Baseline Survey of Terrestrial Invasive Plants on County Forests of Northern Wisconsin

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Project Summary

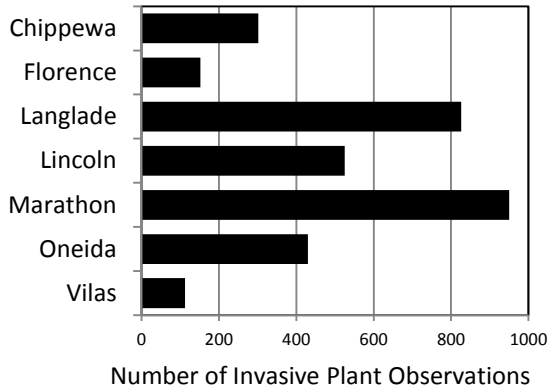
In August-October 2012 and May-September 2013, select sites in seven county forests in northern Wisconsin were surveyed for a targeted list of terrestrial invasive plant species (Appendix 1). Survey sites were predetermined by WI DNR staff in conjunction with county forest administrators. Sites included campgrounds and recreational areas, trails, and recent timber harvests. Surveyors were trained botanists employed with the Lake Superior Research Institute at the University of Wisconsin-Superior. All sites were visited both in early and late summer.

Surveyors carried out meander surveys at each site to locate individuals and populations on the target list. Operationally, an individual was defined as one invasive plant at a GPS location, whereas a population was more than one invasive plant of a species at a GPS location. For each individual or population encountered, information related to population size, extent, and habitat was entered into a field data sheet (Appendix 2). Additionally, geographic coordinates for each observation were obtained using hand-held Garmin eTrex GPS units. Coordinates were recorded in decimal degrees using the WGS 1984 reference coordinate frame. All field data were entered into MS Excel and later subject to QA/QC testing.

The data presented here represent observed presences of invasive species on county forests. These observations may be useful for multiple purposes, including highlighting areas with particular invasive plant problems, showing patterns of spread and distribution, and for developing management plans.

Across all seven county forests, surveyors recorded 3297 individuals or populations of invasive plants. All county forests harbored invasive species. Invasive species observed were those that commonly affect forests through Wisconsin, whereas no 'early detection' species from Appendix 1 were noted. Reed canary grass (38% of observations), Common tansy (29%), and Hemp nettle (29%) were the most commonly encountered invasive species. Invasive buckthorns and honeysuckles were also widespread and abundant. Garlic mustard was observed at 11 sites in four forests.

Figure 1. Total number of invasive plant observations, uncorrected for sampling effort.



Although our goal was not to quantify or compare the types of sites we surveyed, we noted a strong general tendency for the most heavily invaded sites to be recently harvested areas, particularly around skid trails and log landings. ATV trails were also frequently heavily invaded. Invasive species were also common, although generally less abundant along horse trails, recreational activities, and campgrounds.

For each county forest, we've written below a brief description of sites surveyed, sampling effort, and initial findings.

Further details regarding exact locations and population sizes are found in the accompanying MS Excel filed named 'invasive_species_obs.xlsx'. In that file, the worksheet named 'Data' contains the observation records, whereas the worksheet named 'Definitions' has definitions for all fields. This file can be directly added to ArcGIS to map invasive species observations across the forests.

Chippewa County

Sites in Chippewa County, WI were surveyed by five crewmembers May 22-24, 2013. One individual surveyed the county September 28-October 3, 2012. Surveys were conducted on foot or bicycle in most locations, or occasionally from a vehicle when drivable roads were present within the site, or when ATV trails were shared use. All sites were successfully surveyed for invasives with over 300 individuals or populations marked. Nine different invasive species were found in the county (Table 1) and all sites surveyed contained at least two or more species of concern. The most prevalent species observed was *Phalaris arundinacea* which represented 76% of all observed individuals and populations of invasives (Figure 1). *Galeopsis tetrahit* was the second most prevalent representing 13% of observations.

Scattered populations of *Phalaris* were common on the edges of ATV trails and in low areas. *Phalaris* was also scattered on the Hay Meadow horse trails (this was the only observed invasive species at this site in the spring survey). The Morris-Erickson campground contained populations of *Phalaris* in the ditch along the park boundary and *Lonicera* spp. along a fence line adjacent to the park. *Galeopsis* was the most prevalent invasive in the timber sales often found in openings and in full sun, *Phalaris* was also scattered in the sales. Logging activity appeared to be disperse/transport invasives in these areas, most populations were found in recently disturbed soil or on haul roads.

Figure 2. Percent of invasive species observations in Chippewa Co.

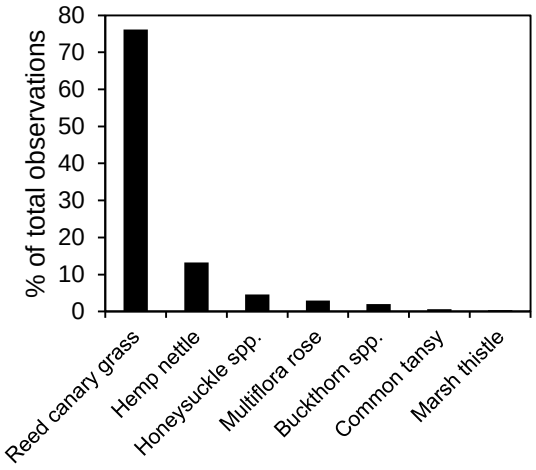


Table 1. Number of invasive species or population observation at Chippewa Co. sites.

Common name	Species	ATV trail	Hay Meadow	Morris-Erickson	Timber sale #1162	Timber sale #1168
Reed canary grass	*Phalaris arundinacea*	151	49	21	5	4
Hemp nettle	*Galeopsis tetrahit*	7	1		18	14
Showy bush honeysuckle	*Lonicera* x *bella*	3		5		1
Invasive honeysuckle	*Lonicera spp.*			5		
Multiflora rose	*Rosa multiflora*	3	6			
Glossy buckthorn	*Rhamnus frangula*	3				2
Common buckthorn	*Rhamnus cathartica*			1		
Common tansy	*Tanacetum vulgare*		2			
Marsh thistle	*Cirsium* spp.					1

Florence County

Forests and recreation areas in Florence County, WI were surveyed June 13-14 by a field crew of four. These sites were revisited September 9-10 by two crewmembers as considerably fewer invasives of concern were visible. Surveys were conducted on foot in most locations, or occasionally from a vehicle when drivable roads were present within the site, or when ATV trails were shared use. All sites were successfully surveyed >140 individuals or populations of invasives were marked at survey sites in the county. Eleven different invasive species were found (Table 2), though not all sites contained invasives. We found no listed invasive species at Scout and Bass Lake campgrounds. *Phalaris arundinacea* and *Lonicera* spp. were the most prevalent species representing 32% and 21% respectively of all observed individuals and populations of invasives (Figure 2). However, *Cirsium palustre* represented 12% of observations and was found in at least six sites. *C. palustre* was very abundant in Lake Emily campground and appeared to have spread between spring and fall surveys.

The ATV trails surveyed contained scattered populations of *Phalaris* along trail sides and in low or wet areas near the trail. Scattered *Galeopsis* populations were observed on the Bush Lake horse trails, while *Phalaris* was more common on the Halls Creek horse trail. Eight invasive species were recorded in the Sand Lake recreation area, *Phalaris* was often found in small clumps along trails here. *Elaeaganus umbellata* may be a species of concern in this county as it appeared to be especially invasive in the sites in which it was found. This was the only county of the seven other northern Wisconsin counties surveyed where *Elaeaganus* was found. Dense populations were often observed along road sides throughout the county.

Figure 3. Percent of invasive species observations in Florence Co.

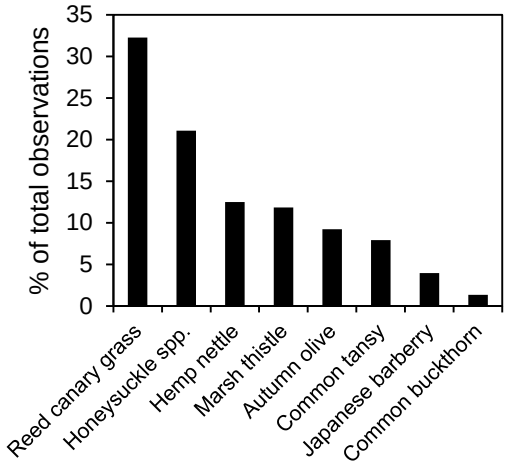


Table 2. Number of invasive species or population observation at Florence Co. sites.

Common name	Species	ATV trail	Bush Lake	Halls Creek	Horse- Bush Lk.	Horse- Halls Cr.	Keyes	Lake Emily	Sand Lake	Timber- Fire Ln.	Timber- La Salle Rd.	W. Bass Lake
Reed canary grass	*Phalaris arundinacea*	9	2	2	1	7	2	2	15	9		
Tatartian honesuckle	*Lonicera tatarica*	7					6			1		
Morrow's honeysuckle	*Lonicera morrowii*	3							2			
Showy bush honeysuckle	*Lonicera* x *bella*	1							3			
Invasive honeysuckles	*Lonicera* spp.	1					1		7			
Hemp nettle	*Galeopsis tetrahit*		1		14	2			2			
Marsh thistle	*Cirsium palustre*			1	1	2		12	1	1		
Autumn olive	*Elaeaganus umbellata*		1						4	1	1	4
Common tansy	*Tanacetum vulgare*	1			6				5			
Japanese Barberry	*Berberis thunbergii*	6					6					
Common buckthorn	*Rhamnus cathartica*	1										1

Langlade County

Trails and recreation areas in Langlade County, WI were surveyed by three individuals June 10-11, 2013. A fall survey was conducted by two crewmembers September 12-13 and September 18, 2013. Surveys were conducted on foot in most locations, or occasionally from a vehicle when drivable roads were present within the site, or when ATV trails were shared use. All sites were visited in the spring, however Popple Ridge horse trails were not resurveyed in the fall as the site was located within the Chequamegon-Nicolet National forest. Over 820 individuals or populations of invasive species were marked at sites within the county. A total of twelve different invasive species were found among sites surveyed (Table 3). The most frequently observed species was *Tanacetum vulgare*, representing 42% of all observed individuals and populations of invasives (Figure 3). *Phalaris arundinacea* and *Galeopsis tetrahit* were also common representing 27% and 18% of observations.

Tanacetum and *Phalaris* were very common along ATV trails, *Galeopsis* was often observed in recent timber sales adjacent to ATV trail. Eleven of the 12 species found in the county were present on the trails, often in abundance. We noted sites that had been apparently sprayed with herbicide to treat garlic mustard. These sites showed evidence of good control of *Alliaria petiolata*; however, a concern is that large populations of *Galeopsis* were observed colonizing these treatment areas. Post-treatment considerations such as reseeding of aggressive native species may limit the reinvasion of these sites. *Tanacetum* and *Phalaris* were abundant in the Evergreen and Moccasin Lake horse trail systems along trail sides. An area of concern in the Moccasin Lake trails was a recent timber sale along the trail that was carpeted with *Galeopsis*, likely one of the most invaded sites encountered of all sites surveyed. The Veteran's Memorial park had populations of *Rhamnus cathartica* near the park entrance and several low areas in the disc-golf course contained *Cirsium palustre* which appeared to be spreading. Control of *C. palustre* at this site is recommended.

Figure 4. Percent of invasive species observations in Langlade Co.

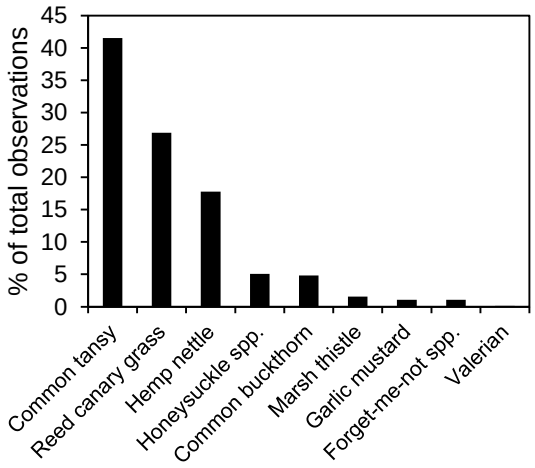


Table 3. Number of invasive species or population observation at Langlade Co. sites.

Common name	Species	ATV trail	Garlic Mustard trt. sites	Horse-Evergreen	Horse-Moccasin	Horse-Popple Rdg.	Veteran Mem.
Common tansy	*Tanacetum vulgare*	210	11	79	21	1	21
Reed canary grass	*Phalaris arundinacea*	158	5	24	20	3	12
Hemp nettle	*Galeopsis tetrahit*	46	13	47	22	2	17
Morrow's honeysuckle	*Lonicera morrowii*	20		1			
Tatarian honeysuckle	*Lonicera tatarica*	10				1	
Invasive honeysuckles	*Lonicera* spp.	9		1			
Common buckthorn	*Rhamnus cathartica*	38					2
Marsh thistle	*Cirsium palustre*	3		2	1		7
Garlic mustard	*Alliaria petiolata*	2	2	2		3	
Forget-me-not spp.	*Myosotis* spp.	1			8		
Valerian	*Valeriana officinalis*	1					

Lincoln County

Trails and recreation areas in Lincoln County, WI were surveyed by five individuals June 3-4, 2013. A fall survey was conducted by one individual September 10-25, 2013. Surveys were conducted on foot in most locations, or occasionally from a vehicle when drivable roads were present within the site, or when ATV trails were shared use. All sites were successfully surveyed with 525 invasive individuals or populations recorded within the county. We encountered 14 different invasive species while surveying Lincoln County (Table 4). *Tanacetum vulgare* and *Phalaris arundinacea* were the most prevalent invasives representing 43% and 32% of all observed individuals and populations of invasives (Figure 4).

Phalaris and *Tanacetum* were abundant along trail sides and open areas on ATV trails in the county. The Ice Age trail near the Newwood campground contained dense populations of *Lonicera* spp., especially near the hydroelectric facility. This was a particularly invaded area, and treatment here may be justified. The proximity of the site to the Wisconsin River which may serve as a transport mechanism for propagules may disperse invasives downstream of the site. *Phalaris* and *Tanacetum* were found often along old roads and trails in timber sales. Logging activity appeared to be disperse/transport invasives in these areas. The Underdown campground and trail was heavily infested with *Tanacetum*, *Phalaris* and *Lonicera* spp. Several populations of *Phalaris* were found in the campground area at the site.

Figure 5. Percent of invasive species observations in Lincoln Co.

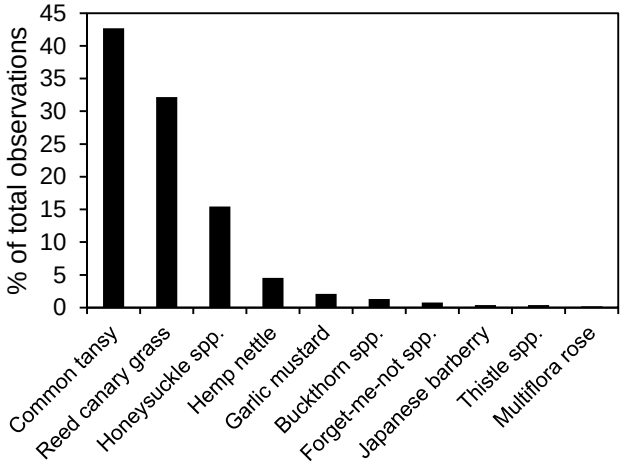


Table 4. Number of invasive species or population observation at Lincoln Co. sites.

Common name	Species	ATV	Ice Age	Newwood	Otter Lake	Timber sales	Underdown
Common tansy	*Tanacetum vulgare*	75	25	27	5	22	70
Reed canary grass	*Phalaris arundinacea*	71	16	2	9	16	55
Morrow's honeysuckle	*Lonicera morrowii*	4	2	8		1	11
Showy bush honeysuckle	*Lonicera* x *bella*	2	8	7		5	10
Invasive honeysuckles	*Lonicera* spp.	1	6	8			2
Tatarian honeysuckle	*Lonicera tatarica*	2	1	2			1
Hemp nettle	*Galeopsis tetrahit*	8	6			3	7
Garlic mustard	*Alliaria petiolata*	3					8
Glossy buckthorn	*Rhamnus frangula*		2				2
Common buckthorn	*Rhamnus cathartica*		1				2
Forget-me-not	*Myosotis* spp.			1		1	2
Japanese barberry	*Berberis thunbergii*	2					
Invasive thistles	*Cirsium* spp.	1				1	
Multiflora rose	*Rosa multiflora*		1				

Marathon County

Sites in Marathon County, WI were surveyed by five individuals August 27-29, 2012 and May 28-31, 2013 by five individuals. All sites were successfully survey in the county with 950 invasive populations or individuals marked. Surveys were conducted on foot in most locations. We found 16 different invasive species among all sites surveyed (Table 5). The most prevalent species was *Phalaris arundinacea* which represented 42% of all observed individuals and populations of invasives (Figure 5). *Tanacetum vulgare* and *Rhamnus frangula* were also quite common in sites representing 21% and 16% of observations respectively.

Phalaris, *Tanacetum*, *Lonicera* spp. as well as *Galeopsis* were frequently found in the Burma Forest Unit. *Galeopsis* was predominately in timber harvest areas, while *Phalaris* and *Lonicera* spp. were frequently found along the ATV trails. *Tanacetum* was found both in harvested areas and along the ATV trails, often in open areas and along trails and haul roads. The Dells of the Eau Claire Park had populations of *Phalaris* and *Lonicera* spp. along the perimeters of fields, parking lots and along the river downstream of the falls. Big Eau Pleine Park contained 12 different invasive species with dense populations of *Phalaris* found along the reservoir shoreline. *Alliaria petiolata* was also found around parking lots. The Kronenwetter Unit had numerous populations of *R. frangula* along trail sides, *Phalaris* was also common here. The Nine Mile Recreation area trails and adjacent timber sales were predominately invaded with *R. frangula* and *Phalaris*. Numerous young *R. frangula* individuals were found beginning to establish in a wet timber sale north of the chalet.

Figure 6. Percent of invasive species observations in Marathon Co.

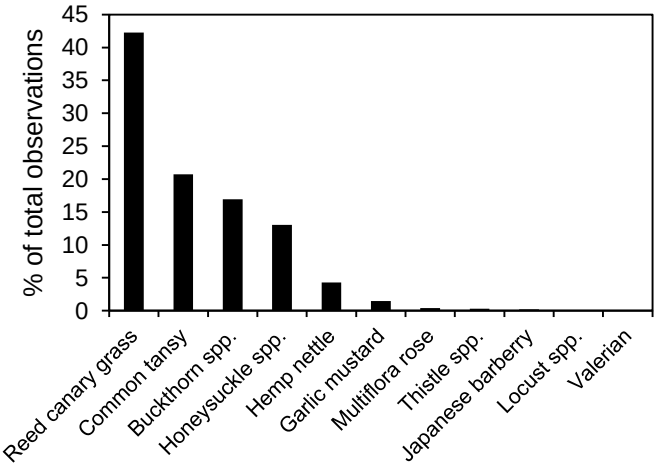


Table 5. Number of invasive species or population observation at Marathon Co. sites.

Common name	Species	Burma ATV/Harvest	Dells of Eau Claire	Eau Pleine	Kronenwetter	Nine Mile
Reed canary grass	*Phalaris arundinacea*	90	43	155	47	67
Common tansy	*Tanacetum vulgare*	94	14	12	18	59
Glossy buckthorn	*Rhamnus frangula*				49	106
Common buckthorn	*Rhamnus cathartica*				1	2
Buckthorn spp.	*Rhamnus* spp.			3		
Morrow's honeysuckle	*Lonicera morrowii*	18	15	3	3	24
Tatarian honeysuckle	*Lonicera tatarica*	13	3	3	2	
Showy bush honeysuckle	*Lonicera* x *bella*	7	3	1	4	8
Invasive honeysuckles	*Lonicera* spp.	8	3		1	5
Hemp nettle	*Galeopsis tetrahit*	30	6	3		2
Garlic mustard	*Alliaria petiolata*	3	3	7		1
Multiflora rose	*Rosa multiflora*				3	1
Invasive thistles	*Cirsium* spp.			2		1
Japanese barberry	*Berberis thunbergii*			2		
Locust spp.	*Robinia* spp.			1		
Valerian	*Valeriana officinalis*	1				

Oneida County

Parks, trails, and timber sales in Oneida County were surveyed by five individuals June 4-5, 2013 and August 21-22 and September 16-17 by two crewmembers. Surveys were conducted on foot in most locations, or occasionally from a vehicle when drivable roads were present within the site, or when ATV trails were shared use. All sites were successfully survey in the county with 430 invasive populations or individuals marked. We found 13 different invasive species among all sites surveyed (Table 6). The most prevalent species were *Phalaris arundinacea* and *Galeopsis tetrahit* which represented 33% and 30%, respectively, of all observed individuals and populations of invasives (Figure 6). *Tanacetum vulagare* was also common representing 25% of observations.

Almon Park was heavily invaded with *Rhamnus* spp., often found around parking lots and field edges. This was also the only site in the county found to contain *Berberis thunbergii*. The ATV trails in this county contained scattered populations of *Phalaris* and *Tanacetum*, often in ditches and open areas. *Galeopsis* found along the trails was often in recent timber harvests adjacent to the trails. Some *Phalaris* and *Tanacetum* were found near the shelter and along the shoreline at Perch Lake Park, *Galeopsis* was also observed along the entrance to the Silent Sport trails. The Noisy Shingle timber sale was a very dense stand of young aspen, only *Cirsium palustre* was found along a perimeter road. The Shingle Mill timber sale contained vast expanses of *Galeopsis*, often in openings and along haul roads. *Phalaris* and *Tanacetum* were less abundant in the sale, but also found on roads and in openings. Logging activity seemed to be the dispersal mechanism of *Galeopsis* in this timber sale and along nearby ATV trails.

Figure 7. Percent of invasive species observations in Oneida Co.

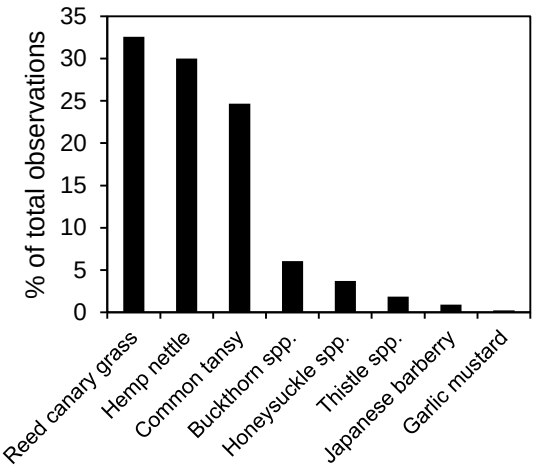


Table 6. Number of invasive species or population observation at Oneida Co. sites.

Common tansy	Species	Almon Park	ATV trail	Perch Lake	Timber- Noisy Shingle	Timber- Shingle Mill
Reed canary grass	*Phalaris arundinacea*	3	109	12		16
Hemp nettle	*Galeopsis tetrahit*		20	10		99
Common tansy	*Tanacetum vulgare*	6	76	8		16
Common buckthorn	*Rhamnus cathartica*	12				2
Glossy buckthorn	*Rhamnus frangula*	8	2			2
Morrow's honeysuckle	*Lonicera morrowii*	3	5			1
Showy bush honeysuckle	*Lonicera* x *bella*	2				3
Invasive honeysuckles	*Lonicera* spp.	1				
Tatarian honeysuckle	*Lonicera tatarica*	1				
Marsh thistle	*Cirsium palustre*		4		2	1
Invasive thistles	*Cirsium* spp.		1			
Japanese barberry	*Berberis thunbergii*	4				
Garlic mustard	*Alliaria petiolata*					1

Vilas County

Sites in Vilas County, WI were surveyed by three individuals June 12-13, 2013 and August 20-21 by two crewmembers as fewer invasives were visible in the fall. Surveys were conducted on foot in most locations, occasionally from a vehicle when drivable roads were present within the site. All sites were successfully survey in the county with 112 invasive populations or individuals marked.

We found 7 different invasive species among all sites surveyed (Table 7). The most prevalent species was *Tanacetum vulgare*, representing 51% of all observed individuals and populations of invasives (Figure 7). *Phalaris arundinacea* and *Lonicera* spp. were also commonly found representing 26% and 14% of observations.

Tanacetum and *Phalaris* populations were found in low abundance at many of the lake recreation areas/trail systems. The Ski Hill Unit trails were more invaded than other similar trails in the area as four different invasive species were found here. The White Squaw Unit had relatively frequent infestations of *Lonicera* spp. and *Tanacetum*. Relative to adjoining counties, Vilas County contained the fewest observations of invasives and lowest number of different invasives encountered. The small size of many of the recreation areas in this county would lend themselves to easy spot treatment that may limit future spread of invasives.

Figure 8. Percent of invasive species observations in Vilas Co.

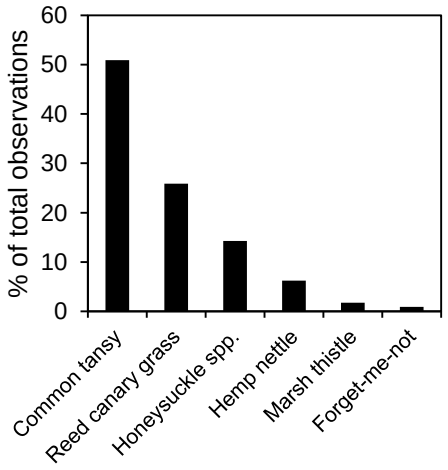


Table 7. Number of invasive species or population observation at Vilas Co. sites.

Common name	Species	Decker Lake	Heart Lake	Hunter Lake	Langley Lake	Muskrat Creek	Pioneer Creek	Ski Hill Trail	Snipe Lake	Snyder Lake	Tamarack Spring	Timber- Claire Fire Ln.	Timber- Deep Lk.	Torch Lake	White Squaw
Common tansy	*Tanacetum vulgare*	4	7		3	4		6			3	13		3	14
Reed canary grass	*Phalaris arundinacea*	3		4	1		7	5	3					4	2
Invasive honeysuckles	*Lonicera* spp.							2							14
Hemp nettle	*Galeopsis tetrahit*			1			2	1							3
Marsh thistle	*Cirsium palustre*											1		1	
Forget-me-not	*Myosotis sylvatica*									1					

Appendix 1. List of species searched for.

Group	Species	Common name	Notes
Common invasive plants that impact forests			
A	*Acer platanoides*	Norway maple	
A	*Alliaria petiolata*	garlic mustard	
A	*Berberis thunbergii*	Japanese barberry	
A	*Cirsium palustre*	European marsh thistle	open
A	*Elaeagnus umbellata*	autumn olive	
A	*Fallopia japonica*	Japanese knotweed	
A	*Galeopsis tetrahit*	brittle stem hemp nettle	
A	*Hesperis matronalis*	dame's rocket	
A	*Lonicera morrowii*	Morrow's honeysuckle	
A	*Lonicera tatarica*	Tatarian honyesuckle	
A	*Lonicera x bella*	Bell's honeysuckle	
A	*Myosotis sylvatica*	garden forget-me-not	
A	*Phalaris arundinacea*	reed canary grass	
A	*Rhamnus cathartica*	common buckthorn	
A	*Rhamnus frangula*	glossy buckthorn	
A	*Robinia hispida*	rose acacia/bristly locust	
A	*Robinia pseudoacacia*	black locust	
A	*Rosa multiflora*	multiflora rose	
A	*Tanacetum vulgare*	common tansy	open
A	*Valeriana officinalis*	garden heliotrope	
Early detection invasive plants			
B	*Achyranthes japonica*	Japanese chaff flower	
B	*Ampelopsis brevipedunculata*	porcelain berry	
B	*Anthriscus sylvestris*	wild chervil	
B	*Caragana arborescens*	Siberian peashrub	
B	*Celastrus orbiculata*	Oriental bittersweet	
B	*Chelidonium majus*	celandine, greater	
B	*Cynoglossum officinale*	hounds tongue	
B	*Cytisus scoparius*	Scotch Broom	
B	*Digitalis lanata*	Grecian foxglove	
B	*Dioscorea oppositifolia*	Chinese yam	
B	*Epipactis helleborine*	Helleborine orchid	
B	*Euonymus alatus*	burning bush	
B	*Euonymus fortunei*	climbing euonymus	
B	*Fallopia sachalinense*	giant knotweed	
B	*Glyceria maxima*	tall manna grass	
B	*Hedra helix*	English ivy	
B	*Heracleum mantegazzianum*	giant hogweed	
B	*Humulus japonicus*	Japanese hops	
B	*Impatiens balfourii*	Balfourii's touch me not	
B	*Impatiens glandulifera*	Policeman's helmet	
B	*Lespedeza cuneata*	Sericea lespedeza	
B	*Ligustrum vulgare*	common privet	
B	*Lonicera maackii*	Amur honeysuckle	
B	*Lonicera japonica*	Japanese honeysuckle	
B	*Microstegium vimineum*	Japanese stilt grass	
B	*Phellodendron amurense*	Amur corktree	
B	*Phytolacca acinosa*	Indian pokeweed	
B	*Polygonum perfoliatum*	mile-a-minute vine	
B	*Pueria montana*	kudzu	
B	*Ranunculus repens*	creeping buttercup	
B	*Rubus phoenicolasius*	wineberry	
B	*Torilis arvensis*	spreading hedgeparsley	
B	*Torilis japonica*	Japanese hedgeparsley	
B	*Vincetoxicum nigrum*	black swallow wort	
B	*Vincetoxicum rossicum*	pale swallow wort	
B	*Wisteria floribunda/sinensis*	Japanese/Chinese wisteria	

Appendix 2. Field data sheet.

County Forest Invasive Plant Survey 2012-2013 **University of Wisconsin-Superior**		Observer(s)	
		Date	
County		GPS Unit ID	
Site		Notes	
Site Type	Campground Trail Forest Harvest		
*Number of Individuals: 1-50 51-100 100-500 500-1000 >1000			
*Area of Infestation (acres): <0.25 0.26-0.50 0.50-1.0 >1			
*Habitat: Forest Ditch Woodland Edge Open Roadside Trail			

GPS Waypoint	Species	Number of Individuals*	Area of Infestation*	Habitat*	Voucher? (Y/N)	Description and Comments

If found, please return to Nick Danz, University of Wisconsin-Superior, Dept of Natural Sciences, Box 2000, Superior, WI 54880