

Appendix 1. Species present in $\geq 10\%$ of plots for each year-by-treatment. Species significant in Indicator Species Analysis are indicated by * for the significant year-by-treatment. No species were significant indicators of pre-treatment sites or control sites in any year. Species identified as components of the Iowa oak savanna understory community in Delong and Hooper (1996) are indicated by †. Species with spring phenologies are indicated by ‡.

Years post restoration	Control	% of plots	Life-form ¹	Native/exotic	Treatment	% of plots	Life-form ¹	Native/exotic
Pre-thinning	<i>Campanula americana</i> †	16.9	A-Forb	Native	<i>Acer nigrum</i>	11.4	Tree	Native
	<i>Carex blanda</i>	29.2	Sedge	Native	<i>Carex blanda</i>	30.0	Sedge	Native
	<i>Carex jamesii</i>	12.3	Sedge	Native	<i>Carex pensylvanica</i> †	42.9	Sedge	Native
	<i>Carex pensylvanica</i> †	36.9	Sedge	Native	<i>Carya ovata</i>	20.0	Tree	Native
	<i>Carya cordiformis</i>	10.8	Tree	Native	<i>Cornus racemosa</i> †	25.7	Shrub	Native
	<i>Carya ovata</i>	16.9	Tree	Native	<i>Erythronium albidum</i> ‡	28.6	P-Forb	Native
	<i>Cornus racemosa</i> †	10.8	Shrub	Native	<i>Eupatorium rugosum</i>	12.9	P-Forb	Native
	<i>Dichanthelium acuminatum</i> †	13.9	P-grass	Native	<i>Fraxinus americana</i>	42.9	Tree	Native
	<i>Fraxinus americana</i>	35.4	Tree	Native	<i>Galium aparine</i> ‡	17.1	A-Forb	Native
	<i>Galium aparine</i> ‡	16.9	A-forb	Native	<i>Ostrya virginiana</i>	24.3	Tree	Native
	<i>Ostrya virginiana</i>	20.0	Tree	Native	<i>Parthenocissus quinquefolia</i> †	91.4	W-Vine	Native
	<i>Parthenocissus quinquefolia</i> †	87.7	W-Vine	Native	<i>Phlox divaricata</i> ‡	11.4	P-Forb	Native
	<i>Phryma leptostachya</i>	20.0	P-forb	Native	<i>Phryma leptostachya</i>	11.4	P-Forb	Native

<i>Quercus alba</i>	12.3	Tree	Native	<i>Prunus serotina</i>	21.4	Tree	Native
<i>Ribes missouriense</i> [†]	12.3	Shrub	Native	<i>Ribes missouriense</i> [†]	11.4	Shrub	Native
<i>Smilax hispida</i>	23.1	W-vine	Native	<i>Smilax hispida</i>	37.1	W-Vine	Native
<i>Symphoricarpos orbiculatus</i> [†]	12.3	Shrub	Native	<i>Symphoricarpos orbiculatus</i> [†]	32.9	Shrub	Native
<i>Thalictrum thalictroides</i> ‡	10.8	P-Forb	Native	<i>Toxicodendron radicans</i> [†]	58.6	W-Vine	Native
<i>Toxicodendron radicans</i> [†]	13.9	W-vine	Native	<i>Ulmus americana</i>	28.6	Tree	Native
<i>Ulmus americana</i>	10.8	Tree	Native	<i>Ulmus rubra</i>	17.1	Tree	Native
<i>Ulmus rubra</i>	21.5	Tree	Native	<i>Viola sororia</i> ‡	21.4	P-Forb	Native
<i>Viola sororia</i> ‡	18.5	P-forb	Native	<i>Vitis riparia</i> [†]	11.4	W-Vine	Native

One

<i>Acalypha rhomboidea</i>	10.8	A-Forb	Native	<i>Agastache nepetoides</i> [†]	10.0	P-Forb	Native
<i>Campanula americana</i> [†]	13.9	A-Forb	Native	<i>Carex blanda</i>	55.7	Sedge	Native
<i>Carex blanda</i>	27.7	Sedge	Native	<i>Carex pensylvanica</i> [†]	48.6	Sedge	Native
<i>Carex pensylvanica</i> [†]	30.8	Sedge	Native	<i>Carya ovata</i>	15.7	Tree	Native
<i>Carya ovata</i>	12.3	Tree	Native	<i>Celtis occidentalis</i>	14.3	Tree	Native
<i>Circaea lutetiana</i>	12.3	P-Forb	Native	<i>Conyza canadensis</i>	18.6	A-Forb	Native
<i>Elymus villosus</i> [†]	10.8	P-Grass	Native	<i>Cornus racemosa</i> [†]	44.3	Shrub	Native
<i>Erythronium albidum</i> ‡	12.3	P-Forb	Native	<i>Dichanthelium acuminatum</i> [†]	10.0	P-Grass	Native
<i>Fraxinus americana</i>	40.0	Tree	Native	<i>Elymus villosus</i> [†]	10.0	P-Grass	Native
<i>Galium aparine</i> ‡	10.8	A-Forb	Native	<i>Erythronium albidum</i> ‡	34.3	P-Forb	Native

<i>Impatiens pallida</i>	13.9	A-Forb	Native	<i>Eupatorium rugosum</i>	15.7	P-Forb	Native
<i>Osmorhiza claytoni</i>	23.1	P-Forb	Native	<i>Fraxinus americana</i>	50.0	Tree	Native
<i>Ostrya virginiana</i>	15.4	Tree	Native	<i>Galium aparine</i> ‡	15.7	A-Forb	Native
<i>Parthenocissus quinquefolia</i> †	89.2	W-Vine	Native	<i>Hackelia virginiana</i>	21.4	P-Forb	Native
<i>Phlox divaricata</i> ‡	13.9	P-Forb	Native	<i>Laportea canadensis</i> *	14.3	P-Forb	Native
<i>Phryma leptostachya</i>	16.9	P-Forb	Native	<i>Melilotus alba</i>	27.1	B-Forb	Exotic
<i>Polygonatum biflorum</i> †	20.0	P-Forb	Native	<i>Menispermum canadense</i> †	12.9	W-vine	Native
<i>Quercus alba</i>	13.9	Tree	Native	<i>Osmorhiza claytoni</i>	11.4	P-Forb	Native
<i>Ribes missouriense</i> †	20.0	Shrub	Native	<i>Ostrya virginiana</i>	20.0	Tree	Native
<i>Sanicula marilandica</i>	21.5	P-Forb	Native	<i>Oxalis stricta</i> †	21.4	P-Forb	Native
<i>Smilax hispida</i>	16.9	W-Vine	Native	<i>Parthenocissus quinquefolia</i> †	90.0	W-Vine	Native
<i>Solidago ulmifolia</i>	13.9	P-Forb	Native	<i>Phlox divaricata</i> ‡	17.1	P-Forb	Native
<i>Symphoricarpos orbiculatus</i> †	10.8	Shrub	Native	<i>Phryma leptostachya</i>	12.9	P-Forb	Native
<i>Thalictrum thalictroides</i> ‡	35.4	P-Forb	Native	<i>Poa pratensis</i>	10.0	P-Grass	Exotic
<i>Toxicodendron radicans</i> †	21.5	W-Vine	Native	<i>Prunus serotina</i>	30.0	Tree	Native
<i>Ulmus americana</i>	16.9	Tree	Native	<i>Quercus alba</i>	10.0	Tree	Native
<i>Ulmus rubra</i>	24.6	Tree	Native	<i>Ribes missouriense</i> †	21.4	Shrub	Native
<i>Viola sororia</i> ‡	26.2	P-Forb	Native	<i>Sanicula marilandica</i>	28.6	P-Forb	Native
				<i>Smilax hispida</i>	48.6	W-Vine	Native
				<i>Solidago ulmifolia</i>	21.4	P-Forb	Native

<i>Symphoricarpos orbiculatus</i> [†]	35.7	Shrub	Native
<i>Taraxacum officinale</i>	12.9	P-Forb	Exotic
<i>Thalictrum thalictroides</i> ‡	15.7	P-Forb	Native
<i>Toxicodendron radicans</i> [†]	64.3	W-Vine	Native
<i>Trifolium repens</i>	20.0	P-Forb	Exotic
<i>Ulmus americana</i>	28.6	Tree	Native
<i>Ulmus rubra</i>	25.7	Tree	Native
<i>Verbascum thapsus</i>	10.0	B-Forb	Exotic
<i>Viola sororia</i> ‡	58.6	P-Forb	Native
<i>Vitis riparia</i> [†]	17.1	W-Vine	Native

Two

<i>Acalypha rhomboidea</i>	13.9	A-Forb	Native	<i>Acalypha rhomboidea</i>	12.9	A-Forb	Native
<i>Aster cordifolius</i>	10.8	P-Forb	Native	<i>Ambrosia artemisiifolia</i> [†]	24.3	A-Forb	Native
<i>Carex amphibola turgida</i>	27.7	Sedge	Native	<i>Campanula americana</i> [†]	17.1	A-Forb	Native
<i>Carex blanda</i>	40.0	Sedge	Native	<i>Carex amphibola turgida</i> *	57.1	Sedge	Native
<i>Carex jamesii</i>	13.9	Sedge	Native	<i>Carex blanda</i>	52.9	Sedge	Native
<i>Carya ovata</i>	26.2	Tree	Native	<i>Carex gravida</i>	11.4	Sedge	Native
<i>Cornus racemosa</i> [†]	12.3	Shrub	Native	<i>Carex jamesii</i> *	41.4	Sedge	Native
<i>Cryptotaenia canadensis</i>	23.1	P-Forb	Native	<i>Carex pensylvanica</i> [†]	37.1	Sedge	Native
<i>Erythronium albidum</i> ‡	16.9	P-Forb	Native	<i>Carya ovata</i>	18.6	Tree	Native

<i>Eupatorium rugosum</i>	36.9	P-Forb	Native	<i>Celtis occidentalis</i>	22.9	Tree	Native
<i>Festuca obtusa</i>	15.4	P-Grass	Native	<i>Conyza canadensis</i> *	47.1	A-Forb	Native
<i>Fraxinus americana</i>	38.7	Tree	Native	<i>Cornus racemosa</i> [†]	51.4	Shrub	Native
<i>Galium aparine</i> ‡	32.3	A-Forb	Native	<i>Cryptotaenia canadensis</i>	28.6	P-Forb	Native
<i>Geum canadense</i> [†]	20.0	P-Forb	Native	<i>Dactylis glomerata</i>	10.0	P-Grass	Exotic
<i>Hackelia virginiana</i>	16.9	P-Forb	Native	<i>Desmodium glutinosum</i>	12.9	P-Forb	Native
<i>Impatiens pallida</i>	13.9	A-Forb	Native	<i>Dicentra cucullaria</i> ‡	14.3	P-Forb	Native
<i>Lactuca floridana</i>	12.3	B-Forb	Native	<i>Erigeron strigosus</i> * [†]	55.7	P-Forb	Native
<i>Osmorhiza claytoni</i>	15.4	P-Forb	Native	<i>Erythronium albidum</i> ‡	44.3	P-Forb	Native
<i>Ostrya virginiana</i>	70.8	Tree	Native	<i>Eupatorium rugosum</i>	31.4	P-Forb	Native
<i>Parthenocissus quinquefolia</i> [†]	89.2	W-Vine	Native	<i>Festuca obtuse</i>	11.4	P-Grass	Native
<i>Phlox divaricata</i> ‡	15.4	P-Forb	Native	<i>Fraxinus americana</i>	45.7	Tree	Native
<i>Podophyllum peltatum</i> ‡	12.3	P-Forb	Native	<i>Galium aparine</i> ‡	48.6	A-Forb	Native
<i>Polygonatum biflorum</i> [†]	21.5	P-Forb	Native	<i>Geum canadense</i> [†]	10.0	P-Forb	Native
<i>Prunus serotina</i>	16.9	Tree	Native	<i>Gleditsia triacanthos</i>	10.0	Tree	Native
<i>Quercus alba</i>	16.9	Tree	Native	<i>Hackelia virginiana</i> *	51.4	P-Forb	Native
<i>Quercus rubra</i>	13.9	Tree	Native	<i>Melilotus alba</i>	27.1	B-Forb	Exotic
<i>Ribes missouriense</i> [†]	18.5	Shrub	Native	<i>Ostrya virginiana</i>	48.6	Tree	Native
<i>Sanicula marilandica</i>	18.5	P-Forb	Native	<i>Oxalis stricta</i> * [†]	35.7	P-Forb	Native
<i>Smilax hispida</i>	20.0	W-Vine	Native	<i>Parthenocissus quinquefolia</i> [†]	88.6	W-Vine	Native

<i>Solidago ulmifolia</i>	16.9	P-Forb	Native	<i>Phlox divaricata</i> ‡	21.4	P-Forb	Native
<i>Symphoricarpos orbiculatus</i> †	18.5	Shrub	Native	<i>Poa pratensis</i>	12.9	P-Grass	Exotic
<i>Thalictrum thalictroides</i> ‡	35.4	P-Forb	Native	<i>Potentilla recta</i>	15.7	P-Forb	Exotic
<i>Ulmus americana</i>	38.5	Tree	Native	<i>Potentilla simplex</i> *†	24.3	P-Forb	Native
<i>Ulmus rubra</i>	16.9	Tree	Native	<i>Prunus serotina</i>	30.0	Tree	Native
<i>Viola sororia</i> ‡	23.1	P-Forb	Native	<i>Ribes missouriense</i> †	21.4	Shrub	Native
				<i>Rubus occidentalis</i> †	21.4	Shrub	Native
				<i>Sanicula marilandica</i>	35.7	P-Forb	Native
				<i>Smilax hispida</i>	32.9	W-Vine	Native
				<i>Solidago canadensis</i> †	12.9	P-Forb	Native
				<i>Sonchus oleraceus</i> *	10.0	A-Forb	Exotic
				<i>Symphoricarpos orbiculatus</i> †	44.3	Shrub	Native
				<i>Taraxacum officinale</i>	32.9	P-Forb	Exotic
				<i>Teucrium canadense</i> †	18.6	P-Forb	Native
				<i>Thalictrum thalictroides</i> ‡	14.3	P-Forb	Native
				<i>Toxicodendron radicans</i> †	65.7	W-Vine	Native
				<i>Trifolium repens</i> *	57.1	P-Forb	Exotic
				<i>Ulmus americana</i>	41.4	Tree	Native
				<i>Ulmus rubra</i>	11.4	Tree	Native
				<i>Verbascum thapsus</i> *	31.4	B-Forb	Exotic

<i>Verbena stricta</i>	22.9	P-Forb	Native
<i>Viola sororia</i> ‡	60.0	P-Forb	Native
<i>Vitis riparia</i> †	18.6	W-Vine	Native

Three

<i>Acalypha rhomboidea</i>	18.5	A-Forb	Native	<i>Ambrosia artemisiifolia</i> †	11.4	A-Forb	Native
<i>Aster cordifolius</i>	12.3	P-Forb	Native	<i>Carex amphibola turgida</i>	22.9	Sedge	Native
<i>Carex blanda</i>	41.5	Sedge	Native	<i>Carex blanda</i>	65.7	Sedge	Native
<i>Carex jamesii</i>	23.1	Sedge	Native	<i>Carex gravida</i> *	54.3	Sedge	Native
<i>Carex pennsylvanica</i> †	21.5	Sedge	Native	<i>Carex jamesii</i>	17.1	Sedge	Native
<i>Carya ovata</i>	23.1	Tree	Native	<i>Carex pennsylvanica</i> †	45.7	Sedge	Native
<i>Erythronium albidum</i> ‡	13.9	P-Forb	Native	<i>Carya ovata</i>	24.3	Tree	Native
<i>Eupatorium rugosum</i>	38.5	P-Forb	Native	<i>Celtis occidentalis</i> *	27.1	Tree	Native
<i>Festuca obtuse</i>	18.5	P-Grass	Native	<i>Circaea lutetiana</i>	12.9	P-Forb	Native
<i>Fraxinus americana</i>	49.2	Tree	Native	<i>Cornus racemosa</i> *†	58.6	Shrub	Native
<i>Galium aparine</i> ‡	23.1	A-Forb	Native	<i>Cryptotaenia canadensis</i>	14.3	P-Forb	Native
<i>Galium triflorum</i>	10.8	P-Forb	Native	<i>Dactylis glomerata</i> *	15.7	P-Grass	Exotic
<i>Geum canadense</i> †	12.3	P-Forb	Native	<i>Dicentra cucullaria</i> ‡	14.3	P-Forb	Native
<i>Ostrya virginiana</i>	63.1	Tree	Native	<i>Dichanthelium acuminatum</i> †	30.0	P-Grass	Native
<i>Parthenocissus quinquefolia</i> †	84.6	W-Vine	Native	<i>Erigeron strigosus</i> †	24.3	P-Forb	Native
<i>Phlox divaricata</i> ‡	10.8	P-Forb	Native	<i>Erythronium albidum</i> ‡	47.1	P-Forb	Native

<i>Podophyllum peltatum</i> ‡	15.4	P-Forb	Native	<i>Eupatorium rugosum</i>	40.0	P-Forb	Native
<i>Polygonatum biflorum</i> †	12.3	P-Forb	Native	<i>Fraxinus americana</i>	47.1	Tree	Native
<i>Prunus serotina</i>	12.3	Tree	Native	<i>Galium aparine</i> ‡	25.7	A-Forb	Native
<i>Quercus alba</i>	15.4	Tree	Native	<i>Galium concinnum</i> †	12.9	P-Forb	Native
<i>Ribes missouriense</i> †	20.0	Shrub	Native	<i>Galium triflorum</i> *	38.6	P-Forb	Native
<i>Sanicula marilandica</i>	23.1	P-Forb	Native	<i>Geum canadense</i> †	20.0	P-Forb	Native
<i>Smilax hispida</i>	24.6	W-Vine	Native	<i>Gleditsia triacanthos</i> *	15.7	Tree	Native
<i>Solidago ulmifolia</i>	26.2	P-Forb	Native	<i>Hackelia virginiana</i>	24.3	P-Forb	Native
<i>Symphoricarpos orbiculatus</i> †	16.9	Shrub	Native	<i>Juncus tenuis</i> *†	25.7	Rush	Native
<i>Thalictrum thalictroides</i> †‡	29.2	P-Forb	Native	<i>Melilotus alba</i>	10.0	B-Forb	Exotic
<i>Toxicodendron radicans</i> †	10.8	W-Vine	Native	<i>Morus rubra</i> *	12.9	Tree	Native
<i>Ulmus americana</i>	26.2	Tree	Native	<i>Ostrya virginiana</i>	57.1	Tree	Native
<i>Ulmus rubra</i>	12.3	Tree	Native	<i>Oxalis stricta</i> †	18.6	P-Forb	Native
<i>Viola sororia</i> ‡	30.8	P-Forb	Native	<i>Parthenocissus quinquefolia</i> †	88.6	W-Vine	Native
				<i>Phlox divaricata</i> ‡	15.7	P-Forb	Native
				<i>Potentilla simplex</i> †	10.0	P-Forb	Native
				<i>Prunus serotina</i>	30.0	Tree	Native
				<i>Quercus alba</i>	11.4	Tree	Native
				<i>Quercus rubra</i>	10.0	Tree	Native
				<i>Ribes missouriense</i> †	21.4	Shrub	Native

<i>Rosa multiflora</i>	12.9	Shrub	Exotic
<i>Rubus occidentalis</i> *†	32.9	Shrub	Native
<i>Sanicula marilandica</i>	24.3	P-Forb	Native
<i>Smilax hispida</i>	37.1	W-Vine	Native
<i>Solidago canadensis</i> *†	34.3	P-Forb	Native
<i>Symphoricarpos orbiculatus</i> *†	62.9	Shrub	Native
<i>Teucrium canadense</i> †	11.4	P-Forb	Native
<i>Thalictrum thalictroides</i> ‡	12.9	P-Forb	Native
<i>Toxicodendron radicans</i> †	70.0	W-Vine	Native
<i>Trifolium repens</i>	35.7	P-Forb	Exotic
<i>Ulmus americana</i>	35.7	Tree	Native
<i>Ulmus rubra</i>	22.9	Tree	Native
<i>Viola sororia</i> *‡	62.9	P-Forb	Native
<i>Vitis riparia</i> *†	25.7	W-Vine	Native
<i>Zanthoxylum americanum</i> *†	12.9	Shrub	Native

¹ Life-form groups are: A-forb, annual forbs; B-Forb, biennial forbs; P-forb, perennial forbs, P-grass, perennial grasses; Rush, perennial rushes; Sedge, perennial sedges; Shrub, shrubs; Tree, trees; W-vine, woody vine.