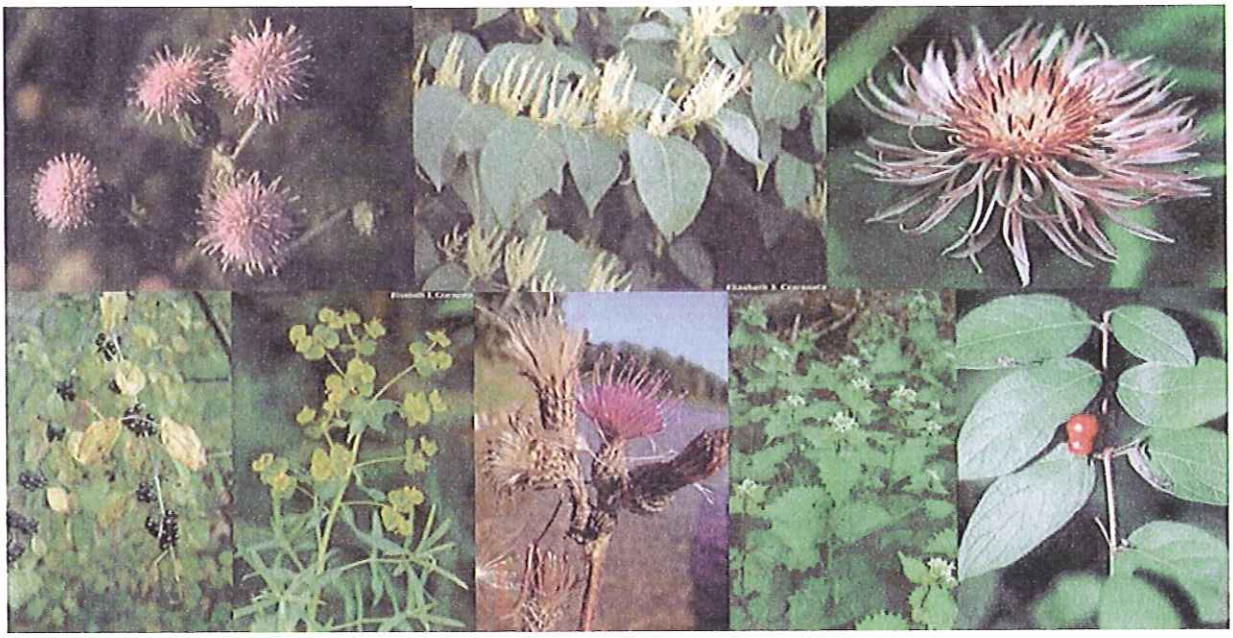
Town of Three Lakes

Terrestrial Invasive Plant Species Survey 2013

Field Work Report



Baerbel Ehrig, February 2014

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Introduction

Every established system gets shaken by the introduction of something new. Depending on the resilience of the system and the character of the new item, the system will either come to a new balance or be completely overthrown.

In regards to an ecosystem, that means that newly introduced species will either coexist with native species or start eliminating them through outcompeting them for access to nutrients and/or environmental conditions needed for survival. An introduced species is labeled as "invasive" if a native species gets pushed out of its niche, resulting in a highly reduced chance for survival.

Invasive plants have the ability to change environmental factors like soil acidity, soil water retention ability, sunlight exposure, nutrient cycling, and species composition. They can also produce compounds toxic to native species, along with either directly parasitizing them or doing so indirectly by harboring insect or fungal parasites.

This creates potential for semi-natural environments that are dominated by alien species, which has been internationally recognized to have a destructive effect on native ecosystems (Sandlund, Schei and Viken 1999).

Ecosystem changes caused by invasive plants are increasingly influenced by human presence. Undisturbed biotas are more resilient to alien species than the ones modified by man (Sandlund, Schei and Viken 1999). Also invasive alien species are unintentionally introduced by globalized migration, trade, and tourism (Sandlund, Schei and Viken 1999) (Jenkins 1999).

In that way Roads are an important avenue for transport of seeds, along with providing new habitat. 20% of the United States' area is ecologically influenced by roads (Forman and Alexander 1998). Seeds are dispersed by vehicles (von der Lippe and Kowarik 2007), and roadside construction disturbance often provides open soil for colonization. And even more so, road shoulders, which are continually disturbed, provide a prime avenue for alien plants to gain a foothold (Hulme 2009). Thus roadways serve as indicators for ecosystem change, and therefore roadside surveys are well suited for assessing the presence and potential impact of invasive plant species.

Another avenue for the introduction of non-native species that end up invading the ecosystem they were introduced to is horticulture. The seeds of species that were initially planted for ornamental or

landscaping purposes spread beyond the confines of their intended area (Hayden Reichard and White 2001).

The Convention on Biological Diversity (CBD) is an international treaty that recognizes the threats to native biodiversity posed by alien invasive species (Sandlund, Schei and Viken 1999). Article 8 of the Treaty orders to "Prevent the introduction of, control or eradicate those alien species which threaten ecosystems, habitats or species." Since 1992 the CBD has been ratified by 193 countries, not including the United States.

In this country, the surveillance of invasive species has gradually been gaining attention on regional, state, and federal levels. In northeastern Wisconsin, the Wisconsin Headwaters Invasives Partnership (WHIP), a multi-partner co-op focused on the effective management, coordination, and implementation of invasive species programs, was formed.

In a collaborative effort between the Oneida County Highway Department and WHIP, Rosie Page performed a roadside survey of county roads in 2012.

Following that, WHIP and the Natural-Cultural Resources Committee of Oneida County's Town of Three Lakes decided to apply for funding to perform a roadside survey on the town level. The survey was conducted between May 24th and September 29th of 2013. Parallel to that project, WHIP conducted a roadside survey of Vilas County, in conjunction with county authorities.

Funding for the respective projects came from Lumberjack Resource Conservation & Development (RC&D), a regional agency that supports conservation projects.

Guidance for the Three Lakes Town Road survey came from the Three Lakes Natural-Cultural Resources Committee, WHIP, the Oneida County Land Information Office, and the Oneida County Land and Water Department.

The Oneida County Land Information Office provided the Juno Trimble GPS unit, along with maintenance for the device, as well as data download and mapping with ArcGIS.

The purpose of the survey was to get an overview on which terrestrial invasive grows where and to what extent. The information gained will help with decision making in regards to working with the changing ecosystem.

The Study Area

The town of Three Lakes is located in northeastern Wisconsin's Oneida County. Dominant ecosystems are a mix of deciduous, coniferous, and boreal forest types, along with lakes and wetlands.

The terrestrial invasive plant species survey covered 260 miles of town road roadsides. In addition, the survey included parks, cemetery, school, airport surroundings, the Three Eagles Trail, 25 boat landings and 15 marked fire department water supply sites. Please see the listing for the boat landings and water supply sites in appendices A and B.

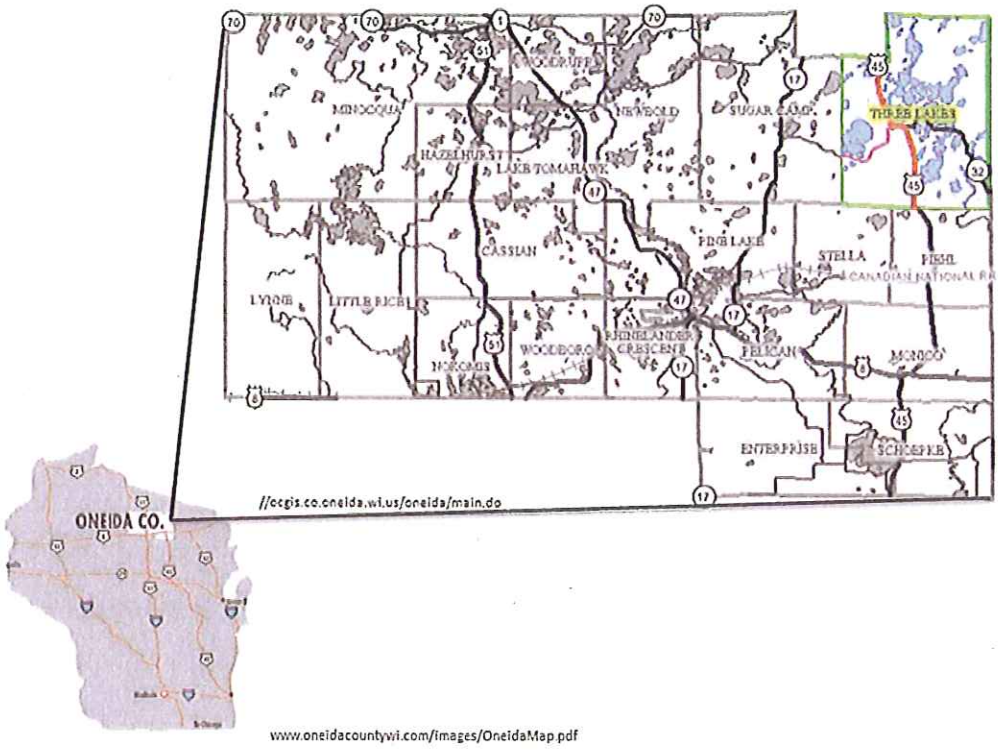

Figure 1: Study area in geographical context

Plants of priority concern

In consideration of the Wisconsin Invasive Species Identification, Classification, and Control Rule – (NR 40), WHIP had identified a number of species that were of priority concern. Table 1 illustrates which species the Three Lakes survey focused on, along with showing their status in Oneida County according

to the field guide provided by the Wisconsin Department of Natural Resources (WDNR 2012), and whether or not they are located in the town of Three Lakes survey area.

Table 1: Plants of priority concern

Species	Regulation	Located
Bush honeysuckles (non-native) (*Lonicera spp)*	Restricted	Yes
Common buckthorn *(Rhamnus cathartica)*	Restricted	Yes
Common reed Gras *(Phragmites australis)*	Restricted	No
Cypress spurge *(Euphorbia cyparissias)*	Restricted	Yes
Forget-me-not *(Myosotis sylvatica)*	Restricted	Yes
Garden valerian *(Valeriana officinalis)*	Restricted	No
Garlic mustard *(Alliaria petiolata)*	Restricted	Yes
Giant hogweed *(Heracleum mantegazzianum)*	Prohibited	No
Japanese barberry *(Berberis thunbergii)*	Cautionary	Yes
Japanese knotweed *(Polygonum cuspidatum)*	Restricted	Yes
Leafy spurge *(Euphorbia esula)*	Restricted	Yes
Oriental bittersweet *(Celastrus orbiculatus)*	Restricted	No
Purple loosestrife *(Lythrum salicaria)*	Restricted	Yes
Spotted knapweed *(Centaurea stoebe)*	Restricted	Yes
Thistles (non-native)	Restricted	Yes
Wild parsnip (*Pastinaca sativa*)	Restricted	No

The non-native Thistles of concern are Canada thistle *(Cirsium arvense),* Musk thistle *(Carduus nutans),* Plumeless thistle *(Carduus acanthoides),* Bull thistle *(Cirsium vulgare)* and European marsh thistle *(Cirsium palustre)*. The invasive Bush honeysuckles are Amur honeysuckle *(Lonicera maackii)*, Bell's honeysuckle *(Lonicera x bella)*, Morrow's honeysuckle *(Lonicera morrowii)* and Tartarian honeysuckle *(Lonicera tatarica)*.

Methodology

Preparation and Planning

Initial preparation began by meeting with Rosie Page and Jean Hansen from the Oneida County Land and Water Department on May 15th 2013. Rosie (who had done the Oneida County roadside survey in 2012) and Jean briefed me on which factors needed to be taken into consideration for the planning, along with

training me in the usage of the Juno Trimble GPS device provided by the Oneida County Land and Water Department.

The initial goal was to cover 260 miles of town roads. I based my survey goals on the average daily distance Rosie had covered in the Oneida County survey (Page 2012).

Another aspect of planning was to take the mowing schedule of the Three Lakes Road Department into consideration. I met once with the crew foreman and he informed me about the tentative mowing plan. As the mowing schedule changed throughout the summer, we stayed in communication so that we could coordinate the mowing with my efforts.

Field Work

The survey began on May 24 2012. After two days of surveying, it was decided to postpone further fieldwork for several weeks since the vegetation was significantly underdeveloped due to a very late Spring. Field work resumed on June 29th 2013. I noticed quickly that I was able to cover more miles in a day than I had initially estimated, due to town roads having narrower shoulders than county roads. In addition, some town roads traversed large tracts of open, mature forest, which provided unfavorable habitat for many invasive species.

Through discussion with Tamarack Song, chair of the Three Lakes Natural-Cultural Resources Committee (NCRC/TL), we concluded that I would use a bicycle when the terrain allowed for very slow bike travel, and when it was easy to keep an overview and roadside vegetation was sparse. In these areas the bike proved beneficial, as I was able to gain perspective from higher up.

With a combination of these two methods of locomotion, I was able to thoroughly cover between 0.5 to 1.5 miles per hour.

At the start of each day, I drove to the area that was to be surveyed. I would cover about a mile in one direction, and then cross the road to survey the other shoulder on my way back to the vehicle. I would usually park the car in a way that it would function as a pivot point, so that I would be able to survey in at least two directions from it. That way the car would always be fairly easy to access in case of a sudden storm or need for supplies.

Problems

Early on during the field work, I incurred problems with the Juno Trimble unit. The display would not register the touch pen correctly. It was brought to Art Hilgendorf from the Land Information Office (LIO) for reprogramming. Since the issues turned out to be reoccurring, the unit was sent back to the manufacturer and the Land Information Office provided the usage of their identical unit, so that I could continue the survey.

One scary moment occurred right in downtown Three Lakes when a large, agitated dog, which was chained in the yard of a private house, broke from his leash and came racing towards me. He jumped up on me, yet he did not bite.

Data Collection

The information gathered on site with the Juno Trimble unit included:

- Species name
- Selection of site type: single point, polygon point, or line of points
- Approximate plant count and approximate populated area measured in square feet

The plant count was estimated to be <10, 10 – 50, or >50. The estimation of area size covered by a plant was measured in <50, 50 – 500, or >500 square feet. Please see the data collection information sheet in Appendix C.

According to the WHIP data collection information sheet, the plant count was supposed to be the parameter collected for woody plants, while the area size was intended to be the parameter for the non-woody plants. After discussion with Art Hilgendorf (LIO) and Tamarack Song (NCRC/TL) it was decided to gather both parameters, as it would add depth to the data gained. For example, there could be a patch of Spotted knapweed that covers 50-500 sq feet. Yet it would make a significant difference in patch density if it contained <10, 10-50, or >50 plants.

Logging Points vs. Lines

Early on during the field work, Art Hilgendorf explained to me that logging data as a *line* would cause difficulties in the display on the map, as the lines would overlay any other data logged as *points*. Therefore we agreed that I would log data as points only. According to that approach, I would log consistent points of a specific species along the roadside if that species occurred in lengthy patches. I would set a new point whenever the maximum patch size or plant count provided in the data collection guidelines was exceeded.

The approach allowed for increased information gain and display in regards to the data, as each point is associated with an estimate for quantity. While setting a line does allow for that as well if it is recorded separately in the field notes, the nature of a line makes it more difficult to indicate quantity when compared with the point.

Results

The survey produced a total of 1607 findings of terrestrial invasive plant species. Of the16 species of priority concern, 11 were found in the study area:

- Bush honeysuckles (non-native) (Lonicera spp)
- Common buckthorn (Rhamnus cathartica)
- Cypress spurge (Euphorbia cyparissias)
- Forget-me-not (Myosotis Sylvatica)
- Garlic mustard (Alliaria petiolata)
- Japanese barberry (Berberis thunbergii)
- Japanese knotweed (Polygonum cuspidatum)
- Leafy spurge (Euphorbia esula)
- Purple loosestrife (Lythrum salicaria)
- Spotted knapweed (Centaurea stoebe)
- Thistles (non-native)

Figure 2 shows the quantitative distribution of the sightings in the Town of Three Lakes. The most common species is Spotted knapweed, with a total of 724 sightings. Non-native Bush honeysuckles follow, with a total of 380 sightings. Non-native Thistles were found 198 times. 166 sightings were recorded for Buckthorn, and Japanese barberry was recorded 91 times. Cypress spurge was found 19 times and Forget–Me–Not 15 times. Leafy spurge and Purple loosestrife occurred 5 times, while Japanese knotweed was found only three times. Garlic mustard was found once and the patch consisted of only one plant.

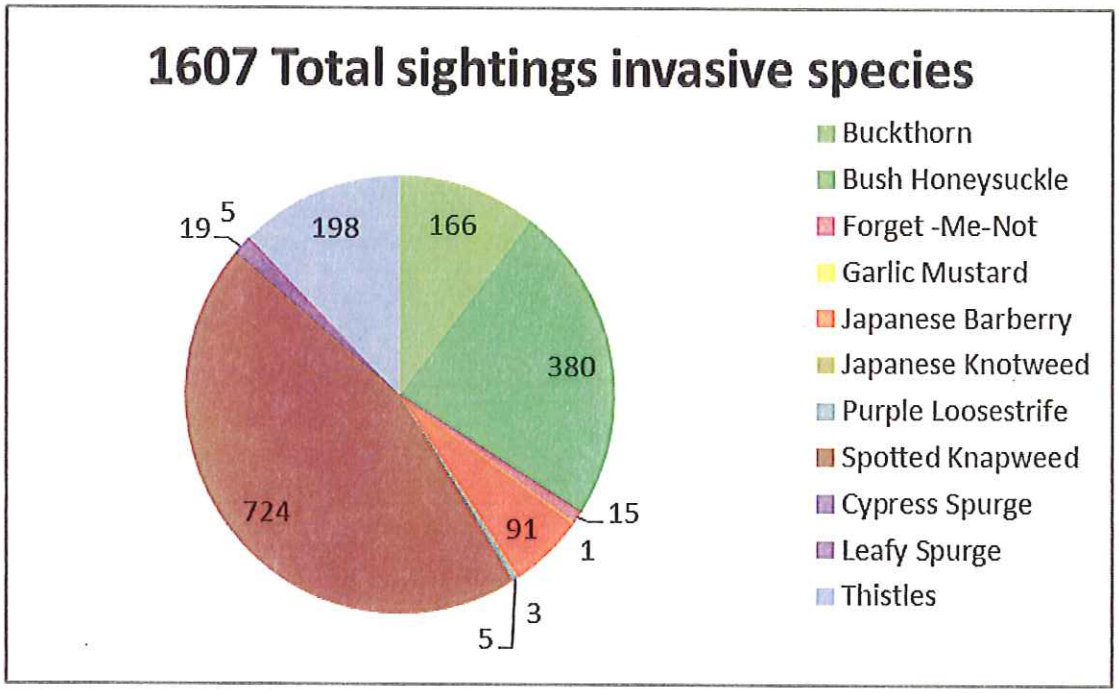

Figure 2: Quantitative distribution of sightings

Other invasive plants not targeted in the survey, such as Tansy *(Tanacetum vulgare)* and Reed Canary Grass *(Phalaris arundinacea)*, were spotted and recorded occasionally, yet often enough to indicate an established presence.

At two locations plants were found that were initially identified to be Giant hogweed (*Heracleum mantegazzianum*). Since Giant hogweed is classified as *prohibited* in this state, I brought it to discussion at a WHIP meeting. That led to further investigation by Jean Hansen and me. As a result the plants were reclassified as Cow parsnip (*Heracleum maximum*).

Table 2 illustrates the percentage of findings for each species.

Table 2: Respective percentage of findings

Species	Sightings	% of Sightings
Buckthorn	166	11
Bush honeysuckle	380	24
Forget-me-not	15	1
Garlic mustard	1	0
Japanese barberry	91	6
Japanese knotweed	3	0
Purple loosestrife	5	0
Spotted knapweed	724	45
Cypress spurge	19	1
Leafy spurge	5	0
Thistles	198	12

Further Results

In Appendix D is a small scale version of the map created by Art Hilgendorf (LIO). Further maps for individual species are in process for production by Caleb Slemmons (WHIP). The data will be uploaded to the Oneida County GIS data bank. Maps and data will also be uploaded to the Three Lakes town web page, and they will be available to the public in hard copy at the Three Lakes Public Library.

Discussion

Effects on Results from Logging Points vs. Lines

To log data as a row of *points* rather than a *line* increases the total number of findings significantly, since a line would only be registered as one finding, while points are many, depending on the length of the stretch. That especially needs to be taken in consideration with the findings of Bush honeysuckle, Buckthorn, Spotted knapweed, and Japanese barberry. At the same time, setting only points seems to allow for a more accurate display of the percentage of findings for each species.

In the beginning of the field work, lines were logged for Bush honeysuckle and Spotted knapweed, so there is some inconsistency in the data and the method. As the chance to redo the area logged as lines in the method with the points was missed, it is now important to keep in consideration that with the latter method the findings for Spotted knapweed, Bush honeysuckle, Japanese barberry, Thistles, Buckthorn, Forget–me-not would be higher. Please see figure 3 below for further illustration.

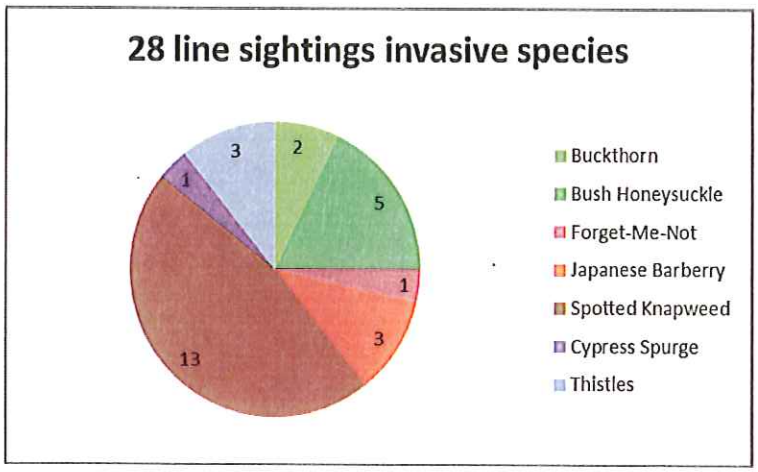

Figure3: Sightings logged as lines

Maximum Use of Data for Output

Due to generalization in the creation of the map displaying all of the found species, the information on quantity, area, and density connected to the symbols was not able to be presented. Please see map in Appendix D. Further exploration is needed on how this issue of spatial resolution could be resolved.

The individual plant maps, which are currently in production, will display information in regards to the area covered by the plant at the specific location. Since the respective species have different growth patterns, there was a need to choose between the variables of *area*, *quantity* and *density*, in order to use the one that would have the highest value of recognition between the different maps. Please see the DNR Field guide for more information on respective growth patterns.

Observations

An interesting observation was that Bush honeysuckle and Buckthorn seem to have a joint occurrence in the Three Lakes area, as well as on a county level (Page 2012). Buckthorn showed its highest presence directly in downtown Three Lakes. Bush honeysuckle had its highest density there as well, and at the same time it has spread definitively into northern part of the town.

Another observation of note is that Spotted knapweed is the least prevalent in the eastern and northeastern parts of the town, which is also where the Chequamegon-Nicolet National Forest is located. Otherwise this plant is widely spread throughout the study area. Its most favored locations are disturbed sites and prairie lands, so the healthy, mature National Forest acreage doesn't provide much habitat for infestation by this plant.

Japanese barberry, Japanese knotweed, and Forget-me-not appear mostly in clustered patches.

Japanese barberry is spreading significantly into the National Forest area on Eaglesham Rd. Besides feral stands, it is also found frequently planted as an ornamental in the area's private yards.

Japanese knotweed stands are found exclusively within downtown Three Lakes. Forget-me-not was found in unkempt, feral yards and along the edges of waterways, especially around the Burnt Rollways dam bridge. There is a patch on each side of the shore of Eagle River right after the boat lift coming from Long Lake. That suggests a possible correlation between the extended still time of boats while they get lifted between the water bodies and the transport of seeds.

Leafy spurge and Cypress spurge occur mostly in yard beds and adjacent areas.

There was a single adult Garlic mustard plant found in downtown Three Lakes. It was located underneath an American Yew shrub.

Thistles were found as single plants or in small-to-large patches. Moist lowlands in particular seem to promote the growth of larger patches.

Purple loosestrife was found in a newly disturbed area on Braham Rd and at the Harbor Campground boat landing near HW 32. Both locations suggest that human involvement plays a role in the establishment of the patches.

Recommendations

Respective Plants

The survey was done in order to be able to gage what could be done in our changing ecosystem.

Since Spotted knapweed is omnipresent in the Three Lakes area, it will be one of the more challenging invasive plants to work with. It needs to be decided which efforts , if any, could realistically effect the population and be economically feasible. A combination of mowing, hand pulling, and herbicide treatment seems to be promising (MacDonald, et al. 2013). Especially the areas where Spotted knapweed findings were more sparse, such as in or adjacent to the National Forest, might be a realistic goal for eradication. One thing to keep in mind is that this area is adjacent to Forest and Vilas Counties, so they would need to have a similar goal in regard to suppression of Spotted knapweed in order to effect long-term results. One possibility is that mowing could be done by the town road departments, while hand pulling could be done by volunteers.

As there was one adult Garlic mustard plant found in downtown Three Lakes, there is reason to suspect that there could be immature plants in the area this year. However, eradication appears to be successful with pulling and clipping (Pardini, et al. 2009), so I volunteer to check on this small patch in the Spring.

NCRC/TL has been working on the eradication of Japanese barberry on Eaglesham Rd. Since there are a couple of other clustered patches on Luebbing Rd, Wheeler Island Rd, and downtown Three Lakes, it would be advisable to extend the present efforts to those areas as well.

The Three Lakes School has been putting considerable time into eradicating the thick Buckthorn stands on its property. Yet there still remain a lot of shrubs to be taken care of just in the immediate vicinity. An exploration with the school would be advisable to see if they could extend their efforts onto downtown Three Lakes. Due to Buckthorn's joint appearance with Bush honeysuckle, it may be advisable to see if the school could take on honeysuckle as well. In general, I would follow Rosie Page's suggestion to consider a joint effort for both species (Page 2012), especially in the area of downtown Three Lakes.

Also it may be desirable to approach the school about the two Japanese knotweed patches on its property. I suggest consulting with WHIP and the DNR Field Guide about what would be the best measure to take in this case.

There have been successful experiments for managing Leafy spurge and Cypress spurge with biological control with insects (Setter and Lym 2013). However, the patches occurring in Three Lakes are small and right near homes. Therefore I would recommend talking with the homeowners and seeing about measures they might like to take. The latter also goes for the patches of Forget-me-not found in yards.

Since Purple loosestrife is only present in three contained locations, eradication seems realistic.

The large non-native thistle patches suggest a contained-area approach for focused eradication, while the sparse single plants might be able to be controlled by mowing.

Implementation of the gained information

The information gained through the terrestrial invasive species survey suggests the approach *Think global - act local*. Native species become alien and oftentimes turn into invasives all over the globe. Therefore global networking is very important. It would be helpful if the United States would ratify the Convention on Biological Diversity and therefore become part of this common international awareness.

In the Town of Three Lakes it is unrealistic to eradicate every invasive plant. New seeds are constantly brought in. What we can do is pick our battle process where eradication is realistic, along with bringing greater awareness to the public.

Future Surveys

For other communities that would like to conduct an invasive species survey, it is important to note that just the field work for the Three Lakes survey was conducted in 282 hours. In addition, there is a need to calculate hours for evaluation. Yet both phases of the Three Lakes survey could have been completed on a smaller budget than was available.

Outlook

The Three Lakes Natural-Cultural Resource Committee plans to use part of the remaining funds from the grant for educating homeowners, students, and the general public on the endangered species issue.

Another remaining project is to involve the town road department, so that they might plan their mowing schedule to help reduce Spotted knapweed stands.

As well, there is making the data available to the general public, as mentioned above.

Acknowledgements

First of all, I would like to thank the Three Lakes Natural-Cultural Resources Committee for striving to gain information on their terrestrial invasive plants, and for applying for the grant that allowed them to do so. Also, I am thankful for Lumberjack Resource Conservation and Development Council providing the funds. Special thanks go to Tamarack Song (NCRC/TL), Jean Hansen (WHIP), Ted Ritter (WHIP) and Art Hilgendorf (LIO) for support and many important discussions. Also very valuable contributions to this project have been made by Art Hilgendorf (LIO) and Caleb Slemmons (WHIP). The outcome wouldn't have been the same without you—thank you!

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Appendices

Appendix A - Listing of Marked Fire Department Water Supply Sites

- Highway 32 – Whitefish Lake lakeside boat landing
- Airport Rd & Highway 32 Harbor Campground Big Stone Lake boat landing
- Highway 32 - Dry hydrant at Northernaire
- Highway 32 - Virgin Lake
- Highway 45 & North Big Lake Loop – Crystal Lake landing
- Schultz Landing Rd – Big Lake
- East Big Lake Loop – Landing at bridge between Big Lake and the Thoroughfare
- Highway X – Medicine Lake boat landing
- Highway X – Blue Ribbon bridge
- Highway X – Nine Mile Creek bridge
- Anders Rd – Thunder Lake boat landing
- Van Bussum Ln – Long Lake boat landing
- O'Neil Rd – Long Lake boat landing
- Meta Lake Rd – Cranberry Lake boat landing
- Cy Williams Rd – Koubenec bridge Planting Ground Lake
- Lake Drive – Maple Lake boat landing

Appendix B - Listing of Boat Landings

Type	Lake	Location
Private	Big Stone	Harbor Campground/ HWY 32
Private	Big Stone	Anchor Marine/HWY 32
Private	Island Lake	HWY X Watercraft
Private	Lake Julia	Julia Lake Rd
Public	Big Stone	Chicken in the Woods Rd
Public	Big Lake/Thoroughfare	E. Big Lake Rd Bridge
Public	Big Lake	E. Big Lake Rd south end
Public	Big Lake	Schultz Landing Rd
Public	Big Lake	N Big Lake Loop D.N.R
Public	Crystal Lake	N Big Lake Loop
Public	Laurel Lake	Campground Rd
Public	Medicine Lake	HWY X
Public	Townline Lake	Turtle Run Rd
Public	Rangeline Lake	Halverson Rd
Public	Big Fork Lake	Four Mile Creek Rd
Public	Long Lake	Van Bussum Ln
Public	Long Lake Channel	Dam Rd
Public	Nine Mile Creek	HWY X
Public	The Thoroughfare	HWY 32
Public	Seven Mile Lake	Wesley Rd
Public	Thunder Lake	Anders Rd
Public	Thunder Lake	North side
Public	Maple Lake	Lake Drive
Public	Cranberry Lake	Meta Lake Rd
Public	Lone Stone Lake	Gary Post Rd

Appendix C- WHIP Data Collection Information Sheet

WHIP ROADSIDE INVASIVES SURVEY INFORMATION TO COLLECT AT EACH SITE					
Species name (select from dropdown list)					
	Site type: (select one:)	Single point	Polygon points	Line of points	
If site type is polygon or line of points, proceed to Field notes					
If site type is single point, proceed to plant count or area size					
	Approximate plant count (woody plants)				
	<10	10-50	>50		
	Approximate square footage of populated area (non-woody plants)				
	<50	50-500	>500		
Field notes:					

Site information to collect on field computer

Estimating area sizes:

50 sq. ft. = the bed of a full size pick-up truck

500 sq. ft. = patch of two lane county roadway with the length being the same as the full roadway width

Appendix D -Terrestrial Invasive Plant Species Map