Vascular plant richness in an electric power right-of-way wetland at Greenwoods Conservancy, summer 1999

Sarah Groff[1]

INTRODUCTION

Greenwoods Conservancy is a thousand-acre nature preserve located in Burlington, New York. A conservation easement through the Otsego Land Trust, a non-profit corporation, protects Greenwoods from development in perpetuity (Taylor, 1994). In 1986, the New York State Power Authority built the Marcy-South power line through Greenwoods. In building the power line, a corridor, or Right-of-Way (ROW), was created. Since the creation of Marcy-South, the ROW has been maintained through selective cutting and chemical stump treatment. The objective of this study was to determine the effect of the ROW management on a wetland that runs through the ROW. A similar study was conducted in 1997 at Belford, Caledonia, Croghan, Eden, Empeyfield and Fulton by the Empire State Electric Energy Research Corporation (ESEERCO). This work concluded that "maintaining ROW within wetlands does not adversely affect one indicator of biodiversity, i.e., vascular species richness, nor the ability to provide habitat for plant species of state or regional concern" (Podniesinski et al., 1997). This study followed the basic methodology of the ESEERCO's survey to determine whether the ESEERCO's conclusion is applicable to the Greenwoods ROW wetland.

METHODS

Two 20 x 50 meter plots were laid out, one within the ROW and the other adjacent to the ROW plot (Figure 1). The deciduous wood surrounding the off-ROW plot limited the size of the plot. To minimize the influence of edge effects, the first 10 meters on either side of the forest edge were excluded from the study (MacLellan and Stewart, 1986). The timed meander method was used to determine the species richness of the two plots. At each site, all vascular plant species were recorded. When 30 minutes elapsed without finding new species, sampling was considered complete (Goff et al, 1982).

Three $0.25m^2$ quadrats were randomly placed within each previously identified plant community. The communities in the two plots were determined, based upon the visually dominant vascular plant species. The percent cover of herbaceous vascular plant species was estimated and categorized using the methods of Mueller- Dombois (1974). Plants that were not readily identified in the field were collected and later identified. Due to the absence of flowers and/ or fruit, some plants were not able to be identified beyond genus. The plants were identified using Cronquist and Gleason (1993) and Holmgraen (1998).

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[1] F.H.V. Mecklenburg Conservation Fellow, summer 1999. Present Affiliation: Deerfield Academy, Deerfield, MA.

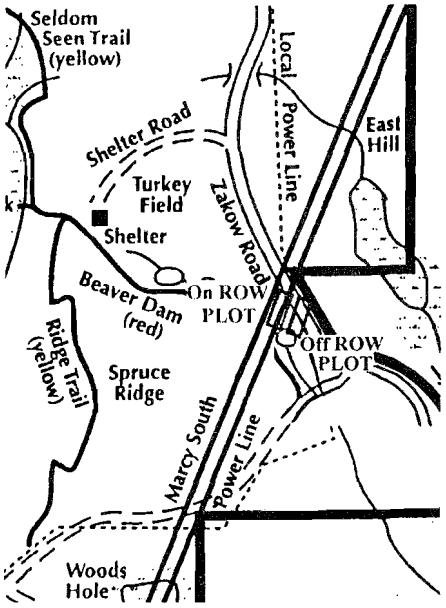

Figure 1. Experimental plot locations, Greenwoods Conservancy.

RESULTS & DISCUSSION

The species list obtained from the timed meander was used to compare the total species richness, richness by plant family, the number of New York State protected species, non-native species and wetland indicator status of individual species. In total, 105 vascular plant species were identified in the Greenwoods ROW wetland (Table 1). The number of species found in each site was 73. There was also no statistically significant difference in the number of N.Y. State protected species, as determined by the N.Y.S. Department of Environmental Conservation (1989), in each plot (8 on-ROW and 7 off-ROW), nor in the number of exotic plants, determined using Mitchell and Tucker (1997) (Table 2). The numbers of wetland species considered facultative wetland, facultative wetland + and obligatory wetland, determined by Reed (1988), were 37 on-ROW and 30 off-ROW (Table 3).

Table1. Summary of species found on and off powerline ROW.

Family	Genus	Species	Common	ON ROW	OFF ROW
Equisetaceae	*Equisetum*	*sylvaticum*	Woodland horsetail	X	
Thelypteridaceae	*Thelypteris*	*noveboracensis*	New York Fern	X	X
Thelypteridaceae	*Thelypteris*	*palustris*	Marsh Fern	X	
Dryopteridaceae	*Athyrium*	*filix-femina*	Lady Fern	X	X
Dryopteridaceae	*Dryopteris*	*campyloptera*	Spreading Shield Fern	X	X
Dryopteridaceae	*Dryopteris*	*carthusiana*	Spinulose Shield Fern	X	X
Dryopteridaceae	*Dryopteris*	*cristata*	Crested Wood Fern	X	
Dryopteridaceae	*Dryopteris*	*intermedia*	Common Wood Fern	X	X
Dryopteridaceae	*Onoclea*	*sensibilis*	Sensitive Fern	X	X
Ranunculaceae	*Clematis*	*spp.*	Clematis	X	

Table1 (cont.) Summary of species found on and off powerline ROW.

Family	Genus	Species	Common	ON ROW	OFF ROW
Ranunculaceae	*Clematis*	*virginiana*	Virgin's-Bower		X
Ranunculaceae	*Ranunculus*	*hispidus var. nitidus*	Swamp Buttercup	X	
Ranunculaceae	*Ranunculus*	*spp.*	Crowfoot		X
Ranunculaceae	*Thalictrum*	*elliptrum*	Meadow Rue		X
Ranunculaceae	*Thalictrum*	*pubescens*	Tall Meadow Rue	X	
Fagaceae	*Quercus*	*rubra*	Red Oak		X
Betulaceae	*Alnus*	*incana ssp. rugosa*	Speckled Alder	X	X
Caryophyllaceae	*Stellaria*	*media*	Common Chickweed		X
Polygonaceae	*Polygonum*	*hydropiper*	Common smartweed	X	
Polygonaceae	*Polygonum*	*sagittatum*	Arrow-leaved Tearthumb	X	X
Polygonaceae	*Polygonum*	*spp.*	Smartweed unk.	X	X
Polygonaceae	*Rumex*	*crispus*	Curly Dock	X	
Clusiaceae	*Hypericum*	*ellipticum*	Pale St. John's-wort	X	
Clusiaceae	*Hypericum*	*mutilum*	Dwarf St. John's-wort	X	
Clusiaceae	*Hypericum*	*spp.*	St. John's-wort	X	
Clusiaceae	*Triadenum*	*fraseri*	Marsh St. John's-wort	X	
Salicaceae	*Populus*	*tremuloides*	Quaking Aspen		X
Salicaceae	*Salix*	*fragilis*	Crack Willow	X	X
Salicaceae	*Salix*	*nigra*	Black Willow	X	
Salicaceae	*Salix*	*sericea*	Silky Willow		X
Brassicaceae	*Cardamine*	*diphylla*	Two-leaf Toothwort	X	X
Ericaceae	*Gaylussacia*	*spp.*	Huckleberry		X
Grossulariaceae	*Ribes*	*spp.*	Currant unk.		X
Grossulariaceae	*Ribes*	*triste*	Swamp Red Currant	X	
Rosaceae	*Agrimonia*	*gryposepala*	Common Agrimony	X	
Rosaceae	*Amelanchier*	*laevis*	Smooth Shadbush		X
Rosaceae	*Crataegus*	*spp.*	Hawthorne unk	X	X
Rosaceae	*Fragaria*	*virginiana*	Wild Strawberry	X	X
Rosaceae	*Geum*	*canadense*	White Avens		X
Rosaceae	*Malus*	*pumila*	Common Apple		X
Rosaceae	*Potentilla*	*canadensis*	Dwarf Cinquefoil		X
Rosaceae	*Prunus*	*serotina*	Black Cherry		X
Rosaceae	*Prunus*	*virginiana*	Choke-Cherry	X	X
Rosaceae	*Rubus*	*allegheniensis*	Northern Blackberry	X	X
Rosaceae	*Rubus*	*hispidus*	Swamp Dewberry	X	
Rosaceae	*Rubus*	*idaeus*	Red Rasberry	X	X
Rosaceae	*Spiraea*	*alba*	Meadowsweet	X	X
Onagraceae	*Circaea*	*lutetiana*	Enchanter's Nightshade		X
Onagraceae	*Ludwigia*	*palustris*	Water Purslane	X	X
Cornaceae	*Cornus*	*alternifolia*	Green Osier		X
Cornaceae	*Cornus*	*sericea*	Red Osier Dogwood	X	X
Vitaceae	*Parthenocissus*	*quinquefolia*	Virginia Creeper	X	
Aceraceae	*Acer*	*rubrum*	Red Maple	X	
Oxalidaceae	*Oxalis*	*stricta*	Lady's Sorrel	X	X
Balsaminaceae	*Impatiens*	*capensis*	Spotted Jewelweed	X	X
Apiaceae	*Hydrocotyle*	*americana*	Pennywort	X	
Apiaceae	*Hydrocotyle*	*umbellata*	Water Pennywort		X
Solanaceae	*Solanum*	*dulcamara*	Climbing Nightshade	X	
Lamiaceae	*Clinopodium*	*vulgare*	Wild Basil		X
Lamiaceae	*Lycopus*	*americanus*	Water-Horehound	X	X

Table1 (cont.). Summary of species found on and off powerline ROW.

Family	Genus	Species	Common	ON ROW	OFF ROW
Lamiaceae	*Lycopus*	*virginicus*	Northern Bugleweed		X
Lamiaceae	*Mentha*	*arvensis*	Field Mint	X	X
Lamiaceae	*Scutellaria*	*galericulata*	Common Skullcap	X	X
Oleaceae	*Fraxinus*	*americana*	White Ash	X	
Oleaceae	*Fraxinus*	*pennsylvanica*	Green Ash	X	X
Scrophulariaceae	*Veronica*	*americana*	American Brooklime	X	
Scrophulariaceae	*Veronica*	*officinalis*	Speedwell		X
Rubiaceae	*Galium*	*trifidum*	Bedstraw		X
Rubiaceae	*Galium*	*triflorum*	Sweet-Scented Bedstraw	X	
Caprifoliaceae	*Sambucus*	*canadensis*	Black Elderberry	X	X
Caprifoliaceae	*Viburnum*	*lentago*	Nannyberry	X	X
Caprifoliaceae	*Viburnum*	*nudum var. casenoides*	Wild Raisin	X	X
Caprifoliaceae	*Viburnum*	*recognitum*	Northern Arrowwood	X	X
Valerianaceae	*Valeriana*	*officinalis*	Garden Heliotrope	X	
Asteracaeae	*Aster*	*lateriflorus*	Calico Aster		X
Asteracaeae	*Aster*	*praealtus*	Willow Aster		X
Asteracaeae	*Aster*	*prenanthoides*	Crookstem Aster	X	X
Asteracaeae	*Aster*	*racemosus*	Small White Aster		X
Asteracaeae	*Cirsium*	*spp.*	Welted Thistle		X
Asteracaeae	*Eupatorium*	*perfoliatum*	Boneset	X	X
Asteracaeae	*Senecio*	*aureus*	Golden Ragwort	X	
Asteracaeae	*Solidago*	*reminia*	Lance-leaved Goldenrod	X	X
Asteracaeae	*Solidago*	*rugosa*	Rough-stemmed Goldenrod		X
Asteracaeae	*Solidago*	*spp.*	Goldenrod	X	
Potamogetonaceae	*Potamogeton*	*natans*	Floating-leaf Pondweed		X
Araceae	*Arisaema*	*triphyllum*	Jack-in-the-Pulpit	X	X
Juncaceae	*Juncus*	*effusus*	Soft Rush	X	X
Cyperaceae	*Carex*	*cristata*	Sedge	X	
Cyperaceae	*Carex*	*dulichium*	Three-armed sedge		X
Cyperaceae	*Carex*	*lurida*	Sedge	X	X
Cyperaceae	*Carex*	*scoparia*	Broom Sedge	X	X
Cyperaceae	*Carex*	*spp.*	Sedge		X
Cyperaceae	*Carex*	*stipata*	Stalk-Grain sedge		X
Cyperaceae	*Eleocharis*	*ovata*	Ovate Spikerush		X
Cyperaceae	*Scirpus*	*cyperinus*	Wool Grass	X	X
Poaceae	*Agrostis*	*gigantea*	Redtop	X	
Poaceae	*Distichlis*	*spicata*	Spikegrass	X	
Poaceae	*Festuca*	*subverticillata*	Nodding Fescue	X	
Poaceae	*Glyceria*	*canadensis*	Rattlesnake Grass	X	
Poaceae	*Leersia*	*oryzoides*	Rice Cutgrass	X	X
Poaceae	*Panicum*	*virgatum*	Switchgrass		X
Sparganiaceae	*Sparganium*	*americanum*	Bur-reed	X	X
Typhaceae	*Typha*	*latifolia*	Cat-tail	X	X
Liliaceae	*Trillium*	*spp.*	Trillium Unk.	X	X
Iridaceae	*Iris*	*versicolor*	Blue Flag	X	

Table 2. Floristic summary of total, threatened, rare, exploitably vulnerable and exotic species found on-ROW, off-ROW and in both plots.

	On ROW	Off ROW	Total
Total Species	73	73	105
Threatened	1	1	1
Rare	0	1	1
Exploitably vulnerable	7	5	7
Exotic	8	9	11

Table 3. Wetland indicator status (number of species determined Obligate (OBL), Facultative Wetland (FACW), Facultative (FAC) and Facultative Upland (FACU).

(Probability In Wetland)	OBL (>99%)	FACW+	FACW (67- 99%)	FACW-	FAC (34- 66%)	FAC-	FACU (1- 33%)	FACU-
On ROW	17	11	9	3	5	2	9	1
Off ROW	15	9	6	4	6	1	8	3

A large number of exotic species, as well as their dominance, is an excellent indicator of disturbance, as a disturbed community has more resources available, at least temporarily, for invading alien species (Robinson et al., 1995). Although there were 8 alien species on-ROW, none dominated their communities. The majority of exotics were found only as singular plants, rather than invasive clusters.

The ESEERCOO study concluded that the creation of the ROW allowed for greater species diversity (Podniesnki et al., 1997). There was a significant difference in the total number of species and the numbers of exotic and protected plants on-ROW and off-ROW. In the wetlands studied by the ESEERCOO, there were both significantly more exotics, protected and total species in the on-ROW plot. In the Greenwoods wetland, however, there is an insignificant difference in the numbers of total species, exotics and protected plants. Likewise, the community cover plots showed little discrepancy between on-ROW and off-ROW, with the exception of a shrub layer domination of *Alnus incana* in the on-ROW shrub swamp community (62.5 % cover) and a shrub layer domination of *Viburnum recognitum* (33% cover) in the off-ROW shrub swamp (Table 4). Despite small differences in the communities of each plot that could be attributed to minerotrophic variations, the off-ROW and on-ROW plots are similar in species richness and rarity.

Table 4. Summary of percent cover for herb, shrub and tree layers on- and off-ROW.

On- ROW			Off- ROW		
Community Type	**Species**	**% Cover**	**Community Type**	**Species**	**% Cover**
Herb Layer			**Herb Layer**		
Marsh	*Leersia orzoides*	41.7	Marsh	*Leersia orzoides*	46.7
	Impatiens capensis	20.8		*Scirpus cyperinus*	20.8
	Festuca subvericillata	5.0		*Impatiens capensis*	6.7
	Polygonum sagittatum	5.0		*Polygonum sagittatum*	5.8
	Salix fragilis	5.0		*Lycopus americana*	5.0
	Agrastis alba	0.8		*Typha latifolia*	5.0
	Carex spp.	0.8		*Eleocharis ovata*	1.7
	Galium trifium	0.8		*Sparganium americanum*	0.8
	Lycopus americana	0.8		*Ludwigia palustris*	0.8
	Sparganium americanum	0.8		*Hypericum muliatum*	0.8
Shrub swamp	*Dryopteris intermedia*	12.5	Shrub swamp	*Athryium filix-femina*	12.5
	Onoclea sensibilis	12.5		*Arisaema triphyllum*	0.8
	Arisaema triphyllum	0.8		*Panicum virgatum*	0.8
	Aster prenanthoides	0.8			
	Fragaria vesca	0.8	Deciduous Forest	*Fragaria virginiana*	5.0
	Solidago rugosa	0.8		*Geum canadense*	0.8
	Thalictrum dioicum	0.8		*Aster praealtus*	0.8
Shrub Layer			**Shrub Layer**		
Shrub swamp	*Alnus incana*	62.5	Shrub swamp	*Viburnum recognitum*	33
	Spiria alba	5.0		*Spiria alba*	13.2
				Rubus ideus	5.0
				Salix serecia	5.0
			Deciduous forest	*Viburnum recognitum*	40.8
				Rubus ideus	26.7
				Alnus incana	20.8
				Viburnum lentago	5.0
				Crateagus spp.	0.8
				Spiria alba	0.8
			Tree Layer		
			Deciduous forest	*Fraxinus pennsylvanica*	85.0

CONCLUSION

Data collected during the course of this study indicate that the management of the Greenwoods Right-Of-Way has not impacted species richness of the wetland area relative to the adjacent unmanaged stand. This could be due to the methods of maintenance in the Marcy-South power corridor; the only impact within the on-ROW wetland is the occasional cutting of trees that have the potential to interfere with the powerline and the cutting of trees surrounding the wetland.

REFERENCES

Cronquist, A. and H. A. Gleason. 1993. Manual of Northeastern United States and adjacent Canada, 2nd ed. New York Botanical Gardens. Bronx, N.Y.

Goff , F. G., G.A. Dawson, and J. H. Rochow. 1982. Site examination for threatened and endangered plant species. Environmental Management 6: 307-316.

Hanley, T. A., R. J. Naiman and M. M. Pollock. 1998. Plant species richness in riparian wetlands- a test of biodiversity theory. Ecology 70: 94- 106.

Holmgraen, N. H. 1998. Illustrated companion to Gleason and Cronquist manual. New York Botanical Gardens. Bronx, N.Y.

MacLellan, P. and J. M. Stewart. 1986. Latitudinal gradients in vegetation along a disturbed transmission line right-of-way in Manitoba. Canadian Journal of Botany 64: 1311-1320.

Mitchell, R. S. and G. S. Tucker. 1997. Revised checklist of New York State plants. New York State Museum Bulletin No. 490, New York Education Department. Albany, New York.

N.Y.S. D.E.C. Division of Lands and Forests. 1989. New York State protected native plants. New York Codes, Rules and Regulations, Section 193.3.

Podniesnki, G., D. J. Leopold and D.J. Raynal. 1997. Vascular species richness and rarity in wetlands on electric power rights-of-way in New York State. Empire State Electric Energy Research Corporation. NewYork, NY.

Reed, Porter B. 1988. National list of plant species that occur in wetlands: New York. National Wetland Inventory, U.S. Fish and Wildlife Service. St. Petersburg, Florida.

Robinson, G. R., J. F. Quinn and M.L. Stanton. 1995. Invasibility of experimentally fragmented California annual grassland. Oecologia 76: 71- 82.

Taylor, Linda A. 1995. Biological survey of Cranberry Bog. In W. N. Harman (ed.) SUNY College at Oneonta Biological Field Station. 27th Annual Report (1994), Cooperstown, N.Y.