMVIRG	Hamamelis virginiana	WITCH-HAZEL	Hamamelidaceae	6		3	FACU	N Shrub	7	18
HEMFULV	HEMEROCALLIS FULVA	ORANGE DAY-LILY	Liliaceae		-3	5	UPL	A Forb	2	2
HEPACUT	Hepatica acutiloba	SHARP-LOBED HEPATICA	Ranunculaceae	6		5	UPL	N Forb	6	11
HEPAMER	Hepatica americana	ROUND-LOBED HEPATICA	Ranunculaceae	6		5	UPL	N Forb	4	4
HESMATR	HESPERIS MATRONALIS	DAME'S ROCKET	Brassicaceae		-3	5	UPL	A Forb	5	13
HIECAES	HIERACIUM CAESPITOSUM	KING-DEVIL	Asteraceae		-2	5	UPL	A Forb	2	2
HIEPILD	HIERACIUM PILOSELLOIDES	GLAUCOUS KING-DEVIL	Asteraceae		-2	5	UPL	A Forb	2	2
HIERAC.	Hieracium sp.	HAWKWEED (UNSPECIFIED)	Asteraceae		-1			A Forb	3	3
HYDAMER	Hydrocotyle americana	WATER-PENNYWORT	Apiaceae	7		-5	OBL	N Forb	2	2
HYDCANA	Hydrophyllum canadense	CANADA WATERLEAF	Hydrophyllaceae	8		-2	FACW-	N Forb	5	10
HYDVIRG	Hydrophyllum virginianum	VIRGINIA WATERLEAF	Hydrophyllaceae	6		-2	FACW-	N Forb	7	28
HYPMAJU	Hypericum majus	LARGER CANADA ST. JOHN'S-WORT	Guttiferae	5		-3	FACW	N Forb	1	1
HYPPERF	HYPERICUM PERFORATUM	COMMON ST. JOHN'S-WORT	Guttiferae		-3	5	UPL	A Forb	7	19
HYPPUNC	Hypericum punctatum	SPOTTED ST. JOHN'S-WORT	Guttiferae	5		-1	FAC+	N Forb	2	2
HYSPATU	Hystrix patula	BOTTLEBRUSH GRASS	Poaceae	5		5	UPL	N Grass	5	18
ILEVERT	Ilex verticillata	WINTERBERRY	Aquifoliaceae	5		-4	FACW+	N Shrub	6	17
IMPCAPE	Impatiens capensis	SPOTTED TOUCH-ME-NOT	Balsaminaceae	4		-3	FACW	N Forb	8	62
IMPPALL	Impatiens pallida	PALE TOUCH-ME-NOT	Balsaminaceae	7		-3	FACW	N Forb	6	14
INUHELE	INULA HELENIUM	ELECAMPANE	Asteraceae		-2	5	UPL	A Forb	2	2
IRIVIRG	Iris virginica	SOUTHERN BLUE FLAG	Iridaceae	5		-5	OBL	N Forb	7	25
JUGCINE	Juglans cinerea	BUTTERNUT	Juglandaceae	6		2	FACU+	N Tree	6	9
JUGNIGR	Juglans nigra	BLACK WALNUT	Juglandaceae	5		3	FACU	N Tree	8	29
JUNBALT	Juncus balticus	RUSH	Juncaceae	5		-5	OBL	N Forb	1	1
JUNBUFO	Juncus bufonius	TOAD RUSH	Juncaceae	1		-4	FACW+	N Forb	2	2
JUNCUS.	Juncus sp.	RUSH (UNSPECIFIED)	Juncaceae	1		0		N Forb	1	1
JUNDUDL	Juncus dudleyi	DUDLEY'S RUSH	Juncaceae	1		0	FAC	N Forb	1	1
JUNEFFU	Juncus effusus	SOFT-STEMMED RUSH	Juncaceae	4		-5	OBL	N Forb	8	16
JUNTENU	Juncus tenuis	PATCH RUSH	Juncaceae	0		0	FAC	N Forb	5	9

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JUNVIRG	Juniperus virginiana	RED-CEDAR	Cupressaceae	4		3	FACU	N Tree	3	3
LACBIEN	Lactuca biennis	TALL BLUE LETTUCE	Asteraceae	6		0	FAC	N Forb	1	1
LACCANA	Lactuca canadensis	TALL LETTUCE	Asteraceae	3		2	FACU+	N Forb	1	1
LACTUC.	Lactuca sp.	WILD LETTUCE (UNSPECIFIED)	Asteraceae	3		2	FACU+	N Forb	6	19
LAMALBU	LAMIUM ALBUM	WHITE DEAD-NETTLE	Lamiaceae		-1	5	UPL	A Forb	1	1
LAPCANA	Laportea canadensis	WOOD NETTLE	Urticaceae	6		-3	FACW	N Forb	8	30
LAPCOMM	LAPSANA COMMUNIS	NIPPLEWORT	Asteraceae		-2	5	UPL	A Forb	1	1
LARLARI	Larix laricina	TAMARACK	Pinaceae	7		-3	FACW	N Tree	5	11
LATLATI	LATHYRUS LATIFOLIUS	EVERLASTING PEA	Fabaceae		-1	5	UPL	A Forb	1	1
LEEORYZ	Leersia oryzoides	CUT GRASS	Poaceae	3		-5	OBL	N Grass	6	18
LEEVIRG	Leersia virginica	WHITE GRASS	Poaceae	6		-3	FACW	N Grass	7	9
LEMMINO	Lemna minor	SMALL DUCKWEED	Lemnaceae	2		-5	OBL	N Forb	5	13
LEMTRIS	Lemna trisulca	STAR DUCKWEED	Lemnaceae	4		-5	OBL	N Forb	3	3
LEOCARD	LEONURUS CARDIACA	MOTHERWORT	Lamiaceae		-2	5	UPL	A Forb	5	12
LEPCAMP	LEPIDIUM CAMPESTRE	FIELD CRESS	Brassicaceae		-1	5	UPL	A Forb	1	1
LEUVULG	CHRYSANTHEMUM LEUCANTHEMUM	OX-EYE DAISY	Asteraceae		-1	5	UPL	A Forb	6	11
LIGVULG	LIGUSTRUM VULGARE	COMMON PRIVET	Oleaceae		-2	1	FAC-	A Shrub	2	3
LILMICH	Lilium michiganense	MICHIGAN LILY	Liliaceae	7		-1	FAC+	N Forb	8	29
LINBENZ	Lindera benzoin	SPICEBUSH	Lauraceae	6		-2	FACW-	N Shrub	8	35
LINBORE	Linnaea borealis	TWINFLOWER	Caprifoliaceae	7		0	FAC	N Forb	1	1
LINVULG	LINARIA VULGARIS	BUTTER-AND-EGGS	Scrophulariaceae		-1	5	UPL	A Forb	2	5
LIPLOES	Liparis loeselii	LOESEL'S TWAYBLADE	Orchidaceae	5		-4	FACW+	N Forb	2	2
LITOFFI	LITHOSPERMUM OFFICINALE	EUROPEAN GROMWELL	Boraginaceae		-1	5	UPL	A Forb	3	3
LOBCARD	Lobelia cardinalis	CARDINAL FLOWER	Campanulaceae	7		-5	OBL	N Forb	4	5
LOBINFL	Lobelia inflata	INDIAN TOBACCO	Campanulaceae	3		4	FACU-	N Forb	1	3
LOBSIPH	Lobelia siphilitica	GREAT BLUE LOBELIA	Campanulaceae	6		-4	FACW+	N Forb	6	8
LOBSPIC	Lobelia spicata	PALE SPIKED LOBELIA	Campanulaceae	8		0	FAC	N Forb	2	2
LOLPERE	LOLIUM PERENNE	PERENNIAL RYE GRASS	Poaceae		-1	3	FACU	A Grass	1	1
LONCANA	Lonicera canadensis	AMERICAN FLY HONEYSUCKLE	Caprifoliaceae	6		3	FACU	N Shrub	6	8
LONDIOI	Lonicera dioica	RED HONEYSUCKLE	Caprifoliaceae	5		3	FACU	N Vine	7	15
LONMAAC	LONICERA MAACKII	AMUR HONEYSUCKLE	Caprifoliaceae		-2	5	UPL	A Shrub	1	1
LONOBLO	Lonicera oblongifolia	SWAMP FLY HONEYSUCKLE	Caprifoliaceae	8		-5	OBL	N Shrub	1	1
LONTATA	LONICERA TATARICA	SMOOTH TARTARIAN HONEYSUCKLE	Caprifoliaceae		-3	3	FACU	A Shrub	3	5
LOTCORN	LOTUS CORNICULATA	BIRDFOOT TREFOIL	Fabaceae		-2	1	FAC-	A Forb	3	3
LUDPALU	Ludwigia palustris	WATER-PURSLANE	Onagraceae	5		-5	OBL	N Forb	5	7
LUZMULT	Luzula multiflora	COMMON WOOD RUSH	Juncaceae	6		3	FACU	N Forb	1	4
LYCAMER	Lycopus americanus	COMMON WATER HOREHOUND	Lamiaceae	4		-5	OBL	N Forb	7	27
LYCDIGI	Lycopodium digitatum	GROUND-CEDAR	Lycopodiaceae	5		5	UPL	N Fern	3	3
LYCLUCI	Lycopodium lucidulum	SHINING CLUBMOSS	Lycopodiaceae	7		-1	FAC+	N Fern	3	4
LYCOBSC	Lycopodium obscurum	GROUND-PINE	Lycopodiaceae	6		3	FACU	N Fern	1	1
LYCTRIS	Lycopodium tristachyum	GROUND-CEDAR	Lycopodiaceae	8		5	UPL	N Fern	1	1
LYCUNIF	Lycopus uniflorus	NORTHERN BUGLE WEED	Lamiaceae	5		-5	OBL	N Forb	8	47
LYSCILI	Lysimachia ciliata	FRINGED LOOSESTRIFE	Primulaceae	4		-3	FACW	N Forb	8	25
LYSNUMM	LYSIMACHIA NUMMULARIA	MONEYWORT	Primulaceae		-3	-4	FACW+	A Forb	4	9

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LYSTHYR	Lysimachia thyrsiflora	TUFTED LOOSESTRIFE	Primulaceae	7		-5	OBL	N Forb	6	22
LYTSALI	LYTHRUM SALICARIA	PURPLE LOOSESTRIFE	Lythraceae		-3	-5	OBL	A Forb	2	2
MAICANA	Maianthemum canadense	CANADA MAYFLOWER	Liliaceae	5		0	FAC	N Forb	7	24
MAIRACE	Maianthemum racemosum	FALSE SPIKENARD	Liliaceae	4		3	FACU	N Forb	8	47
MAISTEL	Maianthemum stellatum	STARRY FALSE SOLOMON-SEAL	Liliaceae	6		1	FAC-	N Forb	8	37
MALPUMI	MALUS PUMILA	APPLE	Rosaceae		-1	5	UPL	A Tree	8	25
MATSTRU	Matteuccia struthiopteris	OSTRICH FERN	Dryopteridaceae	5		-3	FACW	N Fern	8	40
MEDLUPU	MEDICAGO LUPULINA	BLACK MEDICK	Fabaceae		-1	1	FAC-	A Forb	3	5
MEDVIRG	Medeola virginiana	INDIAN CUCUMBER ROOT	Liliaceae	7		5	UPL	N Forb	4	5
MELALBA	MELILOTUS ALBA	WHITE SWEET-CLOVER	Fabaceae		-3	3	FACU	A Forb	2	7
MELOFFI	MELILOTUS OFFICINALIS	YELLOW SWEET-CLOVER	Fabaceae		-1	3	FACU	A Forb	2	2
MENCANA	Menispermum canadense	MOONSEED	Menispermaceae	7		0	FAC	N Vine	6	9
MENTHA.	MENTHA SP.	MINT (UNSPECIFIED)	Lamiaceae		-1	-3		A Forb	7	23
MILEFFU	Milium effusum	WOOD MILLET	Poaceae	8		4	FACU-	N Grass	1	1
MIMRING	Mimulus ringens	MONKEY-FLOWER	Scrophulariaceae	6		-5	OBL	N Forb	4	10
MITDIPH	Mitella diphylla	BISHOP'S CAP	Saxifragaceae	5		2	FACU+	N Forb	8	12
MITREPE	Mitchella repens	PARTRIDGE BERRY	Rubiaceae	6		2	FACU+	N Shrub	8	23
MONFIST	Monarda fistulosa	WILD BERGAMOT	Lamiaceae	6		3	FACU	N Forb	2	5
MONHYPO	Monotropa hypopithys	PINESAP	Monotropaceae	6		5	UPL	N Forb	1	1
MUHFRON	Muhlenbergia frondosa	COMMON SATIN GRASS	Poaceae	5		-3	FACW	N Grass	2	2
MUHMEXI	Muhlenbergia mexicana	LEAFY SATIN GRASS	Poaceae	1		-3	FACW	N Grass	6	15
MYOLAXA	Myosotis laxa	SMALL FORGET-ME-NOT	Boraginaceae	6		-5	OBL	N Forb	5	6
MYOSCOR	MYOSOTIS SCORPIOIDES	COMMON FORGET-ME-NOT	Boraginaceae		-1	-5	OBL	A Forb	1	1
MYRHETE	Myriophyllum heterophyllum	VARIOUS-LEAVED WATER-MILFOIL	Haloragaceae	7		-5	OBL	N Forb	1	1
NASOFFI	NASTURTIUM OFFICINALE	WATERCRESS	Brassicaceae		-1	-5	OBL	A Forb	5	5
NEMMUCR	Nemopanthus mucronata	MOUNTAIN HOLLY	Aquifoliaceae	8		-5	OBL	N Shrub	2	2
NEPCATA	NEPETA CATARIA	CATNIP	Lamiaceae		-2	1	FAC-	A Forb	3	4
OENBIEN	Oenothera biennis	COMMON EVENING-PRIMROSE	Onagraceae	0		3	FACU	N Forb	6	13
OENPERE	Oenothera perennis	SMALL SUNDROPS	Onagraceae	6		0	FAC	N Forb	1	1
ONOSENS	Onoclea sensibilis	SENSITIVE FERN	Dryopteridaceae	4		-3	FACW	N Fern	8	63
ORYASPE	Oryzopsis asperifolia	ROUGH-LEAVED RICE-GRASS	Poaceae	6		5	UPL	N Grass	2	4
ORYRACE	Oryzopsis racemosa	RICE-GRASS	Poaceae	7		5	UPL	N Grass	1	1
OSDCINN	Osmunda cinnamomea	CINNAMON FERN	Osmundaceae	7		-3	FACW	N Fern	5	12
OSDCLAY	Osmunda claytoniana	INTERRUPTED FERN	Osmundaceae	7		-1	FAC+	N Fern	4	4
OSDREGA	Osmunda regalis	ROYAL FERN	Osmundaceae	7		-5	OBL	N Fern	6	13
OSMCLAY	Osmorhiza claytonii	HAIRY SWEET-CICELY	Apiaceae	5		4	FACU-	N Forb	2	4
OSTVIRG	Ostrya virginiana	HOP HORNBEAM	Betulaceae	4		4	FACU-	N Tree	8	38
OXAACET	Oxalis acetosella	NORTHERN WOOD-SORREL	Oxalidaceae	8		3	FACU	N Forb	1	1
OXALIS.	Oxalis sp.	YELLOW WOOD SORREL	Oxalidaceae	0		3	FACU	N Forb	8	49
PANCAPI	Panicum capillare	WITCH GRASS	Poaceae	0		0	FAC	N Grass	2	2
PANIMPL	Panicum implicatum	PANIC GRASS	Poaceae	2		0	FAC	N Grass	3	3
PARINSE	Parthenocissus inserta	THICKET CREEPER	Vitaceae	3		3	FACU	N Vine	8	63
PARPENS	Parietaria pensylvanica	PELLITORY	Urticaceae	3		3	FACU	N Forb	2	2
PEDCANA	Pedicularis canadensis	WOOD-BETONY	Scrophulariaceae	7		2	FACU+	N Forb	1	1

SP_CODE	SCIENTIFIC NAME	COMMON NAME	FAMILY	CC	WEED	CW	WETNESS	TYPE	# OF LNDS	# OF PTCH
PENDIGI	Penstemon digitalis	FOXGLOVE BEARD-TONGUE	Scrophulariaceae	6		1	FAC-	N Forb	2	2
PENSEDO	Penthorum sedoides	DITCH STONECROP	Saxifragaceae	4		-5	OBL	N Forb	5	7
PHAARUN	Phalaris arundinacea	REED CANARY GRASS	Poaceae	0		-4	FACW+	N Grass	8	36
PHLDIVA	Phlox divaricata	WOODLAND PHLOX	Polemoniaceae	7		3	FACU	N Forb	2	2
PHLPRAT	PHLEUM PRATENSE	TIMOTHY	Poaceae		-1	3	FACU	A Grass	4	7
PHRAUST	Phragmites australis (P. communis)	REED	Poaceae	0		-4	FACW+	N Grass	1	1
PHRLEPT	Phryma leptostachya	LOPSEED	Verbenaceae	6		5	UPL	N Forb	5	10
PHYAMER	Phytolacca americana	POKEWEED	Phytolaccaceae	3		1	FAC-	N Forb	1	2
PHYHETE	Physalis heterophylla	CLAMMY GROUND-CHERRY	Solanaceae	3		5	UPL	N Forb	3	6
PHYOPUL	Physocarpus opulifolius	NINEBARK	Rosaceae	5		-2	FACW-	N Shrub	2	6
PICABIE	PICEA ABIES	NORWAY SPRUCE	Pinaceae		-1	5	UPL	A Tree	5	6
PICGLA*	PICEA GLAUCA	WHITE SPRUCE (PLANTED)	Pinaceae		-1	3	FACU	A Tree	7	9
PILFONT	Pilea fontana	BOG CLEARWEED	Urticaceae	5		-3	FACW	N Forb	1	1
PILPUMI	Pilea pumila	CLEARWEED	Urticaceae	5		-3	FACW	N Forb	7	27
PINRES*	PINUS RESINOSA	RED PINE (PLANTED)	Pinaceae		-1	3	FACU	A Tree	4	5
PINSTRO	Pinus strobus	WHITE PINE	Pinaceae	4		3	FACU	N Tree	7	21
PINSYLV	PINUS SYLVESTRIS	SCOTS PINE	Pinaceae		-3	5	UPL	A Tree	4	5
PLALANC	PLANTAGO LANCEOLATA	ENGLISH PLANTAIN	Plantaginaceae		-1	0	FAC	A Forb	2	5
PLAMAJO	PLANTAGO MAJOR	COMMON PLANTAIN	Plantaginaceae		-1	-1	FAC+	A Forb	7	19
PLAPSYC	Platanthera psycodes	SMALL PURPLE FRINGED ORCHID	Orchidaceae	8		-3	FACW	N Forb	2	2
PLARUGE	Plantago rugelii	RED-STALKED PLANTAIN	Plantaginaceae	1		0	FAC	N Forb	2	2
POAALSO	Poa alsodes	BLUEGRASS	Poaceae	7		-2	FACW-	N Grass	3	5
POACOMP	Poa compressa	CANADA BLUEGRASS	Poaceae	0		2	FACU+	N Grass	8	18
POAPALU	Poa palustris	FOWL MEADOW GRASS	Poaceae	5		-4	FACW+	N Grass	6	11
POAPRAT	Poa pratensis	KENTUCKY BLUEGRASS	Poaceae	0		1	FAC-	N Grass	7	15
POATRIV	POA TRIVIALIS	BLUEGRASS	Poaceae		-1	-3	FACW	A Grass	1	1
PODPELT	Podophyllum peltatum	MAY APPLE	Berberidaceae	5		3	FACU	N Forb	8	49
POLACRO	Polystichum acrostichoides	CHRISTMAS FERN	Dryopteridaceae	5		5	UPL	N Fern	7	41
POLAMPH	Polygonum amphibium	WATER SMARTWEED	Polygonaceae	5		-5	OBL	N Forb	4	8
POLCONV	POLYGONUM CONVOLVULUS	BLACK BINDWEED	Polygonaceae		-1	1	FAC-	A Vine	1	1
POLHYDD	Polygonum hydropiperoides	WATER-PEPPER	Polygonaceae	4		-5	OBL	N Forb	1	2
POLHYDR	Polygonum hydropiper	WATER-PEPPER	Polygonaceae	4		-5	OBL	N Forb	2	3
POLLAPA	Polygonum lapathifolium	NODDING SMARTWEED	Polygonaceae	2		-4	FACW+	N Forb	1	1
POLPAUC	Polygala paucifolia	GAY-WINGS	Polygalaceae	6		3	FACU	N Forb	2	5
POLPERS	POLYGONUM PERSICARIA	LADY'S THUMB	Polygonaceae		-1	-3	FACW	A Forb	6	13
POLPUBE	Polygonatum pubescens	DOWNY SOLOMON SEAL	Liliaceae	5		5	UPL	N Forb	8	23
POLVIRG	Polygonum virginianum	JUMPSEED	Polygonaceae	6		0	FAC	N Forb	1	1
POPBALS	Populus balsamifera	BALSAM POPLAR	Salicaceae	4		-3	FACW	N Tree	5	9
POPDELT	Populus deltoides	COTTONWOOD	Salicaceae	4		-1	FAC+	N Tree	5	8
POPGRAN	Populus grandidentata	BIG-TOOTHED ASPEN	Salicaceae	5		3	FACU	N Tree	4	4
POPTREM	Populus tremuloides	QUAKING ASPEN	Salicaceae	2		0	FAC	N Tree	8	48
POTARGU	Potentilla arguta	PRAIRIE CINQUEFOIL	Rosaceae	7		4	FACU-	N Forb	1	1
POTNATA	Potamogeton natans	PONDWEED	Potamogetonaceae	5		-5	OBL	N Forb	1	1
POTPECT	Potamogeton pectinatus	SAGO PONDWEED	Potamogetonaceae	4		-5	OBL	N Forb	2	2

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POTRECT	POTENTILLA RECTA	ROUGH-FRUITED CINQUEFOIL	Rosaceae		-2	5	UPL	A Forb	6	16
POTSIMP	Potentilla simplex	COMMON CINQUEFOIL	Rosaceae	3		4	FACU-	N Forb	5	11
PRENAN.	Prenanthes sp.	WHITE LETTUCE (UNSPECIFIED)	Asteraceae	5		3	FACU	N Forb	8	24
PRUAVIU	PRUNUS AVIUM	SWEET CHERRY	Rosaceae		-2	5	UPL	A Tree	4	5
PRUPENS	Prunus pensylvanica	PIN CHERRY	Rosaceae	3		4	FACU-	N Tree	3	5
PRUSERO	Prunus serotina	WILD BLACK CHERRY	Rosaceae	3		3	FACU	N Tree	8	47
PRUVIRG	Prunus virginiana	CHOKE CHERRY	Rosaceae	2		1	FAC-	N Shrub	8	67
PRUVULG	PRUNELLA VULGARIS	LAWN PRUNELLA	Lamiaceae		-1	0	FAC	A Forb	8	33
PTEAQUI	Pteridium aquilinum	BRACKEN FERN	Pteridaceae	2		3	FACU	N Fern	7	15
PYRCOMM	PYRUS COMMUNIS	PEAR	Rosaceae		-1	5	UPL	A Tree	1	1
PYRELLI	Pyrola elliptica	LARGE-LEAVED SHINLEAF	Pyrolaceae	5		5	UPL	N Forb	4	6
QUEALBA	Quercus alba	WHITE OAK	Fagaceae	6		3	FACU	N Tree	5	8
QUEBICO	Quercus bicolor	SWAMP WHITE OAK	Fagaceae	8		-4	FACW+	N Tree	7	24
QUEMACR	Quercus macrocarpa	BUR OAK	Fagaceae	5		1	FAC-	N Tree	6	18
QUERUBR	Quercus rubra	RED OAK	Fagaceae	6		3	FACU	N Tree	6	19
QUEVELU	Quercus velutina	BLACK OAK	Fagaceae	8		5	UPL	N Tree	2	2
RANABOR	Ranunculus abortivus	SMALL-FLOWERED BUTTERCUP	Ranunculaceae	2		-2	FACW-	N Forb	8	50
RANACRI	RANUNCULUS ACRIS	COMMON BUTTERCUP	Ranunculaceae		-2	-2	FACW-	A Forb	8	26
RANHISC	Ranunculus hispidus var. caricetorum	SWAMP BUTTERCUP	Ranunculaceae	5		-5	OBL	N Forb	5	9
RANHISP	Ranunculus hispidus var. hispidus	HAIRY BUTTERCUP	Ranunculaceae	8		0	FAC	N Forb	1	1
RANPENS	Ranunculus pensylvanicus	BRISTLY CROWFOOT	Ranunculaceae	3		-5	OBL	N Forb	8	20
RANRECU	Ranunculus recurvatus	HOOKED CROWFOOT	Ranunculaceae	4		-3	FACW	N Forb	8	23
RANSCEL	Ranunculus sceleratus	CURSED CROWFOOT	Ranunculaceae	2		-5	OBL	N Forb	7	13
RHAALNI	Rhamnus alnifolia	ALDER-LEAVED BUCKTHORN	Rhamnaceae	7		-5	OBL	N Shrub	5	7
RHACATH	RHAMNUS CATHARTICA	COMMON BUCKTHORN	Rhamnaceae		-3	3	FACU	A Tree	7	48
RHAFRAN	RHAMNUS FRANGULA	GLOSSY BUCKTHORN	Rhamnaceae		-3	-1	FAC+	A Shrub	2	2
RHURADI	Rhus radicans ssp. rydbergii	POISON-IVY	Anacardiaceae	0		0	FAC	N Vine	8	53
RHURANE	Rhus radicans ssp. negundo	POISON-IVY	Anacardiaceae	5		-1	FAC+	N Vine	8	33
RHUTYPH	Rhus typhina	STAGHORN SUMAC	Anacardiaceae	1		5	UPL	N Tree	6	17
RHUVERN	Rhus vernix	POISON SUMAC	Anacardiaceae	8		-5	OBL	N Shrub	1	3
RIBAMER	Ribes americanum	WILD BLACK CURRANT	Grossulariaceae	4		-3	FACW	N Shrub	8	63
RIBCYNO	Ribes cynosbati	PRICKLY GOOSEBERRY	Grossulariaceae	4		5	UPL	N Shrub	8	56
RIBHIRT	Ribes hirtellum	SWAMP GOOSEBERRY	Grossulariaceae	6		-3	FACW	N Shrub	2	3
RIBRUBR	RIBES RUBRUM	RED CURRANT	Grossulariaceae		-2	5	UPL	A Shrub	2	2
RIBTRIS	Ribes triste	SWAMP RED CURRANT	Grossulariaceae	6		-5	OBL	N Shrub	7	12
ROBPSEU	ROBINIA PSEUDOACACIA	BLACK LOCUST	Fabaceae		-3	4	FACU-	A Tree	2	7
ROSCARO	Rosa carolina	PASTURE ROSE	Rosaceae	6		4	FACU-	N Shrub	1	1
ROSMULT	ROSA MULTIFLORA	MULTIFLORA ROSE	Rosaceae		-3	3	FACU	A Shrub	8	18
ROSPALU	Rosa palustris	SWAMP ROSE	Rosaceae	7		-5	OBL	N Shrub	4	10
RUBALLE	Rubus allegheniensis	COMMON BLACKBERRY	Rosaceae	2		2	FACU+	N Shrub	8	31
RUBCANA	Rubus canadensis	BRAMBLE	Rosaceae	7		5	UPL	N Shrub	3	3
RUBFLAG	Rubus flagellaris	NORTHERN DEWBERRY	Rosaceae	4		4	FACU-	N Shrub	1	2
RUBIDAE	Rubus idaeus	WILD RED RASPBERRY	Rosaceae	0		-2	FACW-	N Shrub	8	64
RUBOCCI	Rubus occidentalis	BLACK RASPBERRY	Rosaceae	2		5	UPL	N Shrub	8	32

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RUBPUBE	Rubus pubescens	DWARF RASPBERRY	Rosaceae	4		-4	FACW+	N Forb	8	39
RUDHIRT	Rudbeckia hirta	BLACK-EYED SUSAN	Asteraceae	0		3	FACU	N Forb	3	5
RUDLACI	Rudbeckia laciniata	CUT-LEAVED CONEFLOWER	Asteraceae	7		-4	FACW+	N Forb	2	4
RUMCRIS	RUMEX CRISPUS	CURLY DOCK	Polygonaceae		-2	-1	FAC+	A Forb	7	17
RUMOBTU	RUMEX OBTUSIFOLIUS	BITTER DOCK	Polygonaceae		-1	-3	FACW	A Forb	6	20
RUMORBI	Rumex orbiculatus	GREAT WATER DOCK	Polygonaceae	6		-5	OBL	N Forb	1	1
SAGLATI	Sagittaria latifolia	COMMON ARROWHEAD	Alismataceae	4		-5	OBL	N Forb	4	9
SALALBA	SALIX ALBA	WHITE WILLOW	Salicaceae		-2	-3	FACW	A Tree	1	1
SALBEBB	Salix bebbiana	BEBB'S WILLOW	Salicaceae	4		-4	FACW+	N Shrub	4	9
SALDISC	Salix discolor	PUSSY WILLOW	Salicaceae	3		-3	FACW	N Shrub	6	12
SALERIO	Salix eriocephala	WILLOW	Salicaceae	4		-3	FACW	N Shrub	7	24
SALEXIG	Salix exigua	SANDBAR WILLOW	Salicaceae	3		-5	OBL	N Shrub	5	12
SALLUCI	Salix lucida	SHINING WILLOW	Salicaceae	5		-4	FACW+	N Shrub	1	1
SALPEDI	Salix pedicellaris	BOG WILLOW	Salicaceae	9		-5	OBL	N Shrub	1	1
SALPURP	SALIX PURPUREA	PURPLE-OSIER WILLOW	Salicaceae		-2	-3	FACW	A Shrub	2	4
SALSERM	Salix serissima	AUTUMN WILLOW	Salicaceae	6		-5	OBL	N Shrub	3	3
SALXRUB	SALIX X RUBENS	WILLOW	Salicaceae		-3	-4	FACW+	A Tree	8	29
SAMCANA	Sambucus canadensis	COMMON ELDER	Caprifoliaceae	5		-2	FACW-	N Shrub	8	35
SAMPUBE	Sambucus racemosa	RED-BERRIED ELDER	Caprifoliaceae	5		2	FACU+	N Shrub	8	31
SANCANA	Sanguinaria canadensis	BLOODROOT	Papaveraceae	5		4	FACU-	N Forb	7	39
SANODOR	Sanicula odorata	BLACK SNAKEROOT	Apiaceae	6		-1	FAC+	N Forb	2	2
SAPOFFI	SAPONARIA OFFICINALIS	BOUNCING BET	Caryophyllaceae		-3	3	FACU	A Forb	3	6
SCHPURP	Schizachne purpurascens	FALSE MELIC	Poaceae	6		2	FACU+	N Grass	2	3
SCIACUT	Scirpus acutus	HARDSTEM BULRUSH	Cyperaceae	6		-5	OBL	N Sedge	1	1
SCIATRO	Scirpus atrovirens	BULRUSH	Cyperaceae	3		-5	OBL	N Sedge	8	16
SCICYPE	Scirpus cyperinus	WOOL-GRASS	Cyperaceae	4		-5	OBL	N Sedge	1	1
SCIMICR	Scirpus microcarpus	BULRUSH	Cyperaceae	4		-5	OBL	N Sedge	1	1
SCIPEND	Scirpus pendulus	BULRUSH	Cyperaceae	3		-5	OBL	N Sedge	2	3
SCIPUNG	Scirpus pungens	THREE-SQUARE	Cyperaceae	6		-5	OBL	N Sedge	1	1
SCIVALI	Scirpus validus	SOFTSTEM BULRUSH	Cyperaceae	5		-5	OBL	N Sedge	1	1
SCRMARI	Scrophularia marilandica	LATE FIGWORT	Scrophulariaceae	7		4	FACU-	N Forb	1	1
SCUGALE	Scutellaria galericulata	COMMON SKULLCAP	Lamiaceae	6		-5	OBL	N Forb	6	11
SCULATE	Scutellaria lateriflora	MAD-DOG SKULLCAP	Lamiaceae	5		-5	OBL	N Forb	5	13
SEDUM..	SEDUM SP.	STONECROP (UNSPECIFIED)	Crassulaceae		-1	5	UPL	A Forb	1	1
SENAURE	Senecio aureus	GOLDEN RAGWORT	Asteraceae	7		-3	FACW	N Forb	4	4
SETPUMI	SETARIA PUMILA	YELLOW FOXTAIL	Poaceae		-1	0	FAC	A Grass	1	1
SILLATI	SILENE PRATENSIS	WHITE COCKLE	Caryophyllaceae		-2	5	UPL	A Forb	1	1
SILVULG	SILENE VULGARIS	BLADDER CAMPION	Caryophyllaceae		-1	5	UPL	A Forb	2	2
SIUSUAV	Sium suave	WATER-PARSNIP	Apiaceae	4		-5	OBL	N Forb	5	14
SMIHERB	Smilax herbacea	CARRION-FLOWER	Smilacaceae	5		0	FAC	N Forb	7	15
SMIHISP	Smilax hispida	BRISTLY GREEN-BRIER	Smilacaceae	6		0	FAC	N Vine	8	18
SOLALTI	Solidago altissima	TALL GOLDENROD	Asteraceae	1		3	FACU	N Forb	8	39
SOLCAES	Solidago caesia	BLUE-STEMMED GOLDENROD	Asteraceae	5		3	FACU	N Forb	2	6
SOLCANA	Solidago canadensis	CANADA GOLDENROD	Asteraceae	1		3	FACU	N Forb	5	7

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SOLCASL	Solidago canadensis complex	CANADA GOLDENROD GROUP	Asteraceae	1		3	FACU	N Forb	6	13
SOLDULC	SOLANUM DULCAMARA	BITTERSWEET NIGHTSHADE	Solanaceae		-2	0	FAC	A Vine	8	66
SOLFLEX	Solidago flexicaulis	BROAD-LEAVED GOLDENROD	Asteraceae	6		3	FACU	N Forb	8	43
SOLGIGA	Solidago gigantea	LATE GOLDENROD	Asteraceae	4		-3	FACW	N Forb	4	13
SOLNEMO	Solidago nemoralis	OLD-FIELD GOLDENROD	Asteraceae	2		5	UPL	N Forb	2	2
SOLPATU	Solidago patula	SWAMP GOLDENROD	Asteraceae	8		-5	OBL	N Forb	4	6
SOLPTYC	SOLANUM NIGRUM	BLACK NIGHTSHADE	Solanaceae		-1	0	FAC	A Forb	3	5
SOLRUGO	Solidago rugosa	ROUGH GOLDENROD	Asteraceae	4		-1	FAC+	N Forb	7	19
SONCHU.	Sonchus sp.	SOW THISTLE (UNSPECIFIED)	Asteraceae		-1			A Forb	8	13
SORAUCU	SORBUS AUCUPARIA	EUROPEAN MOUNTAIN-ASH	Rosaceae		-2	5	UPL	A Tree	5	8
SPAEURY	Sparganium eurycarpum	COMMON BUR-REED	Sparganiaceae	3		-5	OBL	N Forb	4	6
SPHINTE	Sphenopholis intermedia	SLENDER WEDGEGRASS	Poaceae	6		0	FAC	N Grass	1	1
SPIALBA	Spiraea alba	MEADOWSWEET	Rosaceae	3		-4	FACW+	N Shrub	7	31
STACHY.	Stachys sp.	HEDGE NETTLE (UNSPECIFIED)	Lamiaceae	7				N Forb	4	5
STAHISP	Stachys hispida	HEDGE NETTLE	Lamiaceae	7		-4	FACW+	N Forb	1	1
STAPALU	STACHYS PALUSTRIS	WOUNDWORT	Lamiaceae		-1	-5	OBL	A Forb	1	1
STATRIF	Staphylea trifolia	BLADDERNUT	Staphyleaceae	7		0	FAC	N Shrub	2	5
STEGRAM	STELLARIA GRAMINEA	STARWORT	Caryophyllaceae		-2	5	UPL	A Forb	4	6
STEMEDI	STELLARIA MEDIA	COMMON CHICKWEED	Caryophyllaceae		-1	3	FACU	A Forb	5	9
STRROSE	Streptopus roseus	ROSE TWISTED-STALK	Liliaceae	7		0	FAC	N Forb	1	1
SYMFOET	Symplocarpus foetidus	SKUNK-CABBAGE	Araceae	7		-5	OBL	N Forb	7	32
TANVULG	TANACETUM VULGARE	GARDEN TANSY	Asteraceae		-1	5	UPL	A Forb	1	1
TAROFFI	TARAXACUM OFFICINALE	COMMON DANDELION	Asteraceae		-2	3	FACU	A Forb	8	52
TAXCANA	Taxus canadensis	CANADIAN YEW	Taxaceae	7		3	FACU	N Shrub	2	3
THADIOI	Thalictrum dioicum	EARLY MEADOW-RUE	Ranunculaceae	5		2	FACU+	N Forb	8	39
THAPUBE	Thalictrum pubescens	HAIRY MEADOW-RUE	Ranunculaceae	5		-2	FACW-	N Forb	8	27
THENOVE	Thelypteris noveboracensis	NEW YORK FERN	Thelypteridaceae	7		-1	FAC+	N Fern	3	4
THEPALU	Thelypteris palustris	MARSH FERN	Thelypteridaceae	5		-4	FACW+	N Fern	7	17
THUOCCI	Thuja occidentalis	ARBOR VITAE	Cupressaceae	4		-3	FACW	N Tree	6	21
TIACORD	Tiarella cordifolia	FOAMFLOWER	Saxifragaceae	6		1	FAC-	N Forb	8	32
TILAMER	Tilia americana	BASSWOOD	Tiliaceae	4		3	FACU	N Tree	8	55
TRAPRAT	TRAGOPOGON PRATENSIS	COMMON GOAT'S BEARD	Asteraceae		-1	5	UPL	A Forb	2	3
TRIAURA	Triosteum aurantiacum	HORSE-GENTIAN	Caprifoliaceae	7		5	UPL	N Forb	5	10
TRIBORE	Trientalis borealis	STARFLOWER	Primulaceae	6		-1	FAC+	N Forb	5	9
TRIEREC	Trillium erectum	STINKING BENJAMIN	Liliaceae	6		1	FAC-	N Forb	8	41
TRIFRAS	Triadenum fraseri	MARSH ST. JOHN'S-WORT	Guttiferae	7		-5	OBL	N Forb	1	2
TRIGRAN	Trillium grandiflorum	COMMON TRILLIUM	Liliaceae	5		5	UPL	N Forb	8	51
TRIPRAT	TRIFOLIUM PRATENSE	RED CLOVER	Fabaceae		-2	2	FACU+	A Forb	5	5
TRIREPE	TRIFOLIUM REPENS	WHITE CLOVER	Fabaceae		-1	2	FACU+	A Forb	6	7
TSUCANA	Tsuga canadensis	HEMLOCK	Pinaceae	7		3	FACU	N Tree	3	9
TUSFARF	TUSSILAGO FARFARA	COLTSFOOT	Asteraceae		-2	3	FACU	A Forb	6	10
TYPANGU	Typha angustifolia	NARROW-LEAVED CAT-TAIL	Typhaceae	3		-5	OBL	N Forb	3	5
TYPLATI	Typha latifolia	BROAD-LEAVED CAT-TAIL	Typhaceae	3		-5	OBL	N Forb	7	15
ULMAMER	Ulmus americana	WHITE ELM	Ulmaceae	3		-2	FACW-	N Tree	8	60

SP_CODE	SCIENTIFIC NAME	COMMON NAME	FAMILY	CC	WEED	CW	WETNESS	TYPE	# OF LNDS	# OF PTCH
URTDIOG	Urtica dioica ssp. gracilis	NETTLE	Urticaceae	2		-1	FAC+	N Forb	2	3
URTDIOI	Urtica dioica ssp. gracilis	NETTLE	Urticaceae	2		-1	FAC+	N Forb	8	25
UTRVULG	Utricularia vulgaris	GREAT BLADDERWORT	Lentibulariaceae	4		-5	OBL	N Forb	1	1
UVUGRAN	Uvularia grandiflora	LARGE-FLOWERED BELLWORT	Liliaceae	6		5	UPL	N Forb	6	10
VACANGU	Vaccinium angustifolium	BLUEBERRY	Ericaceae	6		3	FACU	N Shrub	1	1
VACCORY	Vaccinium corymbosum	SMOOTH HIGHBUSH BLUEBERRY	Ericaceae	8		-3	FACW	N Shrub	2	3
VACPALL	Vaccinium pallidum	BLUEBERRY	Ericaceae	9		5	UPL	N Shrub	1	1
VERAMER	Veronica americana	AMERICAN BROOKLIME	Scrophulariaceae	6		-5	OBL	N Forb	1	1
VERANAG	VERONICA ANAGALLIS-AQUATICA	WATER SPEEDWELL	Scrophulariaceae		-1	-5	OBL	A Forb	5	6
VERHAST	Verbena hastata	BLUE VERVAIN	Verbenaceae	4		-4	FACW+	N Forb	7	15
VEROFFI	VERONICA OFFICINALIS	COMMON SPEEDWELL	Scrophulariaceae		-2	5	UPL	A Forb	8	18
VERSERP	Veronica serpyllifolia	THYME-LEAVED SPEEDWELL	Scrophulariaceae	0		-3	FACW	N Forb	3	4
VERSTRI	Verbena stricta	HOARY VERVAIN	Verbenaceae	7		5	UPL	N Forb	1	1
VERTHAP	VERBASCUM THAPSUS	COMMON MULLEIN	Scrophulariaceae		-2	5	UPL	A Forb	5	9
VERURTI	Verbena urticifolia	WHITE VERVAIN	Verbenaceae	4		-1	FAC+	N Forb	5	7
VIBACER	Viburnum acerifolium	MAPLE-LEAVED ARROW-WOOD	Caprifoliaceae	6		5	UPL	N Shrub	8	30
VIBCASS	Viburnum cassinoides	WITHE-ROD	Caprifoliaceae	7		-3	FACW	N Shrub	1	1
VIBLENT	Viburnum lentago	NANNYBERRY	Caprifoliaceae	4		-1	FAC+	N Shrub	8	51
VIBOPUL	VIBURNUM OPULUS	EUROPEAN HIGHBUSH CRANBERRY	Caprifoliaceae		-1	0	FAC	A Shrub	5	6
VIBRAFI	Viburnum rafinesquianum	DOWNY ARROW-WOOD	Caprifoliaceae	7		5	UPL	N Shrub	1	2
VIBTRIL	Viburnum trilobum	HIGHBUSH CRANBERRY	Caprifoliaceae	5		-3	FACW	N Shrub	6	14
VICCRAC	VICIA CRACCA	BIRD VETCH	Fabaceae		-1	5	UPL	A Forb	3	4
VIOBLAN	Viola blanda	SWEET WHITE VIOLET	Violaceae	6		-2	FACW-	N Forb	2	3
VIOCANA	Viola canadensis	CANADA VIOLET	Violaceae	6		5	UPL	N Forb	4	4
VIOCONS	Viola conspersa	DOG VIOLET	Violaceae	4		-2	FACW-	N Forb	8	25
VIOCUCU	Viola cucullata	MARSH VIOLET	Violaceae	5		-5	OBL	N Forb	7	39
VIOMACL	Viola macloskeyi	SMOOTH WHITE VIOLET	Violaceae	6		-5	OBL	N Forb	1	2
VIOPUBE	Viola pubescens	YELLOW VIOLET	Violaceae	5		4	FACU-	N Forb	8	47
VIOROST	Viola rostrata	LONG-SPURRED VIOLET	Violaceae	6		3	FACU	N Forb	2	2
VIOSORO	Viola sororia	COMMON BLUE VIOLET	Violaceae	4		1	FAC-	N Forb	8	48
VITRIPA	Vitis riparia	RIVERBANK GRAPE	Vitaceae	0		-2	FACW-	N Vine	8	59
WALFRAG	Waldsteinia fragarioides	BARREN-STRAWBERRY	Rosaceae	5		5	UPL	N Forb	2	3
WOLBORE	Wolffia borealis	DOTTED WATER MEAL	Lemnaceae	4		-5	OBL	N Forb	2	3
ZANAMER	Zanthoxylum americanum	PRICKLY-ASH	Rutaceae	3		5	UPL	N Shrub	1	1

APPENDIX D: DATA USED IN FLORAL SURVEY ANALYSIS

TRIAL LNDSCP	PATCH	WEED SPECIES RICHNESS	NATIVE SPECIES RICHNESS	MEAN CONSERVATISM	FQI	LOG PATCH AREA	LOG CORE AREA	LOCAL FOREST COVER	EDGE/ TOTAL RATIO	COMMUNITY RICHNESS	DISTURBANCE INDEX	YEARS SINCE LOGGING	OLDEST COMMUNITY
1	297	6	143	4.7535	56.84	0.886	0.0006	3.679	1.4	2	20	3	3
1	307	44	158	4.1911	52.68	1.713	0.0436	4.125	1.1	6	22	3	2
1	308	21	149	4.2081	51.37	0.838	0.0000	3.783	1.6	4	25	35	3
1	317	20	201	4.7960	68.00	1.759	0.0291	3.650	1.2	9	12	13	3
1	322NE	22	63	2.9841	23.69	0.435	0.0000	3.253	1.6	2	10	3	1
1	322SE	21	74	3.2466	27.93	0.489	0.0000	3.356	1.6	2	9	3	2
1	322W	25	93	3.2581	31.42	0.681	0.0000	3.333	1.6	2	17	3	2
1	336S	5	52	3.5962	25.93	0.364	0.0000	5.057	1.6	1	9	2	3
1	338	34	271	4.6236	76.11	1.953	0.0307	4.256	1.3	14	19	35	3
1	348	10	105	4.3048	44.11	0.950	0.0000	4.045	1.6	3	10	35	1
1	351	4	73	4.4658	38.16	1.259	0.0047	4.681	1.3	1	8	3	2
2A	167	7	66	3.8333	31.14	0.777	0.0000	1.798	1.6	3	15	13	3
2A	168	6	82	4.5122	40.86	0.669	0.0000	1.632	1.6	1	5	22	4
2A	169E	7	61	4.2623	33.29	0.405	0.0000	1.480	1.6	2	6	22	3
2A	169N	10	74	4.4459	38.25	0.853	0.0003	1.546	1.5	1	8	35	1
2A	169S	15	116	4.4522	47.95	1.002	0.0010	1.261	1.4	3	11	35	3
2A	175	7	44	3.6364	24.12	0.485	0.0000	1.453	1.6	1	21	22	2
2A	176	8	79	4.0506	36.00	1.036	0.0012	1.447	1.4	2	15	35	3
2A	177	26	132	4.2197	48.48	1.133	0.0058	1.544	1.2	4	19	35	3
2A	219	26	132	3.8712	44.48	1.490	0.0229	1.842	1.1	5	28	35	3
2A	232	15	91	3.9011	37.21	1.427	0.0208	2.052	1.1	2	21	35	4
2B	241	4	103	4.3107	43.75	1.030	0.0025	0.983	1.3	4	14	13	3
2B	255	11	121	4.2083	46.29	1.376	0.0012	1.144	1.5	3	13	22	3
2B	260	12	98	3.9490	39.09	0.728	0.0000	1.244	1.6	3	14	13	3
2B	268	9	60	3.6833	28.53	0.376	0.0000	1.310	1.6	1	10	22	3
2B	269	6	73	4.0685	34.76	0.559	0.0000	1.415	1.6	1	16	22	3
2B	270	13	149	4.3893	53.58	1.221	0.0078	1.404	1.2	6	16	35	3
2B	274	8	89	3.9326	37.10	0.986	0.0004	1.253	1.5	4	16	22	2
2B	277	13	106	4.0755	41.96	1.298	0.0055	1.256	1.3	3	24	35	2
2B	278	23	107	4.1963	43.41	0.736	0.0000	1.171	1.6	2	20	35	3
2B	293	10	63	4.6032	36.54	0.834	0.0000	1.272	1.6	1	20	13	3

TRIAL LNDSCP	PATCH	WEED SPECIES RICHNESS	NATIVE SPECIES RICHNESS	MEAN CONSERVATISM	FQI	LOG PATCH AREA	LOG CORE AREA	LOCAL FOREST COVER	EDGE/ TOTAL RATIO	COMMUNITY RICHNESS	DISTURBANCE INDEX	YEARS SINCE LOGGING	OLDEST COMMUNITY
2C	137	14	150	4.5503	55.73	1.797	0.1122	0.592	0.8	5	15	3	2
2C	151	6	74	4.0270	34.64	0.653	0.0000	0.899	1.6	2	10	35	3
2C	153	8	55	4.5273	33.58	1.314	0.0208	0.776	1.0	1	18	35	3
2C	154	11	80	3.7875	33.88	0.594	0.0000	1.242	1.6	1	14	35	3
2C	156	7	54	4.0926	30.07	0.324	0.0000	0.461	1.6	1	12	35	3
2C	157	7	53	3.8113	27.75	0.406	0.0000	0.482	1.6	2	9	35	2
2C	160	13	78	4.0641	35.89	0.974	0.0007	0.647	1.4	3	24	35	4
2C	166E	11	33	3.9394	22.63	0.559	0.0000	0.837	1.6	1	40	35	3
2C	166W	10	45	3.8000	25.49	0.571	0.0000	0.862	1.6	1	17	22	2
3	101	28	185	4.5246	61.54	1.830	0.0761	2.571	1.0	6	14	35	3
3	29	20	140	4.2786	50.63	1.265	0.0077	2.024	1.2	5	8	22	3
3	53	33	179	4.2793	57.25	1.357	0.0000	3.283	1.6	6	16	35	3
3	54	18	133	4.1203	47.52	0.667	0.0000	2.909	1.6	6	17	13	2
3	55	7	78	4.2564	37.59	0.719	0.0000	2.774	1.6	1	8	13	3
3	56	26	168	4.4702	57.94	1.453	0.0015	2.872	1.5	3	15	35	3
4	108	6	106	4.1136	42.35	0.943	0.0009	1.910	1.4	2	12	22	3
4	114	28	208	4.5094	65.04	2.115	0.2048	2.108	0.8	10	25	22	4
4	119	11	78	4.7053	41.56	0.321	0.0000	3.533	1.6	3	20	3	2
4	120	11	143	3.9103	46.76	1.191	0.0001	3.569	1.5	4	18	35	4
4	130	9	114	4.5524	48.61	0.769	0.0000	2.668	1.6	2	25	35	3
4	3	13	88	4.2018	39.42	0.678	0.0000	0.622	1.6	2	10	35	3
5	12	6	109	4.5185	47.17	0.998	0.0010	1.306	1.4	3	11	13	3
5	16	17	99	3.9899	39.70	1.018	0.0000	1.316	1.6	1	34	35	3
5	18	22	114	3.9912	42.61	1.424	0.0292	1.494	1.0	5	16	22	3
5	19	9	68	3.5294	29.10	1.112	0.0001	1.882	1.5	2	11	22	1
5	23E	5	92	4.4783	42.95	0.867	0.0000	1.612	1.6	2	16	13	3
5	23W	31	140	4.1429	49.02	1.226	0.0097	1.665	1.2	4	20	13	3
5	24	8	66	3.7273	30.28	0.681	0.0000	1.009	1.6	1	10	35	2
5	27	11	91	3.8242	36.48	1.344	0.0145	1.710	1.2	2	20	35	2
5	335	7	102	4.4902	45.35	0.852	0.0006	0.983	1.4	3	12	22	3

TRIAL LNDSCP	PATCH	WEED SPECIES RICHNESS	NATIVE SPECIES RICHNESS	MEAN CONSERVATISM	FQI	LOG PATCH AREA	LOG CORE AREA	LOCAL FOREST COVER	EDGE/ TOTAL RATIO	COMMUNITY RICHNESS	DISTURBANCE INDEX	YEARS SINCE LOGGING	OLDEST COMMUNITY
6	179	13	98	4.4286	43.84	0.223	0.0000	3.590	1.6	1	19	35	3
6	180	35	57	3.3860	25.56	0.663	0.0000	2.574	1.6	2	35	3	1
6	182	4	40	4.9000	30.99	0.632	0.0000	2.525	1.6	2	18	22	4
6	183	11	35	3.9714	23.50	0.536	0.0000	2.303	1.6	1	21	22	3
6	184	6	69	4.4493	36.96	0.956	0.0009	1.759	1.4	3	19	13	3
6	188	26	92	3.9556	37.94	0.977	0.0000	3.419	1.6	5	19	22	4
6	189	25	111	4.1892	44.14	1.079	0.0044	3.160	1.3	3	18	35	3
6	198	55	282	4.4588	74.88	2.074	0.1305	3.395	1.0	15	24	22	3
6	200	7	81	4.2963	38.67	0.687	0.0000	3.861	1.6	3	9	35	2