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STATE OF ALIEN PLANT SPECIES IN EIGHT STATE NATURAL AREAS IN EASTERN WISCONSIN

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ABSTRACT

An annotated list of the non-native plant species found in eight eastern Wisconsin natural areas and their relative abundances in 1988 is presented. Except for European buckthorn, aliens were scattered and at low densities, several found mainly along trails. The most seriously invaded sites were Sanders Park and Muskego Park, areas with numerous hiking trails and relatively open, oak-dominated canopies.

INTRODUCTION

Since the advent of Europeans into Wisconsin, most of the state's natural plant communities have been greatly altered through a variety of artificial disturbances (e.g., lumbering, grazing, agriculture, settlements, industry). Many of the best remaining areas have been designated as state Natural Areas by the Scientific Areas Preservation Council and the Department of Natural Resources. A "Natural Area" may be defined as "a tract of land or water so little modified by man's activity or sufficiently recovered that it contains intact native plant and animal communities believed to be representative of the presettlement landscape" (Tans and Dawson 1980). These remnants of our natural heritage are used for scientific research and education by preserving natural diversity and allowing natural processes to proceed without human interference. As such, they serve as reference sites to which other, more disturbed areas may be compared.

A potential threat to the integrity, quality, and usefulness of natural areas is the introduction and establishment of non-native plant species which may become weedy. Throughout the world, alien species have become common, and, at times, harmful members of the local vegetation. Witness cheatgrass (Bromus tectorum) in the rangelands of the American West (Mack 1981), saltcedar (Tamarix chinensis) along river channels of the Southwest (Graf 1982), prickly-pear cactus (Opuntia spp.) in Australia (Ehrlich and Birch 1967), the Eurasian honeysuckle (Lonicera x bella) (Barnes and Cottam 1974) and the European buckthorn (Rhamnus cathartica) (Leitner 1985) in the open woodlands of southern Wisconsin. It is therefore important to monitor periodically natural areas and report on the status of exotics.

As part of a program by the Department of Natural Resources to acquire

baseline data on Natural Areas (or "Scientific Areas"), during the summer of 1988 I surveyed the vegetation of eight sites in eastern Wisconsin (Table 1). For sampling, I used modified line-transects; in addition, I made an inventory of all vascular species present within each site and ranked them on a subjective scale as "abundant", "common", "occasional", or "rare". Duplicate voucher specimens were collected and deposited in the herbaria of the Milwaukee Public Museum and the University of Wisconsin-Madison.

Table 1. Locations and descriptions of the eight state Natural Areas. CI refers to Curtis' Continuum Index.

<u>Sci. Area No.</u>	<u>Site Description</u>
11	<p>Haskell Noyes Memorial Woods</p> <p>Fond du Lac Co. T13N R19E E1/2 NW1/4 S12. 28 ha.</p> <p>Hilly site on thin, stony soil, dominated by <u>Acer saccharum</u> and <u>Quercus rubra</u>. Network of established hiking trails. Tamarack swamp at north end. CI = 2293.</p>
51	<p>Waupun Park Maple Forest</p> <p>Fond du Lac Co. T14N R15E NE1/4 NE1/4 S31. 16 ha.</p> <p>County park on level site, bisected by county highway. Canopy of <u>Acer saccharum</u>, <u>Tilia americana</u>, <u>Fraxinus americana</u>, and <u>Carya cordiformis</u>. CI = 2364. Network of frequently used hiking trails.</p>
56	<p>Sanders Park Hardwoods</p> <p>Racine Co. T3N R22E N1/2 SE1/4 S36. 12 ha.</p> <p>Part of heavily used county park, encircled by park road. On two low E-W ridges, with stream in between. Canopy of <u>Tilia americana</u>, <u>Fraxinus americana</u>, <u>Quercus rubra</u>, and <u>Quercus alba</u>. CI = 1821. Network of established trails.</p>
95	<p>Renak-Polak Maple-Beech Woods</p> <p>Racine Co. T4N R22E E1/4 S14. 28 ha.</p> <p>Level site on former floodplain of Root River, with large areas of shrub-carr and sedge-meadow along stream in center. Dominated by <u>Acer saccharum</u>, <u>Tilia americana</u>, <u>Fagus grandifolia</u>, and <u>Quercus rubra</u>. CI = 2444.</p>

Table 1 continued

- 112 Muskego Park Hardwoods
Waukesha Co. T5N R20E E1/2 NW1/4 S17. 24 ha.
On gradual southerly slope, with stream at north boundary. Several seasonal ponds, and large sedge-meadow at southeast corner. Network of wide and narrow trails. Canopy of Quercus alba, Acer saccharum, and Quercus rubra. CI = 1990.
- 135 Kewaskum Maple-Oak Woods
Washington Co. T12N R19E NE1/4 S15. 20 ha.
Divided into two tracts: north site is mostly level, with sedge-meadow at south end, and south site is very hilly, with several seasonal ponds in depressions. Canopies are similar (Acer saccharum, Quercus rubra, and Tilia americana). Combined CI = 2282.
- 143 Mayville Ledge Beech-Maple Woods
Dodge Co. T12N R16E SW1/4 SW1/4 S36. 24 ha.
Site follows exposed portion of Niagara escarpment. Somewhat rolling woods on plateau dominated by Ostrya virginiana, Fagus grandifolia, and Acer saccharum. CI = 2534. Old woodland roads. Woods on slope below cliff on thin, rocky soil dominated by Quercus rubra, Tilia americana, and Acer saccharum. CI = 2256. There is a sedge meadow at east end of upper woods.
- 197 Riveredge Creek and Ephemeral Pond
Ozaukee Co. T11N R21E SE1/4 S6, NE1/4 S7, NW1/4 S8. 27 ha.
Formerly Larix laricina - Thuja occidentalis swamp, now second-growth lowland woods dominated by Betula papyrifera, Fraxinus pennsylvanica, and Acer rubrum surrounding clear streams. CI = 1542.
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RESULTS

A total of 28 alien plant species in 17 families was encountered in the eight Natural Areas during the summer of 1988 (Table 2). No single species occurred in all eight sites. The most frequent were the shrubs Rhamnus cathartica, in seven areas, and Berberis thunbergii, in six. Twelve species were confined to only one site. Rhamnus cathartica was also probably the most abundant species, being either common or occasional wherever it occurred. Polygonum persicaria was the only alien classified as abundant (in Muskego), and was common in three other areas. Solanum dulcamara, where it occurred (four sites), was consistently common. Of 72 species-site occurrences, one was classified as abundant, 18 were common, 37 were occasional, and 16 were rare (Table 3).

Although the greatest number of aliens (17) was found in Sanders, over half of these (9) were rare and only three were common (Table 3). By contrast, of the 13 species from Muskego, seven were either abundant or common and none were rare. At the opposite extreme, the least seriously invaded site appears to be Renak-Polak, where, of the six exotics, all were either occasional or rare.

Comparing the number of aliens to the total number of species found at each site (Table 4) shows the greatest percentages at Sanders (12.8%), Muskego (10.2%), Waupun (8.5%), and Mayville (7.2%), while Renak (4.3%) and Riveredge (4.9%) show the least. Once again, though, Muskego seems to be more heavily invaded, with the abundant and common categories totalling over 5%, while the occasional and rare species reach more than 10% at Sanders.

An annotated list of the alien species encountered, arranged by families, follows:

- 1) Apocynaceae
 - a) Vinca minor (periwinkle) - one large, dense patch near the west end of Sanders Park, possibly the remnant of an old homestead; should be removed.
- 2) Asteraceae
 - a) Arctium minus (common burdock) - found at low densities in five sites along established footpaths.
 - b) Cirsium vulgare (bull thistle) - rare in Sanders, along a trail.
 - c) Taraxacum officinale (dandelion) - not common anywhere; along trails in Sanders, Haskell Noyes, and the large paths in Muskego; relative frequency of 3.7% in Haskell Noyes and 0.5% in Riveredge.
- 3) Berberidaceae
 - a) Berberis thunbergii (Japanese barberry) - occasionally found in six sites, never abundant.
- 4) Brassicaceae
 - a) Barbarea vulgaris (yellow rocket) - rare in one site (Sanders).

- 5) Caprifoliaceae
 - a) Ionicera x bella (Eurasian honeysuckle) - found in four sites; especially common in Sanders, where in 1981 (Leitner 1985) it reached a density of 165/ha in the shrub stratum and 308/ha in the woody seedling stratum; in 1988, it had a mean cover value of 2.2% in Sanders; in Waupun, the mean cover was 4.0%.
 - b) Viburnum lantana (wayfaring tree) - one specimen at one site - an exposed area of the Mayville Ledge, probably a remnant of settlement.
 - c) Viburnum opulus (highbush cranberry) - fairly widespread (five sites); mean cover at Riveredge = 0.4% and at Waupun = 0.3%.
- 6) Crassulaceae
 - a) Sedum telephium (live-forever) - a few individuals along an intermittent stream in Sanders.
- 7) Lamiaceae
 - a) Leonurus cardiaca (motherwort) - only along trails in two sites.
 - b) Prunella vulgaris (self-heal) - scattered at Riveredge and along trails at Muskego and Haskell Noyes.
- 8) Liliaceae
 - a) Convallaria majalis (lily-of-the-valley) - a large clone at the west end of Sanders, near Vinca; should be eradicated as this species can spread through woods.
 - b) Heimerocallis fulva (day-lily) - a few individuals found in the same area as Convallaria and Vinca in Sanders.
- 9) Lythraceae
 - a) Lythrum salicaria (purple loosestrife) - one large patch (ca. 200 stems) in large marsh in Muskego; removed August, 1988, by DNR personnel; site should be monitored annually to ensure all plants have been removed.
- 10) Orchidaceae
 - a) Epipactis helleborine (helleborine) - one individual found in each of three sites; 0.6% relative frequency in Sanders.
- 11) Plantaginaceae
 - a) Plantago major (common plantain) - most common along wide trails in Muskego; elsewhere also along footpaths.
- 12) Poaceae
 - a) Echinochloa crusgalli (barnyard grass) - scattered in wet areas of three sites.
- 13) Polygonaceae
 - a) Polygonum hydropiper (water-pepper) - relatively common in the Mayville marsh.

- b) Polygonum persicaria (lady's-thumb) - common in wet areas of four sites, especially at Muskego.
 - c) Rumex crispus (curly dock) - relatively common in marshy areas.
- 14) Rhamnaceae
- a) Rhamnus cathartica (European buckthorn) - the most widespread and abundant exotic species; the highest densities were found in Waupun, with many seedlings and small shrubs (mean cover = 6.8%), and in Sanders, where mean cover = 0.3% and density = 12/ha; in 1981, the shrub density at Sanders was 31/ha (Leitner 1985); in Renak, buckthorns were concentrated near the west side, with a few large stems and some seedlings; in Haskell Noyes, it occurred only in the tamarack swamp; at Riveredge, I found one mature individual with a few seedlings.
- 15) Rosaceae
- a) Pyrus malus (apple) - a few scattered individual trees in two sites; in Mayville, it was located in a former clearing near the south boundary of the upper woods.
 - b) Rubus idaeus (red raspberry) - uncommon, only occasionally found at two sites; mean cover at Riveredge = 0.2%.
- 16) Scrophulariaceae
- a) Veronica anagallis-aquatica (water speedwell) - several individuals located in the bed of the large stream at Sanders.
 - b) Veronica officinalis (common speedwell) - one small patch at Sanders.
- 17) Solanaceae
- a) Solanum dulcamara (nightshade) - common in four sites; relative frequency at Riveredge = 0.5%; several large, dense patches at Waupun.

Table 2. Occurrence of non-native plant species in eight natural areas surveyed during summer, 1988. A = abundant; C = common; O = occasional; R = rare.

Sa, Sanders; Mu, Muskego; RP, Renak-Polak; Ri, Riveredge; Ke, Kewaskum; Ma, Mayville; HN, Haskell Noyes; Wa, Waupun

Species	Site								Total
	Sa	Mu	RP	Ri	Ke	Ma	HN	Wa	
<i>Arctium minus</i>	R	C	R				O	O	5
<i>Barbarea vulgaris</i>	R								1
<i>Berberis thunbergii</i>	O	O	O		O		O	O	6
<i>Cirsium vulgare</i>	R								1
<i>Convallaria majalis</i>	O								1
<i>Epipactis helleborine</i>	R		R				R		3
<i>Echinochloa crusgalli</i>	O	C				O			3
<i>Hemerocallis fulva</i>	R								1
<i>Leonurus cardiaca</i>						O	O		2
<i>Lonicera x bella</i>	C	O			O			O	4
<i>Lythrum salicaria</i>		C							1
<i>Plantago major</i>		C					O		2
<i>Polygonum hydropiper</i>						O			1
<i>Polygonum persicaria</i>	C	A			C	O			4
<i>Prunella vulgaris</i>		O		O			O		3
<i>Pyrus malus</i>	R					R			2
<i>Rhamnus cathartica</i>	C	O	O	O	O		O	C	7
<i>Rhamnus frangula</i>				R					1
<i>Rubus idaeus</i>				O				O	2
<i>Rumex crispus</i>		C	O		C	O			4
<i>Sedum telephium</i>	R								1
<i>Solanum dulcamara</i>		C		C		C		C	4
<i>Taraxacum officinale</i>	O	O		R			O		4
<i>Veronica anagallis-aquatica</i>	R								1
<i>Veronica officinalis</i>	R								1
<i>Viburnum lantana</i>					R				1
<i>Viburnum opulus</i>	O	O	O			C		O	5
<i>Vinca minor</i>	O								1
Totals 28 spp.	17	13	6	6	6	9	8	7	72

Table 3. Number of non-native species for each site by abundance category.
A = abundant; C = common; O = occasional; R = rare.

Site	A	C	O	R	Total
Sanders	0	3	5	9	17
Muskego	1	6	6	0	13
Mayville	0	4	3	2	9
Haskell Noyes	0	0	7	1	8
Waupun	0	2	5	0	7
Renak-Polak	0	0	4	2	6
Riveredge	0	1	4	1	6
Kewaskum	0	2	3	1	6
Totals	1	18	37	16	72

Table 4. Number of non-native species by site as a percentage of total number of species encountered. A = abundant; C = common; O = occasional; R = rare.

Site	Total No. of Species	% of Non-native Species				Total
		A	C	O	R	
Sanders	133	0.0	2.2	3.8	6.8	12.8
Muskego	127	0.8	4.7	4.7	0.0	10.2
Waupun	82	0.0	2.4	6.1	0.0	8.5
Mayville	125	0.0	3.2	2.4	1.6	7.2
Haskell Noyes	141	0.0	0.0	5.0	0.7	5.7
Kewaskum	118	0.0	1.7	2.5	0.8	5.1
Riveredge	123	0.0	0.8	3.2	0.8	4.9
Renak-Polak	138	0.0	0.0	2.9	1.4	4.3

DISCUSSION

The fact that so few alien species have become at all widespread points out that invaders are usually not successful at becoming established in pre-existing, native, closed communities. Prevention of ecesis through unsuitable habitat and intense competition with the native flora is the usual way that a plant community will resist invasion. Disturbance, though, results in relatively open communities in which invaders can more successfully compete. Six of the exotics (i.e., Leonurus, Prunella, Taraxacum, Arctium, Cirsium, and Plantago)

exotics (i.e., Leonurus, Prunella, Taraxacum, Arctium, Cirsium, and Plantago) were found predominantly, if not exclusively, along well-used trails, where trampling has compacted the soil and the canopy has been opened. Four others (Vinca, Convallaria, Hemerocallis, and Viburnum lantana) appear to be left from settlement. The only species that could be considered widespread and common was Rhamnus cathartica.

The five sites most heavily invaded (Sanders, Muskego, Mayville, Haskell Noyes, and Waupun) have all been disturbed by woodland trails or roads. Sanders, Muskego, and Waupun are part of county parks where trails are maintained by park personnel through clearing and the addition of layers of wood chips. Many of the trails at Muskego are several meters wide and are also used for horseback riding and snowmobiles, activities not compatible with the concept of Natural Areas. These wide trails have effectively fragmented the woods into smaller parcels. The effect is not quite as severe at the other areas, though the trails still provide avenues of invasion for exotics. Trails could probably never be eliminated at these public, heavily-used sites; however, they should be kept as narrow as possible and limited to foot traffic to minimize disturbance.

While Curtis (1959) contended that no weedy species, native or exotic, could survive beneath the deep shade of a mesic forest in Wisconsin, an additional problem associated with dry-mesic woods such as Sanders and Muskego is the nature of their canopy. Of the seven upland sites, these are the most xeric (Continuum Indexes of 1821 and 1990, respectively) with high densities of oaks and relatively little sugar maple. The overstories are rather open, allowing a much higher light intensity to reach the forest floor compared with mesic forests. Buckthorn (Rhamnus cathartica), in particular, reacts favorably to such open sites, and is much less dense or non-existent beneath the shady canopy of a sugar maple forest (Leitner 1985). Xeric and dry-mesic sites in southern Wisconsin are more at risk of invasion and may require more intense management to exclude exotics.

LITERATURE CITED

- Barnes, W. J., and G. Cottam. 1974. Some autecological studies of the Lonicera x bella complex. Ecology 55: 40-50.
- Curtis, J. T. 1959. The vegetation of Wisconsin. Univ. of Wisconsin Press, Madison, WI.
- Ehrlich, P. R., and L. C. Birch. 1967. The "balance of nature" and "population control". Amer. Natur. 101: 97-107.
- Graf, W. L. 1982. Tamarisk and river-channel management. Environ. Manage. 6: 283-296.

Leitner, L.A. 1985. An alien shrub in a changing landscape: The European buckthorn (Rhamnus cathartica L.) in southeastern Wisconsin. Ph.D. Dissertation, Dept. of Biol. Sci., Univ. of Wisconsin-Milwaukee.

Mack, R. N. 1981. Invasion of Bromus tectorum L. into western North America: An ecological chronicle. *Agro-Ecosystems* 7: 145-165.

Tans, W., and R. Dawson. 1980. Natural Area Inventory. Scientific Areas Section, Dept. of Natural Res., Madison, WI.