An Ecological Study of Wolf's Bog, Cheboygan County, Michigan[1]

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INTRODUCTION

Wolf's bog has beeen a subject of ecologic interest, because, although it contains the finest example of subclimax Thuja forest in the region, obvious evidence of the beginning of succession to the beach-maple forest, the regional climax, is making headway in it.

LOCATION

Wolf's bog is located in the northern part of sections 13 and 14, Munro township, Cheboygan county, Michigan. It is approximately six miles northeast of the University of Michigan Biological Station, on Douglas Lake. This now lakeless bog covers an area of about 190 acres.

DESCRIPTION

The bog is located in a very evident depression. The last stages of the lake, which was in the northeast edge of the bog, lost its natural vegetation about 1916, when it was transformed into a sawmill pond. When the sawmill was abandoned, vegetation filled in the pond area. At the present time all evidence of this area, with its strictly aquatic plants, has disappeared.

The stream which enters the area at the extreme northeast corner is due to spring floods caused by heavy snows. The stream bed connects with a pond north of the road, and after winding through the climax Thuja it branches to such an extent that its course is extremely hard to follow. These anastomosing branches end in the Salix-Alnus association south of the Thuja. The very evident rise in land at the western and southern boundaries of the bog limit its extent in those directions. Pasture in a cut-over area and a cultivated field also aid in determining the northern boundary. A hardwood forest occupies the ridge on the west, and the Mud Lake Hardwoods connect with the eastern boundary in its central portion.

The land within the bog area has become stabilized. In no place is there found open water surrounded by a quaking mat of vegetation. It follows that only a few species of pioneer bog plants remain, even though there is a great variety of other types of vegetation.

Biotic factors have decidedly influenced the development of Wolf's bog. On the fingerlike projection at the southwestern part of the bog, where Picea is the dominant tree, much second growth Thuja is found. Investigation revealed that a number of Picea trees are being attacked by the mistletoe, *Arceuthobium pusillum*. The presence of dead uncharred Picea indicates the same destruction in the past.

A Larix cemetery of very tall trees is located south of the Picea projection. Since sawfly larvae have destroyed by defoliation most of the Larix trees of

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1. The work was done under the direction of Dr. F. C. Gates during the 1936 and 1937 summer sessions of the University of Michigan Biological Station.

this region, it is assumed that such destruction likewise occurred in this particular part of Wolf's bog.

The removal of Christmas trees and extensive lumbering have greatly reduced the number of conifers throughout the entire bog. The lumbering operations which began before the time of the sawmill, first removed great amounts of Thuja, but the more recent lumbering has taken place in the far southwestern part of the Picea projection. Continuation of such lumbering will tend to obliterate this part of the bog forest, because the light conditions of the soil will be different, the effects of wind and precipitation will increase, and the soil structure will change markedly. The existing bog plants, both high and low, will eventually be replaced by the bushes of the adjoining Salix-Alnus associations.

After the trees at the southwestern part had been removed by fire, the owner cut remaining trees and bushes to make pasture. As a result, few species of ground plants occur. Certain grasses with underground rhizomes, such as *Agropyrum repens,* will best bear the pasturing. A new community of weeds, including *Amaranthus graecizans, Chenopodium album* and *Artemisia annua,* has been established in a field adjoining the southeastern corner of the bog.

The pyric factor has been an important one in the development of the bog. The area has been swept by fire at least three times in the past thirty years. The last and most destructive fire occurred in 1918, when most of the southern part of the climax Thuja was destroyed. Many large charred trunks are found throughout the dense growth of Salix and Alnus which now cover the area where greatest destruction took place.

Depths to sand vary in the different associations of the bog, but in no place is there a great accumulation of humus. The lack of water and the shallow basin account for the greater oxidation of vegetation. In the climax Thuja the greatest depth found is 90 centimeters. At a place in the principal east-west path the greatest depth is 60 centimeters. The average depth to sand in the Thuja is 35 centimeters. The other extreme is found on the Prunus ridge, where sand covers approximately ninety percent of the entire surface.

As shown in table No. 1, data taken with a quinhydron electric potentiometer, at the place of greatest accumulation of organic material, show the soil to be alkaline from the surface down about 20 cm., below which the reaction is acid.

TABLE No. 1. The hydrogen ion concentration of the organic soil accumulation at different depths in the Thuja climax Association of Wolf's Bog.

1.	At the surface	pH 7.4
2.	At a 10 cm. depth	pH 7.4
3.	At a 20 cm. depth	pH 7.0
4.	At a 30 cm. depth	pH 6.94
5.	At a 40 cm. depth	pH 6.9
6.	At a 50 cm. depth	pH 6.86
7.	At a 60 cm. depth	pH 6.86
8.	At a 70 cm. depth	pH 6.86
9.	At a 80 cm. depth	pH 6.86
10.	At a 85 cm. depth	pH 6.86

GENERAL DESCRIPTION OF THE VARIOUS ASSOCIATIONS

(1) Thuja Climax

The densest growth of Thuja is found in the lower part of the depression occupied by the bog. Many years ago the Thuja forest covered a much larger area. Thuja stumps and fallen logs of great circumference are found in all of the bog subareas except that dominated by *Prunus pennsylvanica*. This forest contains the largest Thuja ever found in the Douglas Lake region. Their diameters range from 60 centimeters to a meter, and the age of one of the largest is estimated to have been approximately four hundred years.

In a count of mature trees the following approximate percentages of species were found: *Thuja occidentalis*, 62; *Tsuga canadensis*, 18; *Acer rubrum*, 14; *Abies balsamea*, 2; *Betula papyrifera* 2; *Sorbus americana*, 2. Results obtained from field work carried on in 1937 shows that this climax Thuja is not going to be replaced by young Thuja and is therefore entering into a stage of succession. In a series of seven-point observation areas, each consisting of twenty square meters, interesting data concerning comparative density of deciduous and coniferous seedlings were observed. In the dense Thuja areas the average density (ground coverage) of seedlings of deciduous trees was over nine times that of seedlings of conifers. (See table No. 2.) This large number of deciduous seedlings and saplings, taken with their healthy condition, is the best evidence of the onset of succession.

The greater part of the bog area is flooded in the spring, and evidences show that this is particularly true in this Thuja subarea. The ground surface is covered with hummocks, and the tree needles on its surface are cemented together into huge masses. The presence of *Typha latifolia* and many species of Carex are indicatory of this. The fallen logs on which luxuriant growths of mosses occur could hardly have obtained their ample supply of moisture in any way except through flooding.

Very little ground vegetation is found within the forest because of the deep shade cast by the larger Thuja. The greatest amount of ground vegetation is found in the lumbering paths and along the stream bed. The species found most commonly with the Thuja here include: *Coptis trifolia, Galium triflorum, Mitella nuda, Rubus triflorus, Maianthemum canadense, Viola pallens, Trillium grandiflorum, Arisaema triphyllum*, and *Aspidium thelypteris*. The grass found most abundantly in this region is *Brachyelytrum erectum*.

(2) Picea-Abies Association

The association dominated by Picea and Abies is found in the projection located southwest of the cilmax Thuja. The Thuja here are not as large nor as abundant as in the first area.

Work carried on in 1937 shows that in this area there are very many more coniferous seedlings than deciduous. It is concluded that this is the part of the bog in which most growth toward the typical high bog forest is taking place.

The ground vegetation is made up of a greater number of species than that of the Thuja climax. The explanation is that the ground is not so densely shaded by the smaller Picea and Abies, and that more moisture is retained

TABLE 2.—Point observation data, showing the density of vegetation at different levels (quadrats each two square meters in area; full coverage expressed as 100).

AREA I.—CLIMAX THUJA.

QUADRAT	1	2	3	4	5	6	7	8	9	10	Total density.
Levels of Plant Growth.											
Trees	100	75	80	80	65	100	100	100	80	100	880
High shrubs	0	1	0	0	12	0	10	2	0	0	25
Low shrubs	40	2	7	15	25	40	5	10	2.5	2.5	149
Ground cover	1.3	3.8	5.4	2.3	2.5	1.8	4.6	5.5	4.6	6.3	38.1
Tree trunks	5	3	2	4	6	10	7	10	6	8	61
Seedling conifers	0	0	0	0	0	0	0	0	.3	0	.3
Seedling deciduous trees	0	0	.8	.5	.3	0	.3	.5	.3	.3	3.0
Seedling shrubs	.3	0	.3	.3	.3	0	.3	0	0	0	1.5
Grasses and sedges	0	.3	0	0	.3	.3	0	0	0	0	0.9
Forbs	1	.5	.3	0	.3	.5	1	3	1	5	12.6
Moss cover	0	3	4	1.5	1.3	1	3	2	3	1	19.8

AREA II.—PICEA-ABIES PROTECTION.

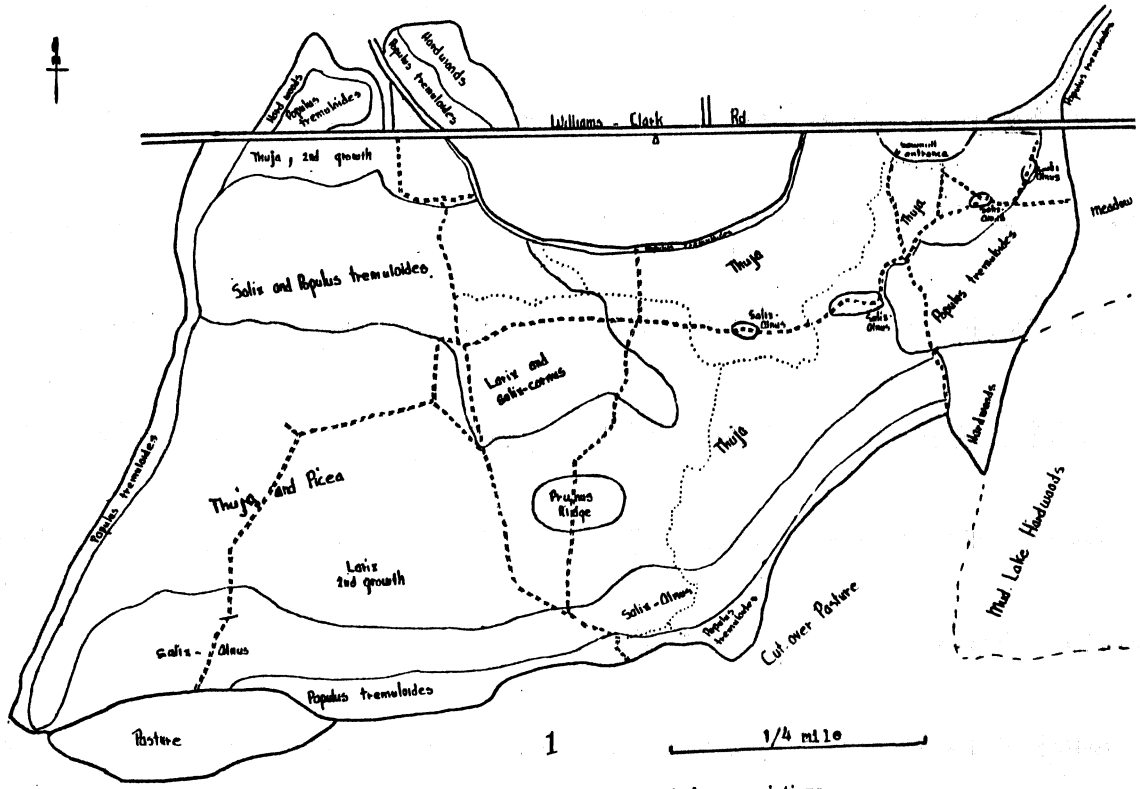
QUADRAT	1	2	3	4	5	6	7	8	9	10	Total density.
Levels of plant growth.											
Trees	10	100	50	90	80	0	50	100	100	100	680
High shrubs	30	10	0	10	0	80	50	10	10	0	200
Low shrubs	50	25	75	60	22	50	28	100	100	10	520
Ground cover	19.	3.3	12.3	1.6	9.5	7.6	4.8	1.3	3.8	18.4	81.6
Tree trunks	1	10	3	7	9	1	2	1.5	4	2	40.5
Seedling conifers	4	.3	.3	.8	.5	.3	.8	.8	.3	.4	8.5
Seedling deciduous trees	0	0	0	0	0	.3	0	0	0	0	0.3
Grasses and sedges	3	0	8	.3	5	2	2	0	0	4	24.3
Forbs	2	1	1	.5	3	1	2	.5	.5	10	21.5
Mosses	10	2	3	0	1	4	0	0	3	4	27.0

in the ground because of the large quantities of Sphagnum. It is in the paths of this moist area that the rare bog plants are found. Examples of such plants are: *Drosera rotundifolia, Cypripedium parviflorum, Cypripedium reginae, Arethusa bulbosa, Listera convallarioides* and *Spiranthes romanzoffiana.*

(3) LARIX ASSOCIATION

The Larix in Wolf's bog is second growth, and has developed since the devastating work of the sawfly larvae in 1916-1918. However, much of the first growth may have been removed by fire, for there are many charred stumps. Larix trees are very shallow rooted, and the loss from windfall may have been great. Only one of the first growth Larix trees remains in this central part. The age of the younger trees averages twenty-five years.

The shrub and tree count showed the following approximate percentages of species; : *Larix laricina,* 60; *Populus tremuloides,* 14; *Salix* spp, 10; *Picea mariana,* 6; *Thuja occidentalis,* 6; *Cornus stolonifera,* 2; *Populus balsamifera,* 2. One characteristic of this association is the presence of a great quantity of shrubs and a dense ground cover of a great variety of species. Species of ground vegetation which occur most frequently are: *Botrychium virginianum, Chiogenes hispidula, Cypripedium parviflorum, Eriophorum viridi-carinatum, Vaccinium oxycoccus, Lycopus americanus, Rubus triflorus, Fragaria virginiana.*



MAP 1. Wolf's bog, showing the present-day associations

South of the Picea-Abies projection is a long narrow area which contains many extremely tall dead Larix trunks. All the older living Larix have disappeared. Their destruction has probably been caused by the sawfly larvae. A very dense growth of small Larix is found here. The size of these trees indicate an approximate age of twenty years. These young trees take so much of the ground space that there is little left for other vegetation. This zone gradually changes into a high bog shrub association dominated by *Salix* spp. and *Alnus incana.*

(4) Salix-Alnus High Bog Shrub Association

The high bog shrub association in the area is dominated by *Alnus incana* and various species of Salix. It is found in the eastern part of the bog, south and east of the climax Thuja, and again south of the Piceas-Abies finger. There is also an extensive area south of the Larix cemetery; this forms an irregular zone paralleling the southern boundary, but in most cases separated from it by an area dominated by *Populus tremuloides.*

Where the Salix-Alnus occurs in the eastern part of the bog, two other associations are found quite generally mixed with it. In the more northerly part is much *Populus tremuloides,* and *Larix laricina* is found in the southerly section. Furthermore, charred logs and invading conifers indicate that this particular part of the association is very unstable.

At this place there is a tendency for *Cornus stolonifera* to replace Alnus as a dominant with the Salix. The shrubs are low; there is abundant sunlight, and a considerable Sphagnum mat to retain the moisture. Such soil and light conditions are conducive to a great variety of species. The close contact with neighboring associations greatly increases that number.

South of the Picea-Abies projection and south of the Larix cemetery the shrubs form such dense clumps that passage through this area is very difficult. Many small trees of Picea, Larix and Thuja are present. The Salix and Alnus are taller than those in the part of the association discussed above, and so close together that the ground is densely shaded. The straggly appearance of the ground plants indicates the need for more light, if they are to survive.

A count of trees and shrubs showed the following approximate percentages: *Alnus incana,* 50; *Salix* sp., 34; *Betula papyrifera,* 10; *Abies balsamea,* 4; *Populus tremuloides,* 2. The following species of ground plants found quite generally are: *Typha latifolia, Maianthemum canadense, Fragaria virginiana, Eupatorium purpureum, Cirsium arvense, Solidago* sp., *Aralia nudicaulis, Viola canadensis, Coptis trifolia, Clintonia borealis, Ledum groenlandicum, Eriophorum viridi-carinatum* and *Rubus strigosus.*

(5) Populus Tremuloides Association

Associations in which *Populus tremuloides* dominates are found irregularly distributed within the bog. The part of the *Populus tremuloides* adjoining the northern climax Thuja and extending to the meadow on the east is the most representative. The charred and cut logs show this to be a secondary association caused by the destruction of fire and lumbering in a Thuja association. The disturbing factor evidently ended suddenly, for just across the path from the northern edge of the *Populus tremuloides* is the old climax Thuja association.

The trees at this particular place, as is true of the aspens in Wolf's bog, are medium sized or small. A tree count gives the following approximate percentages: *Salix* spp., 40; *Populus tremuloides*, 36; *Betula papyrifera*, 12; *Alnus incana*, 4; *Picea mariana*, 4; *Abies balsamea* 2; *Acer rubrum*, 2.

The invasion of the area by the Mud Lake hardwoods from the south and east is shown by an increasing number of seedlings and saplings of *Acer saccharum* and *Tilia americana*. Then coniferous seedlings and saplings from the Thuja association at the north and west have also invaded this area. In addition to the invading plants from these two associations, there are also invaders from the Salix-Alnus association and from the nearby pasture. The ground vegetation consequently includes a mixture of species, including: *Pteris aquilina, Hieracium aurantiacum, Epilobium angustifolium, Aralia nudicaulis, Lactuca canadensis, Trifolium repens, Fragaria virginiana, Gaultheria procumbens, Achillea millefolium*, and *Rumex acetosella*.

(6) Prunus Pennsylvanica Association

The prunus association is located on an oval shaped sandy east-west ridge about 400 meters wide and 900 meters long. Its presence is due to glacial deposition. The presence of charred logs indicates that it did not escape the ravages of fire.

The small amount of ground vegetation supported by the sandy soil is stunted or dying. None of the prunus trees exceed a height of 10 meters. A tree count gives the following approximate percentages: *Prunus pennsylvanica*, 86; *Acer rubrum*, 12; *Picea mariana*, 2. The following ground plants are found: *Epilobium angustifolium, Fragaria virginiana, Phleum pratense, Diervilla lonicera, Hieracium aurantiacum, Verbascum thapsus* and *Pteris aquilina*. Mosses of the genera Ceratodon and Polytrichum form a brownish cover over much of the ground surface.

There seems to be an invasion from the west of young Larix and *Picea mariana*, but their growth will probably be not extensive because of the elevation of the area.

SUMMARY

1. Wolf's bog, a tree-covered lakeless area in Cheboygan county, Michigan, exhibits six types of vegetation: (1) Thuja, the climax forest, found in the deepest part of the depression; (2) Picea-Abies, which extends over a slightly higher area; (3) Larix, which forms a second growth area where the plant successions have been most disturbed; (4) High bog shrub, dominated by Salix and Alnus, which forms an intermedial zone between the *Populus tremuloides* area and the Thuja; (5) *Populus tremuloides*, on the clayey elevations; (6) *Prunus pennsylvanica*, on a sandy ridge.

2. Fires have swept over parts of the area several times in the last thirty years. Lumbering, attacks of the sawfly larvae, and the growth of the mistletoe, *Arceuthobium pusillum*, are important factors in producing the present stage of bog development in the area studied.

3. Approximately 270 species of plants, representing 54 families of Spermatophytes, 3 of Pteridophytes and 18 of Bryophytes, have been collected.

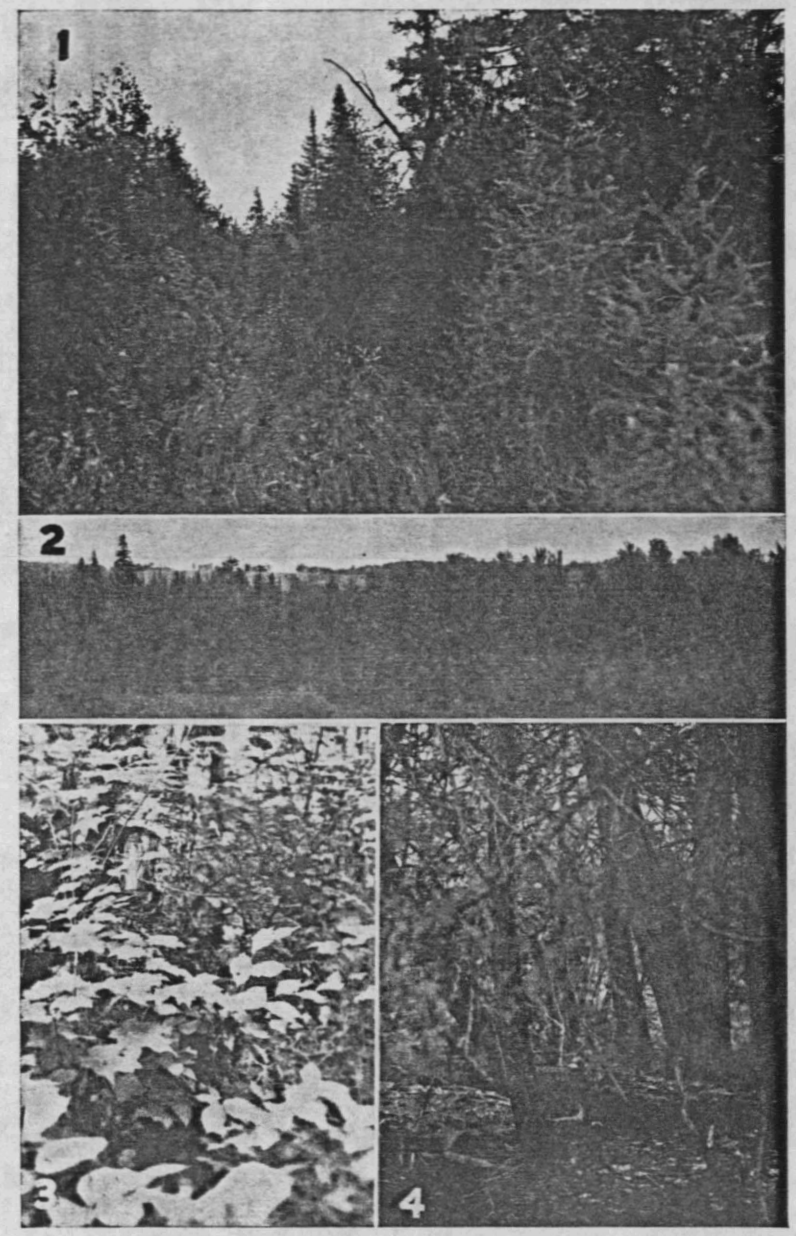
4. It seems evident from the appearance of many seedlings, saplings and occasional tree representatives of the beech-maple plant association within the climax Thuja that the successional tendency is toward the beech-maple forest.

VIEWS OF WOLF'S BOG

FIG. 1. Characteristic vegetation at northeast entrance.
FIG. 2. General view from the northward.
FIG. 3. Invasion of beech-maple elements into the Thuja association.
FIG. 4. A dense part of the Thuja association.

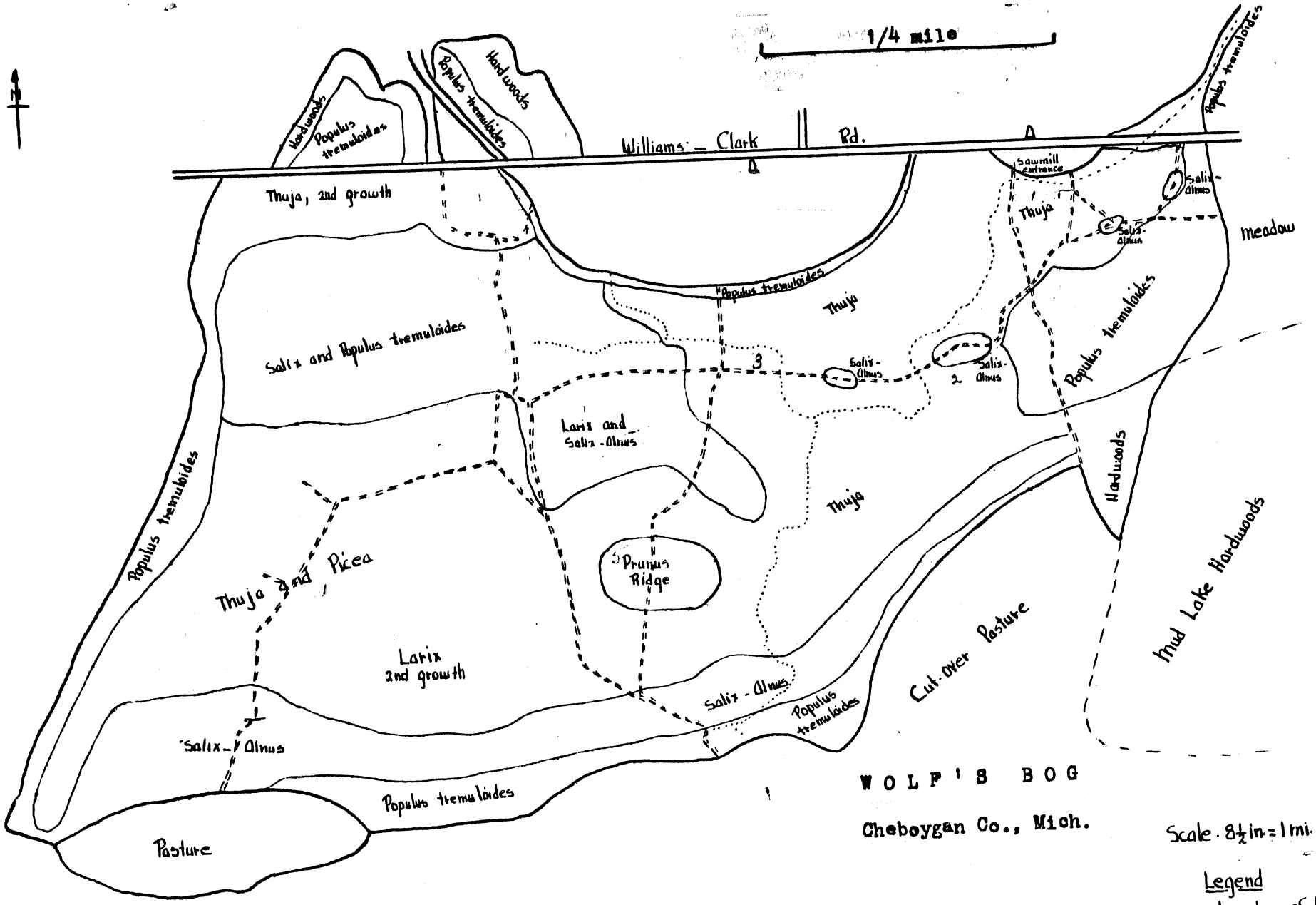
(Photos by Elsie Townsend, G. S. Avery and W. H. Stickel.)

VIEWS OF WOLF'S BOG



Views of Wolf's Bog

1936



Wolfs Bog, Cheboygan Co., Mich.

Annotated List of Moss and Liverwort Species Found in Wolf's Bog during the 1936 Session of the University of Michigan Biological Station.

Family	Name	Association	No.	Occurrence
MOSSES				
Aulacomniaceae	Aulacomnium palustre	(Larix (Salix-Alnus	1	abundant
Bartramiaceae	Philonotus sp.	Salix-Alnus	2	common
Brachytheciaceae	Camptothecium nitens	Thuja-Picea	5	frequent
Bryaceae	Mnium punctatum	Thuja-Picea	4	common
	Mnium spinulosum	Thuja-Picea	3	frequent
	Pohlia nutans	Thuja-Picea	46	common
Dendriaceae	Climaceum dendroides	Thuja-Picea	6	common
Dicranaceae	Ceratodon purpureus	(Populus (Prunus	7	abundant
	Dicranum montanum	Thuja-Picea	9	abundant
	Dicranum rugosum	Thuja-Picea	10	common
	Dicranum scoparium	Thuja-Picea	44	frequent
	Dicranum viride	Thuja-Picea	11	common
	Oncophorus Wahlenbergii	Thuja-Picea	8	frequent
Fissidentaceae	Fissidens sp.	Thuja-Picea	42	frequent
Georgiaceae	Georgia pellucida	Thuja-Picea	12	common
Hypnaceae	Calliergon cordifolium	Thuja-Picea	14	infrequent
	Chrysohypnum chrysophyllum	Thuja-Picea	38	frequent
	Drepnocladus sp.	Larix & Salix	41	frequent
	Heterophyllon Haldanianum	Thuja-Picea	15	common
	Hypnum Schreberi	Thuja-Picea	47	frequent
	Platygyrium repens	Thuja-Picea	45	infrequent
	Pylaisia Schimperi	Thuja-Picea	17	infrequent
	Rhytidiadelphus triquetrus	(Larix (Salix-Alnus	13	common
	Stereodon Lindbergii	Thuja-Picea	16	common
	Stereodon recurvans	Thuja-Picea	37	common
Leskaceae	Elodium lanatum	Thuja-Picea	18	frequent
	Hylocomnium splendens	Thuja-Picea	43	frequent
	Thuidium delicatulum	Thuja-Picea	19	abundant
Leucobryaceae	Leucobryum glaucum	Thuja-Picea	21	common
Leucodotiaceae	Leucodon sciuroides	Thuja-Picea	20	frequent
Neckeraceae	Neckera pennata	Thuja-Picea	22	Abundant

Family	Name	Association	No.	Occurrence
Polytrichaceae	Catherinea undulata	Thuja-Picea	23	found once
	Polytrichum commune	Thuja-Picea	24	frequent
	Polytrichum juniperinum	(Populus (Prunus	25	abundant common
	Polytrichum piliferum	Prunus	40	
Sphagnaceae	Sphagnum sp. (Capillaceum group)	(Larix (Salix	36	common
	Sphagnum Gergensohnii	Thuja-Picea	36a	frequent
	Sphagnum palustre	Larix-Salix	36b	common
LIVERWORTS				
Jungermanniaceae	Bazzania trilobata	Thuja-Picea	32	infrequent
	Calypogeia trichomanis	Thuja-Picea	34	infrequent
	Frullania eboracensis	Thuja-Picea	31	common
	Lophocolea heterophylla	Thuja-Picea	35	infrequent
	Porella platyphylloidea	Thuja-Picea	30	common
	P tilliaium pulcherrimum	Thuja-Picea	29	frequent
	Radula complanata	Thuja-Picea	33	frequent
	Trichocolea tomentella	Thuja-Picea	28	frequent
Marchantiaceae	Conocephalum conicum	Thuja-Picea	26	abundant
	Marchantia polymorpha	(Larix (Thuja-Picea	27	common
Metzgeriaceae	Pellia epiphylla	Thuja-Picea	39	rare

Plate II

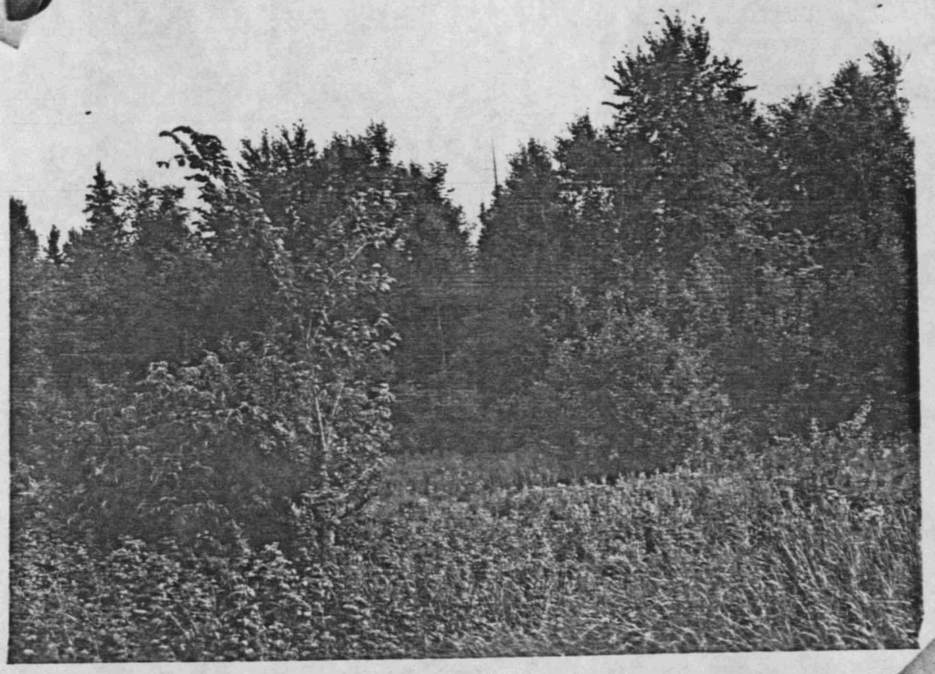


Fig 1. Looking South at Sawmill entrance

Townsend 1936

Plate III

Fig1 Typical bog Plant, Lilium philadelphicum
Townsend 1936

Fig 2 Typical Bog Plants, Cypripedium hirsuticaulis
Townsend 1936

Plate IV

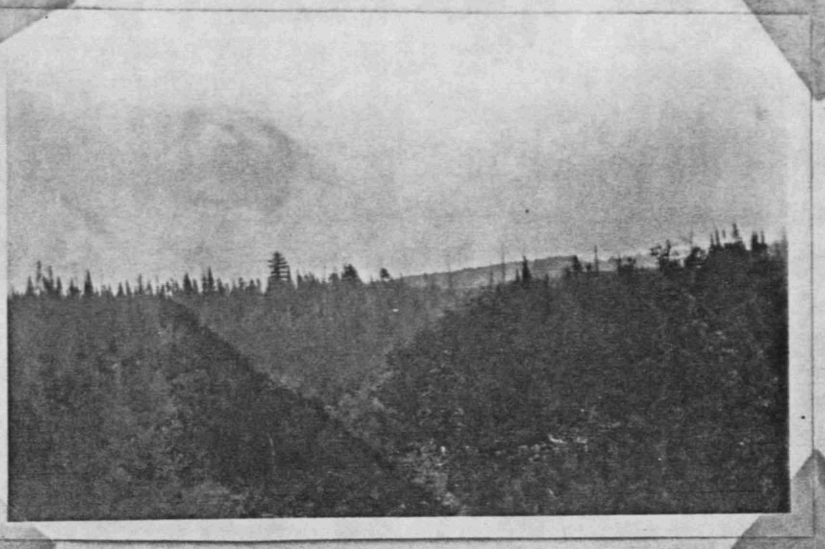


Fig 1. Looking southwest into Bog
Dutro 1936

Fig 2. Northern edge of Bog from Clark's meadow
Dutro 1936

Fig 3 Sawmill entrance at northeastern part of Bog
Dutro 1936

Point Observation Method

Area I

Survey of 10 quadrats, 2 sq meters in area each in climax Thuja forest in an east-west direction starting east at a point 20 paces south of path leading from sawmill entrance.

Quadrat	1	2	3	4	5	6	7	8	9	10	T. Density
Levels of Plant growth											
Trees	100	75	80	80	65	100	100	100	80	100	880
High Shrubs	0	1	0	0	12	0	10	2	0	0	23
Low Shrubs	40	2	7	15	25	40	5	10	2.5	2.5	149
Ground coverage											
Density per area	3.2	3.4	3.6	3.1	4.1	6	5.6	7.8	5.3	7.1	49.2
Tree Trunks	5.	3.	2.	4.	6.	10.	7.	10.	6.	8	30.5
Conifer Seedling	0	0.	0	0	0	0.	0	0.	.25	0	.1
Deciduous "	0	0	.75	.50	.25	0.	.25	.5	.25	.25	1.4
Shrub "	.3	0	.25	.25	.25	0.25	0	0	0	0	.6
Grasses and Sedges	0	.3	0	0	.25	.25	0	0	0	0	.4
Forbs	1.	.5	.25	0	.25	.50	1.	3	1	5.	6.3
Moss cover	0	3.	4.	1.5	1.25	1.	3.	2	3	1.	9.9

Area II

Survey of 10 quadrats, 2 sq. meters in area each in Picea-Abies projection west of point 25 paces south on north-south path where two principal paths intersect.

Quadrat	1	2	3	4	5	6	7	8	9	10	T. Density
Levels of Plant Growth											
Trees	10	100	50	90	80	0	50	100	100	100	680
High Shrubs	30	10	0	10	0	80	50	10	10	0	200
Low Shrubs	50	25	75	60	22	50	28	100	100	10	520
Ground Coverage											
Density per Area	10	6.6	7.7	4.3	9.3	4.3	3.9	1.4	3.9	10.2	80.9
Tree Trunks	1.	10.	3.	7.	9.	1.	2	1.50	4.	2.	20.3
Conifer Seedlings	4.	.25	.3	.75	.5	.25	.75	.75	.25	.4	4.1
Deciduous "	0.	0.	0	0	0	.25	0	0	0	0.	.1
Grasses and Sedges	3.	0	8.	.25	5.	2.	2	0	0	4.	12.1
Forbs	2	1.	1.	.50	3.	1.	2	.50	.50	10.	10.8
Mosses	10.	2.	3.	0	1.	4.	0	0	3.	4.	13.5

Frequency Indices from Tree and Seedling Quadrat Counts taken in 6 different Areas in Wolf's Bog.

	Area Association	I Thuja	II Thuja	III Thuja	IV Prunus	V Picea-abies	VI Picea-Abies
Conifers							
Abies balsamea	tree	6	16	22	4	12	48
" "	seedling	4	20	24	2	20	6
Larix laricina	tree	0	0	20	0	20	24
" "	seedling	0	0	0	0	8	4
Picea mariana	tree	0	0	16	4	74	24
" "	seedling	0	0	0	4	46	30
Thuja occidentalis	tree	52	60	64	0	76	80
" "	seedling	4	0	4	0	50	16
Tsuga canadensis	tree	0	2	0	0	0	0
" "	seedling	0	0	0	0	0	0
Deciduous							
Acer rubrum	tree	16	6	4	0	0	4
" "	seedling	24	20	6	0	0	2
" saccharum	tree	2	0	0	0	0	0
" "	seedling	0	0	0	0	0	0
" spicatum	tree	16	8	10	0	0	0
" "	seedling	34	24	14	0	0	0
Betula Papyrifera	tree	4	2	12	0	0	0
" "	seedling	2	0	6	0	0	0
Fraxinus nigra	tree	6	18	2	0	0	0
" "	seedling	2	20	2	0	0	0
Populus tremuloides	tree	0	0	10	6	0	0
" "	seedling	0	0	4	16	0	0
Prunus pennsylvanica	tree	0	0	0	80	0	0
" "	seedling	0	0	0	20	0	0

Tree Count taken in Climax Thuja - 1929

Abies balsamea	80
Acer rubrum	5
Acer saccharum	8
Acer spicatum	46
Alnus incana	14
Amelanchier canadensis	1
Betula papyrifera.	50
Cornus sp.	1
Fagus grandifolia.	3
Fraxinus nigra	86
Larix laricina	2
Picea canadensis	18
Picea mariana	10
Populus tremuloides.	1
Salix discolor & rostrata.	1
Sorbus americana	12
Thuja occidentalis	400
Tilia americana	1
Tsuga canadensis	22
Ulmus americana	6
	767

GROUND PLANTS IN CLIMAX THUJA - 100 Quadrats - 1929

	Species	Frequency
1.	Abies balsamea	17
2.	Acer rubrum	4
3.	Acer saccharum	2
4.	Acer spicatum.	27
5.	Actaea rubra	5
6.	Alnus incana	3
7.	Amelanchier spicata.	1
8.	Aralia nudicaulis	12
9.	Arisaema triphyllum.	3
10.	Aspidium spinulosum.	2
11.	Aspidium thelypteris	17
12.	Aster laevis	1
13.	Aster novae-angliae.	2
14.	Aster puniceus	1
15.	Betula papyrifera	11
16.	Brachyelytrum erectum	27
17.	Caltha palustris.	2
18.	Carex intumescens	17
19.	Carex sp.	10
20.	Carex sp.	15
21.	Clintonia borealis	15
22.	Coptis trifolia	28
23.	Cornus canadensis	11
24.	Equisetum arvense	8
25.	Equisetum sylvaticum	4
26.	Fragaria virginiana.	5
27.	Fraxinus nigra	14
28.	Ferns sp.	1
29.	Galium trifidum	20
30.	Gaultheria procumbens	1
31.	Geum rivale	2
32.	Glyceria nervata.	3
33.	Ilex verticillata	1
34.	Impatiens biflora	5
35.	Linnaea borealis var. americana.	1
36.	Liparis loeselii.	4
37.	Listera convallaroides.	4
38.	Lycopodium clavatum.	1
39.	Lycopus uniflorus	1
40.	Maianthemum canadense	21
41.	Medeola virginiana	2
42.	Mitchella repens	4
43.	Mitella nuda	58
44.	Moneses uniflora.	1
45.	Moss cover	54
46.	Needle cover	0
47.	Onoclea sensibilis	9
48.	Picea mariana.	1
49.	Polygala pauciflora.	2
50.	Prunella vulgaris	1

Species	Frequency
51. Pyrola asarifolia	1
52. Rhus glabra borealis	1
53. Ribes triste	1
54. Rubus triflorus.	20
55. Senecio balsamitae	1
56. Smilacina racemosa.	1
57. Solidago caesia.	1
58. Solidago rugosa.	7
59. Solidago uliginosa.	1
60. Taraxacum vulgare	1
61. Taxus canadensis	14
62. Thuja occidentalis.	52
63. Trientalis americana	12
64. Trillium grandiflorum.	6
65. Tsuga canadensis	14
66. Viburnum cassinoides	1
67. Viola pallens	51

List of Species Found by Ecology Class (1936)

in Larix Association - Wolf's Bog

1. Aster lindleyanus
2. Botrychium virginianum
3. Calamagrostis canadensis
4. Carex leptalea
5. Carex trisperma
6. Chiogenes hispidula
7. Clintonia borealis
8. Cornus canadensis
9. Cornus stolonifera
10. Epilobium angustifolium
11. Epigaea repens
12. Eriophorum viridi-carinatum
13. Fragaria virginiana
14. Galium triflorum
15. Gaultheria procumbens
16. Larix laricina
17. Ledum groenlandicum
18. Linnaea borealis
19. Lycopus americanus
20. Mitella nuda
21. Picea mariana
22. Polytrichum sp.
23. P opulus tremuloides
24. Rubus triflorus
25. Salix discolor
26. Salix rostrata
27. Sphagnum sp.
28. Solidago sp.
29. Taraxacum officinale
30. Thuja occidentalis
31. Trientalis americana
32. Vaccinium canadense
33. Vaccinium oxycoccus

Results of Tree Counts Taken in Each Plant Association

Wolf's Bog - 1936

Plant Association	Species	No.	Percentage
I. Thuja	Abies balsamea	1	2
	Acer rubrum	7	14
	Betula papyrifera	1	2
	Sorbus americana	1	2
	Thuja occidentalis	31	62
	Tsuga canadensis	9	18
II. Larix laricina	Cornus stolonifera	1	2
	Larix laricina	30	60
	Picea mariana	3	6
	Populus balsamifera	1	2
	Populus tremuloides	7	14
	Salix sp.	5	10
	Thuja occidentalis	3	6
III. Salix-Alnus	Abies balsamea	2	4
	Alnus incana	25	50
	Betula papyrifera	5	10
	Populus tremuloides	1	2
	Salix sp.	17	34
IV. Populus tremuloides	Abies balsamea (small)	1	2
	Acer rubrum	1	2
	Betula papyrifera	6	12
	Picea mariana	2	4
	Populus tremuloides	18	36
	Salix sp.	20	40
	Sorbus americana	2	4
V. Prunus pennsylvanica	Acer rubrum	6	12
	Picea mariana	1	2
	Prunus pennsylvanica	43	86

Results of Testing the Soil Found in Plant Associations of Wolf's Bog - 1936

1. In *Populus tremuloides* association: - pH value of soil at surface is 4.

2. In *Prunus* association: - pH value of soil at surface is 5.

3. In *Salix-Alnus* association: - pH value of soil at surface is 7.

4. In *Larix* association: - pH value of soil at surface is 8.

5. In *Thuja* association where ground vegetation is lacking: - pH value of soil at surface is 8.

6. In *Thuja* association where best sample of peat was obtained:-
   pH value (1) at surface is 8.5
   (2) at depth of 10 cm. is 8.0
   (3) at depth of 20 cm. is 7.5
   (4) at depth of 30 cm. is 7.0
   (5) at depth of 40 cm. is 6.5
   (6) at depth of 50 cm. is 5.0

7. Water found in path in Thuja-Picea projection: - pH value is 8.

Annotated List of Plant Species Found in Wolf's Bog During the 1936 Session of the University of Michigan Biological Station

Family	Species	Collection Number	Occurrence
Aceraceae	Acer rubrum	1	common
	Acer saccharum	2	rare
	Acer spicatum	3	common
Amaranthaceae	Amaranthus graecizans	4	rare
Anacardiaceae	Rhus glabra borealis	11	infrequent
	Rhus toxicodendron	12	rare
Apocynaceae	Apocynum androsaemifolium	5	infrequent
Aquifoliaceae	Ilex verticellata	6	frequent
	Nemopanthus mucronata	7	common
Araceae	Arisaema triphyllum	8	common
Araliaceae	Aralia hispida	9	infrequent
	Aralia nudicaulis	10	abundant
Asclepiadaceae	Asclepias incarnata	13	abundant
	Asclepias syriaca	14	infrequent
Balsaminaceae	Impatiens biflora	15	common
Betulaceae	Alnus incana	16	abundant
	Betula lutea	17	found once
	Betula papyrifera	18	frequent
	Ostrya virginiana	19	found once
Boraginaceae	Cynoglossum officinale	20	rare
Campanulaceae	Campanula aparanoides	21	frequent
Caprifoliaceae	Diervilla lonicera	22	frequent
	Linnaea borealis var. americana	23	abundant
	Lonicera canadensis	24	infrequent
	Lonicera dioica	25	frequent
	Lonicera hirsuta	26	infrequent
	Lonicera oblongifolia	27	infrequent
	Sambucus racemosa	28	frequent
	Viburnum cassinoides	80	common
	Viburnum opulus	30	infrequent
Caryophyllaceae	Arenaria serpyllifolia	31	infrequent
	Cerastium vulgatum	32	infrequent
	Lychnis alba	33	infrequent
	Saponaria officinalis	34	frequent
	Silene latifolia	35	infrequent
	Stellaria longifolia	36	found once
Chenopodiaceae	Chenopodium album	37	infrequent

Family	Species	Collection Number	Occurrence
Compositae	Achillea millefolium	38	frequent
	Ambrosia artemesifolia	39	infrequent
	Anaphalis margaritacea	40	common
	Antennaria neodioica	41	common
	Artemesia biennis	42	infrequent
	Aster lateriflorus var. ni[illegible]suticaulis	45	frequent
	Aster linoleyanus	46	common
	Aster macrophyllus	47	infrequent
	Aster novae-angliae	48	frequent
	Aster paniculatus	44	frequent
	Aster sagittifilius	51	infrequent
	Aster salicifolius	52	frequent
	Aster sp.	49	common
	Aster sp.	50	infrequent
	Chrysanthemum leucanthemum var. pinnatifidum	53	infrequent
	Cirsium arvense	54	frequent
	Cirsium lanceolatum	55	common
	Cirsium muticum	56	infrequent
	Erigeron annuus	57	frequent
	Erigeron canadensis	58	frequent
	Erigeron philadelphicus	59	infrequent
	Erigeron strigosus	61	infrequent
	Erigeron sp.	60	infrequent
	Eupatorium perfoliatum	62	common
	Eupatorium purpureum	63	common
	Gnaphalium decurrens	64	common
	Gnaphalium uliginosum	43	infrequent
	Hieracium aurantiacum	65	frequent
	Hieracium sp.	66	found once
	Lactuca canadensis	67	common
	Lactuca pulchella	68	infrequent
	Lactuca spicata	69	frequent
	Petasites palmatus	70	frequent
	Rudbeckia hirta	71	frequent
	Senecio balsamitae	72	infrequent
	Senecio sp.	73	found once
	Solidago canadensis	75	common
	Solidago graminifolia	76	common
	Solidago rugosa	78	common
	Solidago sp.	74	infrequent
	Solidago sp.	77	infrequent
	Taraxacum officinale	79	frequent
Cornaceae	Cornus canadensis	81	abundant
	Cornus circinata	82	infrequent
	Cornus stolonifera	83	abundant
Cruciferae	Brassica arvensis	84	infrequent
	Capsella bursa-pastoris	85	infrequent
	Cardamine pennsylvanica	86	frequent
	Erysimum cheiranthoides	87	infrequent
	Lepidium virginicum	88	infrequent
	Radicula palustris var. hispida	89	infrequent

Family	Species	Collection Number	Occurrence
Cyperaceae	Carex arctata	90	infrequent
	Carex aurea	91	infrequent
	Carex flava	93	common
	Carex gracillima	94	frequent
	Carex hystericina	96	
	Carex intumescens	95	common
	Carex laxiflora	97	frequent
	Carex leptalea	98	frequent
	Carex paupercula	29	frequent
	Carex rosea	99	common
	Carex stipata	100	common
	Carex sp.	135	frequent
	Eleocharis palustris	101	frequent
	Eriophorum viridi-carinatum	103	common
	Scirpus atrocinctus	104	common
	Scirpus atrovirens	105	common
	Scirpus cyperinus	106	common
Droseraceae	Drosera rotundifolia	108	infrequent
Equisetaceae	Equisetum arvense	109	common
	Equisetum palustre	110	infrequent
	Equisetum sylvaticum	111	common
Ericaceae	Chiogenes hispidula	112	common
	Epigaea repens	113	frequent
	Gaultheria procumbens	114	abundant
	Ledum groenlandicum	115	abundant
	Mitchella repens	116	frequent
	Moneses uniflora	117	infrequent
	Pyrola americana	118	infrequent
	Pyrola asarifolia	119	frequent
	Pyrola asarifolia var. incarnata	121	frequent
	Pyrola elliptica	120	infrequent
	Vaccinium canadense	122	common
	Vaccinium oxycoccus	123	common
	Vaccinium pennsylvanicum	124	infrequent
Euphorbiaceae	Euphorbia serpyllifolia	199	rare
Fagaceae	Fagus grandifolia	125	frequent
Geraniaceae	Geranium robertianum	126	found once
Gramineae	Agropyron repens	127	common
	Agrostis alba	129	frequent
	Agrostis capillaris	128	frequent
	Brachyelytrum erectum	131	abundant
	Bromus ciliatus	130	common
	Calamagrostis canadensis	133	common
	Cinna latifolia	134	common
	Glyceria nervata	136	frequent
	Muhlenbergia mexicana	137	frequent
	Phleum pratense	138	common
	Poa pratensis	139	frequent
Iridaceae	Iris versicolor	140	frequent

Family	Species	Collection Number	Occurrence
Juncaceae	Juncus effusus	141	common
	Juncus tenuis	142	infrequent
Labiatae	Lycopus americanus	143	common
	Lycopus uniflorus	144	common
	Mentha arvensis	145	infrequent
	Mentha spicata	146	frequent
	Nepeta cataria	147	infrequent
	Prunella vulgaris	148	common
	Satureja vulgaris	149	infrequent
	Scutellaria galericulata	150	common
	Scutellaria lateriflora	151	common
	Stachys palustris	152	infrequent
Leguminosae	Lathyrus palustris	153	frequent
	Medicago sativa	154	infrequent
	Trifolium agrarium	156	rare
	Trifolium hybridum	157	common
	Trifolium pratense	158	frequent
	Trifolium repens	159	common
	Melilotus alba	155	frequent
Liliaceae	Clintonia borealis	160	abundant
	Lilium philadelphicum var. andinum	161	common
	Maianthemum canadense	162	abundant
	Polygonatum biflorum	163	common
	Smilacina racemosa	164	common
	Streptopus amplexifolius	165	frequent
	Trillium grandiflorum	167	frequent
	Uvularia grandiflora	166	common
	Zygadenus chloranthus	168	infrequent
Lycopodiaceae	Lycopodium annotinum	169	frequent
	Lycopodium obscurum var. dendroideum	170	infrequent
Oleaceae	Fraxinus nigra	171	common
Onagraceae	Circaea alpina	172	common
	Circaea intermedia	173	rare
	Circaea lutetiana	174	frequent
	Epilobium adenocaulon	175	frequent
	Epilobium angustifolium	176	abundant
	Epilobium densum	177	frequent
	Oenothera muricata	178	infrequent
Orchidaceae	Arethusa bulbosa	179	rare
	Cypripedium hirsutum	181	common
	Cypripedium parviflorum	180	frequent
	Habenaria hyperborea	182	common
	Leparis loeslii	183	rare
	Listera convallaroides	184	frequent
	Spiranthes romanzoffiana	185	infrequent

Family	Species	Collection Number	Occurrence
Pinaceae	Abies balsamea	186	abundant
	Larix laricina	187	abundant
	Picea canadensis	188	abundant
	Picea mariana	189	abundant
	Pinus strobus	190	infrequent
	Taxus canadensis	191	common
	Thuja occidentalis	192	abundant
	Tsuga canadensis	193	abundant
Plantaginaceae	Plantago lanceolata	194	found once
	Plantago major	195	infrequent
Polygalaceae	Polygala pauciflora	196	frequent
Polygonaceae	Polygonum cilinode	197	infrequent
	Polygonum convolvulus	198	frequent
	Polygonum persicaria	201	rare
	Polygonum sp.	200	rare
	Rumex acetosella	202	frequent
	Rumex crispus	203	infrequent
	Rumex obtusifolius	204	common
Polypodiaceae	Adiantum pedatum	206	infrequent
	Aspidium cristatum	207	abundant
	Aspidium spinulosum	209	common
	Aspidium thelypteris	210	abundant
	Aspidium sp.	208	frequent
	Asplenium filix-femina	211	frequent
	Athyrium angustifolium	212	infrequent
	Botrychium virginianum	213	frequent
	Cystopteris fragilis	218	infrequent
	Onoclea sensibilis	214	common
	Osmunda regalis	215	common
	Phegopteris dryopteris	216	common
	Pteris aquilina	217	abundant
Primulaceae	Trientalis americana	219	common
Ranunculaceae	Actaea alba	220	common
	Actaea rubra	221	common
	Anemone canadensis	222	frequent
	Caltha palustris	223	frequent
	Clematis virginiana	224	common
	Coptis trifolia	225	abundant
	Ranunculus acris	226	common
	Ranunculus recurvatus	227	common
	Ranunculus sceleratus	228	frequent
Rhamnaceae	Rhamnus alnifolia	229	common
Rosaceae	Agrimonia gryposepala	230	frequent
	Amelanchier canadensis	231	common
	Fragaria virginiana	232	abundant
	Geum rivale	236	common
	Geum strictum	233	frequent
	Geum sp.	234	found once

Family	Species	Collection Number	Occurrence
Rosaceae	Potentilla monspeliensis	235	common
	Potentilla recta	237	frequent
	Prunus pennsylvanica	238	abundant
	Pyrus malus var. sylvestris	239	rare
	Rosa sp.	240	found once
	Rosa sp.	241	found once
	Rubus idaeus var. aculeatissimus	243	frequent
	Rubus occidentalis	244	infrequent
	Rubus triflorus	245	abundant
	Rubus villosus	242	common
	Sorbus americana	246	frequent
	Spiraea latifolia	247	infrequent
Rubiaceae	Galium triflorum	248	abundant
Salicaceae	Populus balsamifera	249	frequent
	Populus grandidentata	250	frequent
	Populus tremuloides	251	abundant
	Salix discolor	252	abundant
	Salix rostrata	253	abundant
	Salix serissima	254	common
Saxifragaceae	Mitella nuda	257	common
	Ribes (hybrid)	259	rare
	Ribes lacustre	260	frequent
	Ribes sp.	258	rare
	Ribes sp.	261	rare
Scrophulariaceae	Castilleja coccinea	262	rare
	Verbascum thapsus	263	frequent
Solanaceae	Solanum nigrum	264	rare
Tiliaceae	Tilia americana	265	infrequent
Typhaceae	Typha latifolia	266	frequent
Umbelliferae	Daucus carota	267	infrequent
	Pastinaca sativa	268	frequent
	Sanicula marilandica	269	infrequent
Urticaceae	Ulmus americana	270	frequent
Valerianaceae	Valeriana uliginosa	271	frequent
Verbenaceae	Verbena stricta	272	infrequent
Violaceae	Viola canadensis	273	common
	Viola pallens	275	rare
	Viola renifolia	276	infrequent
	Viola sp.	274	frequent

Cheboygan Co. Mich

Herbarium List of Plants Collected in Wolf's Bog During the University of Michigan Summer Session, 1936.

Ruth Dutro and Edith Clapp

No.	Name of Species		Plant Association	Month
1.	Acer rubrum	T	Thuja	July
2.	Acer saccharum	T	Thuja	July
3.	Acer spicatum	S	Thuja	July
4.	Amaranthus graecizans	W	Populus tremuloides	August
5.	Apocynum androsaemifolium	W	Populus tremuloides	August
6.	Ilex verticellata	S	Salix-Alnus	June
7.	Nemopanthus mucronata	S	Salix-Alnus	July
8.	Arisaema triphyllum	H	Thuja	June
9.	Aralia hispida	H	Prunus	July
10.	Aralia nudicaulis	H	Thuja	July
11.	Rhus glabra borealis	S	Populus tremuloides	July
12.	Rhus toxicodendron	S	Thuja	August
13.	Asclepias incarnata	H	Larix	August
14.	Asclepias syriaca	H	Populus tremuloides	August
15.	Impatiens biflora	H	Thuja	July
16.	Alnus incana	S	Salix-Alnus	July
17.	Betula lutea	T	Thuja	July
18.	Betula papyrifera	T	Populus tremuloides	July
19.	Ostrya virginiana	T	Thuja	July
20.	Cynoglossum officinale	H	Populus tremuloides	August
21.	Campanula aparanoides	H	Thuja	August
22.	Diervilla lonicera	S	Larix	July
23.	Linnaea borealis var. americana		Thuja	June
24.	Lonicera canadensis	S	Larix	July
25.	Lonicera dioica	S	Populus tremuloides	August
26.	Lonicera hirsuta	S	Populus tremuloides	August
27.	Lonicera oblongifolia	S	Larix	July
28.	Sambucus racemosa	S	Populus tremuloides	July
29.	Carex paupercula		P opulus tremuloides	July
30.	Viburnum opulus	S	Thuja	July
31.	Arenaria serpyllifolia	H	Populus tremuloides	August
32.	Cerastium vulgatum	H	Populus tremuloides	August
33.	Lychnis alba	H	Populus tremuloides	August
34.	Saponaria officinalis	H	Populus tremuloides	August
35.	Silene latifolia	H	Populus tremuloides	August
36.	Stellaria longifolia	H	Populus tremuloides	August
37.	Chenopodium album	H	Populus tremuloides	August
38.	Achillea millefolium	H	Populus tremuloides	August
39.	Ambrosia artemisiifolia	H	Populus tremuloides	August
40.	Anaphalis margaritacea	H	Populus tremuloides	August
41.	Antennaria neodioica	H	Prunus	August
42.	Artemisia biennis	H	Populus tremuloides	August
43.	Gnaphalium uliginosum	H	Populus tremuloides	August
44.	Aster paniculatus	H	Thuja	July
45.	Aster lateriflorus var. hisuticaulis		Thuja	August
46.	Aster lindleyanus		Thuja	August
47.	Aster macrophyllus	H	Populus tremuloides	July
48.	Aster novae-angliae		Larix	August
49.	Aster sp.		Salix-Alnus	July
50.	Aster sp.		Larix	July

No.	Name of Species		Plant Association	Month
51.	Aster sagittifolius	H	Populus tremuloides	August
52.	Aster Salicifolius		Salix-Alnus	August
53.	Chrysanthemum leucanthemum var. pinnatifidum		Populus tremuloides	July
54.	Cirsium arvense		P opulus tremuloides	July
55.	Cirsium lanceolatum		Salix-Alnus	August
56.	Cirsium muticum		Salix-Alnus	August
57.	Erigeron annausnse		Populus tremuloides	August
58.	Erigeron canadensis		Populus tremuloides	August
59.	Erigeron philadelphicuss		Larix	July
60.	Erigeron sp.		Populus tremuloides	August
61.	Erigeron strigosus		Populus tremuloides	August
62.	Eupatorium perfoliatumm		Larix	July
63.	Eupatorium purpureum		Sali-Alnus	July
64.	Gnaphalium decurrens		Populus tremuloides	August
65.	Hieracium aurantiacum		Prunus	August
66.	Hieracium sp.		Larix	August
67.	Lactuca canadensis		Populus tremuloides	July
68.	Lactuca pulchella		Populus tremuloides	August
69.	Lactuca spicata		Larix	August
70.	P etasites palmatus		Larix	August
71.	Rudbeckia hirta		Populus tremuloides	August
72.	Senecio balsamitae		Populus tremuloides	July
73.	Senecio sp.		Populus tremuloides	July
74.	Solidago sp.		Thuja	August
75.	Solidago canadensis		Salix-Alnus	August
76.	Solidago graminifolia		Populus tremuloides	July
77.	Solidago sp.		Populus tremuloides	July
78.	Solidago rugosa		Thuja	August
79.	Taraxacum officinale	H	Populus tremuloides	July
80.	Viburnum cassinoides	S	Salix-Alnus	July
81.	Cornus canadensis	Low Shrub	Thuja	June
82.	Cornus circinata	S	Thuja	June
83.	Cornus stolonifera	S	Salix-Alnus	July
84.	Brassica arvensis	H	P opulus tremuloides	August
85.	Capsella bursa-pastoris		Populus tremuloides	August
86.	Cardamine pennsylvanica		Thuja	July
87.	Erysimum cheiranthoides		Populus tremuloides	August
88.	Lepidium virginicum		Populus tremuloides	July
89.	Radicula palustris var. hispida	H	Populus tremuloides	August
90.	Carex arctata	Sedge	Thuja	July
91.	Carex aurea		Thuja	July
92.	Carex bebbii		Larix	July
93.	Carex flava		Larix	August
94.	Carex gracillima		Thuja	July
95.	Carex intumescens		Thuja	July
96.	Carex hystericina		Thuja	August
97.	Carex laxiflora		Thuja	July
98.	Carex leptalea		Larix	July
99.	Carex rosea		Thuja	July
100.	Carex stipata		Thuja	July
101.	Eleocharis palustris		Thuja	July
102.	Eriophorum viridicarinatum		Larix	July
104.	Scirpus atrocinctus		Larix	August
105.	Scirpus atrovirens		Larix	July
106.	Scirpus cyperinus		Thuja	August

No.	Name of Species	Plant Association	Month
107.			
108.	Drosera rotundifolia	Larix	July
109.	Equisetum arvense	Populus tremuloides	June
110.	Equisetum palustre	Larix	July
111;	Equisetum sylvaticum	Thuja	July
112.	Chiogenes hispidula	Larix	July
113.	Epigaea repens	Thuja	July
114.	Gaultheria procumbens	Populus tremuloides	July
115.	Ledum groenlandicum	Larix	August
116.	Mitchella repens	Larix	July
117.	Moneses uniflora	Thuja	July
118.	Pyrola americana	Larix	July
119.	Pyrola asarifolia	Larix	July
120.	Pyrola elliptica	Thuja	July
121.	Pyrola asarifolia var. incarnata	Larix	July
122.	Vaccinium canadense	Populus tremuloides	July
123.	Vaccinium oxycoccus	Larix	July
124.	Vaccinium pennsylvanicum	Populus tremuloides	July
125.	Fagus grandifolia	Thuja	June
126.	Geranium robertianum	Salix-Alnus	August
127.	Agropyron repens	Larix	July
128.	Agrostis capillaris	Larix	July
129.	Agrostis alba	Larix	July
130.	Bromus ciliatus	Thuja	July
131.	Brachyelytrum erectum	Thuja	July
132.			
133.	Calamagrostis canadensis	Thuja	July
134.	Cinna latifolia	Larix	July
135.	Carex sp.	Larix	July
136.	Glyceria nervata	Larix	July
137.	Muhlenbergia mexicana	Thuja	July
138.	Phleum pratense	Populus tremuloides	July
139.	Poa pratensis	Populus tremuloides	July
140.	Iris versicolor	Thuja	July
141.	Juncus effusus	Larix	August
142.	Juncus tenuis	Larix	August
143.	Lycopus americanus	Thuja	July
144.	Lycopus uniflorus	Populus tremuloides	July
145.	Mentha arvensis	Populus tremuloides	August
146.	Mentha spicata	Salix-Alnus	August
147.	Nepeta cataria	Populus tremuloides	August
148.	Prunella vulgaris	Salix-Alnus	July
149.	Satureja vulgaris	Salix-Alnus	August
150.	Scutellaria galericulata	Thuja	July
151.	Scutellaria lateriflora	Thuja	July
152.	Stachys palustris	Populus tremuloides	August
153.	Lathyrus palustris	Thuja	July
154.	Medicago sativa	Populus tremuloides	August
155.	Melilotus alba	Populus tremuloides	July
156.	Trifolium agrarium	Larix	July
157.	Trifolium hybridum	Larix	July
158.	Trifolium pratense	Populus tremuloides	July
159.	Trifolium repens	Larix	July
160.	Clintonia borealis	Thuja	July
161.	Lilium philadelphicum var. andinum	Thuja	June
162.	Maianthemum canadense	Thuja	June
163.	Polygonatum biflorum	Thuja	July

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164.	Smilacina racemosa	Thuja	July
165.	Streptopus amplexifolius	Thuja	July
166.	Uvularia grandiflora	Thuja	July
167.	Trillium grandiflorum	Thuja	July
168.	Zygadenus chloranthus	Larix	August
169.	Lycopodium annotinum	Thuja	August
170.	Lycopodium obscurum var. dendroideum	Thuja	August
171.	Fraxinus nigra	Thuja	July
172.	Circaea alpina	Thuja	July
173.	Circaea intermedea	Thuja	July
174.	Circaea lutetiana	Larix	August
175.	Epilobium adgnocaulonum	Larix	July
176.	Epilobium angustifolium	Salix-Alnus	July
177.	Epilobium densum	Salix-Alnus	August
178.	Oenothera muricata	Populus tremuloides	August
179.	Arethusa bulbosa	Thuja	July
180.	Cypripedium parviflorum	Larix	July
181.	Cypripedium hirsutum	Larix	July
182.	Habenaria hyperborea	Thuja	July
183,	Leparis loeslii	Larix	August
184.	Listera convallaroides	Larix	July
185.	Spiranthes romanzoffiana	Larix	July
186.	Abies balsamea	Thuja	July
187.	Larix laricina	Larix	July
188.	P icea canadensis	Thuja	July
189.	P icea mariana	Larix	July
190.	Pinus strobus	Thuja	July
191.	Taxus canadensis	Thuja	July
192.	Thuja occidentalis	Thuja	July
193.	Tsuga canadensis	Thuja	July
194.	Plantago lanceolata	Populus tremuloides	August
195.	P lantago major	Populus tremuloides	July
196.	P olygala pauciflora	Larix	August
197.	Polygonum cilinodes	Populus tremuloides	August
198.	Polygonum convolvulus	Populus tremuloides	July
199.	Euphorbia serpyllifolia	Populus tremuloides	August
200.	Polygonum sp.	Salix-Alnus	July
201.	Polygonum persicaria	Populus tremuloides	August
202.	Rumex acetosella	Populus tremuloides	July
203.	Rumex crispus	Populus tremuloides	July
204.	Rumex obtusifolius	Thuja	July
205.			
206.	Adiantum pedatum	Larix	July
207.	Aspidium cristatum	Larix	July
208.	Aspidium sp.	Thuja	July
209.	Aspidium spinulosum	Thuja	July
210.	Aspidium thelypteris	Thuja	July
211.	Asplenium filix-femina	Larix	July
212.	Athyrium angustifolium	Larix	July
213.	Botrychium virginianum	Larix	July
214.	Onoclea sensibilis	Thuja	July
215.	Osmunda regalis	Thuja	July
216.	P hegopteris dryopteris	Thuja	July
217.	Pteris aquilina	Populus tremuloides	July
218.	Cystopteris fragilis	Larix	July
219.	Trientalis americana	Thuja	July
220.	Actaea alba	Thuja	August

No.	Name of Species	Plant Association	Month
221.	Actaea rubra	Salix-Alnus	August
222.	Anemone canadensis	Populus tremuloides	July
223.	Caltha palustris	Thuja	July
224.	Clematis virginiana	Populus tremuloides	July
225.	Coptis trifolia	Thuja	June
226.	Ranunculus acris	Populus tremuloides	July
227.	Ranunculus recurvatus	Populus tremuloides	August
228.	Ranunculus sceleratus	Thuja	July
229.	Rhamnus Alnifolia	Larix	July
230.	Agrimonia gryposepala	Larix	July
231.	Amelanchier canadensis	Salix-Alnus	August
232.	Fragaria virginiana	Larix	July
233.	Geum strictum	Salix-Alnus	July
234.	Geum sp.	Populus tremuloides	July
235.	Potentilla monspeliensis	Populus tremuloides	July
236.	Geum rivale	Larix	July
237.	Potentilla recta	Populus tremuloides	July
238.	Prunus pennsylvanica	Prunus	July
239.	Pyrus malus var. sylvestris	Populus tremuloides	July
240.	Rosa sp.	Populus tremuloides	July
241.	Rosa sp.	Salix-Alnus	July
242.	Rubus villosus	Populus tremuloides	July
243.	Rubus idaeus var. aculeatissimus	Larix	July
244.	Rubus occidentalis	Thuja	August
245.	Rubus triflorus	Larix	July
246.	Sorbus americana	Thuja	July
247.	Spiraea latifolia	Salix-Alnus	August
248.	Galium triflorum	Thuja	July
249.	Populus balsamifera	Thuja	July
250.	Populus grandidentata	Thuja	July
251.	Populus tremuloides	Populus tremuloides	July
252.	Salix discolor	Salix-Alnus	July
253.	Salix rostrata	Salix-Alnus	July
254.	Salix serissima	Salix-Alnus	July
255.			
256.			
257.	Mitella nuda	Thuja	August
258.	Ribes sp.	Thuja	July
259.	Ribes (hybrid)	Thuja	July
260.	Ribes lacustre	Thuja	July
261.	Ribes sp.	Thuja	July
262.	Castilleja coccinea	Thuja	July
263.	Verbascum thapsus	Populus tremuloides	August
264.	Solanum nigrum	Populus tremuloides	August
265.	Tilia americanum	Salix-Alnus	July
266.	Typha latifolia	Larix	July
267.	Daucus carota	Populus tremuloides	July
268.	Pastinaca sativa	Thuja	July
269.	Sanicula marilandica	Thuja	July
270.	Ulmus americana	Thuja	July
271.	Valeriana uliginosa	Thuja	July
272.	Verbena stricta	Populus tremuloides	July
273.	Viola canadensis	Thuja	July
274.	Viola sp.	Thuja	July
275.	Viola pallens	Thuja	August
276.	Viola renifolia	Thuja	July