

THE ALDO  
LEOPOLD  
FOUNDATION

# Japanese Hedge-Parsley Report 2011

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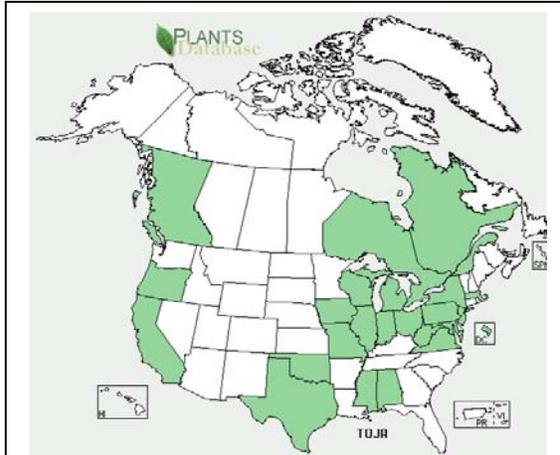
## Introduction

Japanese hedge-parsley (JH-P) or erect hedge parsley (*Torilis japonica*) is an invasive weed native to Eurasia. JH-P is currently observed in various densities in woodland and savanna ecosystems in the United States and Canada (Figure 1). It is now a major invasive species in Wisconsin, as it has shown that it is capable of spreading rapidly and forming large populations (Sheehan 2007) (Photo 1). One possibility as to why this plant may be so adaptive to invading areas within Sauk County is that the plant prefers soils that are light and sandy, thus requiring soils that are well-drained, although it is capable of growing in most soil types. Another dilemma when facing the daunting task of controlling this plant is the fact that it is hermaphroditic, containing both male and female organs, meaning the plant is self-fertile (D.C. Houtt, 2010).



**Photo 1: Example of a large Japanese Hedge-Parsley population**

JH-P was first noticed on the Leopold Memorial Reserve in 2005. The Midwest Invasive Plant Network has published a more recent map that shows JH-P as “widespread” in the southern portion of Wisconsin (Figure 2) (Midwest Invasive Plant Network, 2008). In July of 2006 the Wisconsin DNR published a “Weekly News” article that alerts readers to be on the watch for JH-P—an invasive weed “poised to invade Wisconsin forests” (Wisconsin Department of Natural Resources, 2006). This species has been identified as one of the target invasive species to monitor and educate the public about, before it becomes a large problem (Cofrin Center for Biodiversity--Herbarium: University of Wisconsin-Green Bay, 2007).



**Figure 1: Japanese hedge-parsley distribution in US and Canada (USDA Natural Resources Conservation Service, 2008)**



**Figure 2: Current Japanese hedge-parsley distribution. In southern Wisconsin Japanese hedge-parsley is classified as “widespread” (Midwest Invasive Plant Network, 2008)**

Current Midwest general distribution, including southern Ontario  Not Known  Isolated  Locally Abundant  Widespread

### *Identification and Biology*

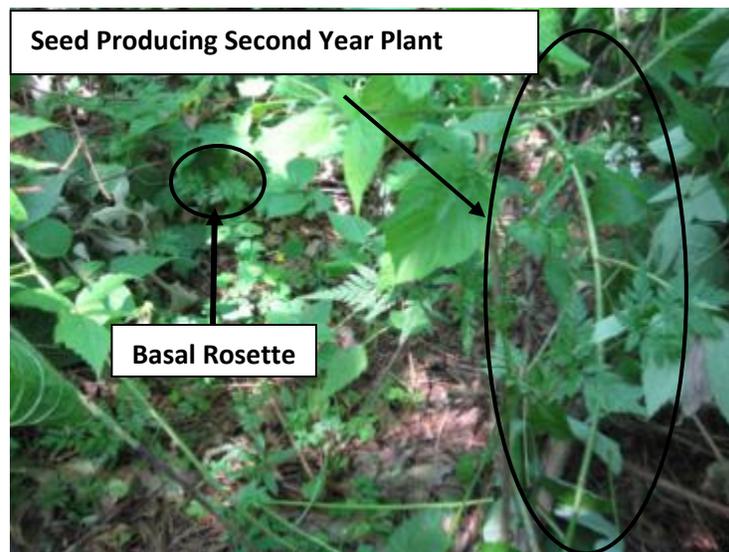
Some sources classify JH-P as an annual forb (Czarapata, 2005). It is also characterized as a biennial herb (Wisconsin Department of Natural Resources, 2006; Midwest Invasive Plant Network, 2008) with the seedlings remaining green over winter (Eagan, 2006). Therefore, JHP is considered a winter annual, where seeds germinate in the fall of the year, are formed, and grow to form “ground-hugging” plants (Photo 2), these plants then grow to produce flowers the following summer (Brock, 2007). **Some sources, however suggest that *Torilis japonica* is an annual plant which flowers from July to August, and seeds ripen from August to September (D.C. Houtt, 2010).** In the field, the Aldo Leopold Foundation Stewardship Crew has seen JH-P acting more like a biennial—the seeds grow to a basal rosette in year one (Photo 2 and 3), over winter, and then become mature, seed producing plants in year two (Photo 4). While this biennial life cycle has been commonly observed, the 2009 and 2010 crews have come across populations of first year seedlings that have not matured this summer. This may indicate that these seedlings germinated this spring rather than the previous fall and may still mature this year or will need to over-winter and mature next year.



**Photo 2: A patch of first-year Japanese hedge-parsley basal rosettes that will over-winter and become seed producing plants the following summer**



**Photo 3: A first-year Japanese hedge-parsley basal rosette with carrot-like tap root**



**Photo 4: Over-wintered basal rosette and mature seed producing plant**

JH-P is in the Parsley family (*Apiaceae*) and grows to 12-20" in height with alternate and pinnately divided leaves (Czarapata, 2005). It has a thick taproot (Photo 3) and can have multiple stems branching from the base (Tengalia, 2007). JH-P blooms in July and August with tiny white flowers that form umbels clustered at the top of the plant and at the ends of lateral branches (Photo 5 and 6).



**Photo 5: Umbel-forming white flowers**



**Photo 6: Mature Japanese hedge-parsley with flowers at the ends of lateral branches (*Torilis japonica*)**

The fruits are flattened, oval to oblong, and have a Velcro-like bristly characteristic (Czarapata, 2005) (Photo 7). The fruits attach to any fabric or animal hair that brushes against it (Tengalia, 2007; Czarapata, 2005). The stick-tight nature of the fruit makes this invasive plant ready and able to spread quickly, which is why it has been marked as a targeted invasive species (Cofrin Center for Biodiversity--Herbarium: University of Wisconsin-Green Bay, sent email asking author).



**Photo 7: Oval to oblong, Velcro-like fruits of Japanese hedge-parsley (Midwest Invasive Plant Network, 2008)**

The duration of viability for the seed bank is unknown. However, areas on the LMR where JH-P has been pulled since 2005, show noticeable decreases in population sizes. JH-P can be confused with other white-flowered, umbel-producing plants with pinnately divided leaves such as Queen Anne's lace (*Daucus carota*) (Photo 8). The JH-P basal rosettes can be mistaken for sweet cicely (*Osmorhiza*) and common ragweed (*Ambrosia*) (Photo 9 and 10). The following website provides more photos of look-a-like plants that are easily confused with JH-P: <http://dnr.wi.gov/invasives/fact/japanparsley.htm> (Wisconsin Department of Natural Resources, 2004)



**Photo 8: Queen Anne's lace**



**Photo 9: Sweet cicely**



**Photo 10: Common ragweed**

### *Habitat*

JH-P is commonly found in disturbed, upland areas such as urban areas, railroad rights-of-way, roadsides, trails, or forest edges. It then proliferates into the adjacent grasslands, prairies, savannas, and forests (Eagan, 2006; Wisconsin Department of Natural Resources, 2006; Wisconsin Department of Natural Resources, 2004).

### *Implications*

Field observations implicate that JH-P has the potential to be as aggressive or more aggressive than garlic mustard—a species that has required over 500 hours of the Aldo Leopold Foundation Stewardship crew's time in 2010. JH-P has begun to spread prolifically on land adjacent to the Aldo Leopold Foundation including along Levee Road (from Schepp Road to DNR property), Van Hoosen Road and on the Birrenkott property (Photo 11).



**Photo 11: Japanese hedge-parsley dominates the understory on the Birrenkott property on the corner of Levee Road and Schepp Road.**

The Stewardship crew's past goals have been to control JH-P along roadsides that border our property and continue to monitor our property to keep JH-P from spreading uncontrollably. However, due to the increased spread of JH-P along the roadsides and being untreated in adjacent lands, the stewardship crew is beginning to see JH-P creeping more into the LMR. The 2011 stewardship crew has continued to track JH-P populations for the third year similar to the Garlic Mustard protocol (see 2011 Garlic Mustard Report). While we began managing this invasive species relatively early in its introduction, we are now seeing an increase in its presence on the LMR. We hope that our efforts in controlling JH-P will keep populations at a manageable size. In 2011, we noticed a decrease in the abundance of JH-P on the focused managed plots, thus indicating to us that the efforts of conservation management seem to be having a positive impact of the species of concern thus far.

## Methods

On the LMR, efforts to control JH-P began in 2003 at the first detected patch near a clump of river birch on the east end of the Shack prairie along Levee Road. The first extensive treatment began in 2005 with roadside maintenance along Levee Road, Birch Row, the Anniversary Unit, and the eastern portion of the Shack Prairie. After noticing the emergence of JH-P in areas where it had not previously been, the 2010 stewardship crew continued the same approach to monitoring and controlling JH-P as the 2009 crew established. In addition to the Anniversary unit, Birch Row, the Shack Prairie and the roadsides; the sands behind the shack, the Shack Pines, Sand Hill and Clay Hill were also scouted. In 2008, the stewardship crew recognized 7 discrete JH-P populations on the LMR (see 2008 Japanese Hedge-Parsley Report). Efforts were concentrated in these areas and little scouting for new populations were conducted. In 2009, the crew felt that it was important to take the time to transect areas where JH-P populations were known and areas where JH-P would likely be found. As a result, 60 JH-P populations were located and GPSed to ensure that these populations will be monitored and treated in future years. In 2011, two new populations were found and also recorded according to the same protocol. Of the new populations that were found, most of them seemed to occur along and in front of roadsides.

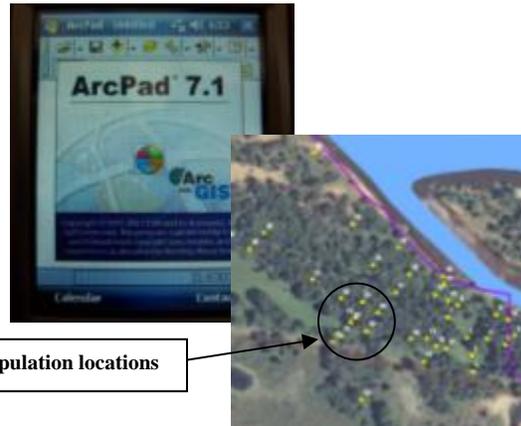
### *Data Collection*

The 2011 season was the third year of systematic transecting and data collection. Similar to the Garlic Mustard protocol, crew members lined up and walked transects between two physical barriers (roads, paths etc.) looking for JH-P populations. A PDA (Personal Digital Assistant) and Bluetooth GPS unit were used to mark new population locations and record information about the population (Photo 11). The PDA is equipped with

ArcPad, which allows the data collector to mark locations and record data in GIS (a tutorial on this process can be found at *P:/StewardshipProgram/InvasiveSpecies/How to Use GPS and PDA units.docx*) (Photo 12). This data can then be uploaded into GIS and we can then produce a map of all the Japanese Hedge-Parsley populations found on the LMR (Photo 13) (see full map at the end of the report).



**Photo 12: PDA (left) and Bluetooth GPS (right) equipment**



**Photo 13: ArcPad software and JH-P population map**

When a population was discovered, it was given a GPS location, a unique identification number and a yellow flag (to distinguish from the orange garlic mustard flags) (Photo 14). The data collector would also record the diameter of the population and the date (Photo 15). Both the population number and diameter was written on the flag and the spine of the flag. Only populations greater than 5 plants were recorded or where seedlings were present were recorded. A population less than 5 plants or when we felt that the population was small enough and where hand-pulling successfully eradicated was not recorded.



**Photo 14: Data collector writing population number and diameter on a yellow flag**



**Photo 15: Data collector recording population characteristics**

## *Control*

Hand-pulling, mechanical control and chemical control are the three tools used for managing JH-P. The best means for controlling JH-P depends on the population size and the developmental stage of the plants.

### *Hand-pulling*

Since many of the JH-P populations on the LMR are rather small, hand-pulling has been the primary management approach for controlling this species. The plants are hand-pulled, collected in the back of the Kubota, and piled at the Leopold Center (LC) in an area that can be easily monitored in future years to ensure the pulled plants do not deposit viable seeds.

### *Mechanical Control*

Mowing is effective in controlling JH-P. Mowing should be done as soon as the white flowers have formed—a time when the plants are visible in the field but the cut plants are not capable of depositing mature seeds. However, if mowing is done too early, before flowers begin to appear, JH-P will still have enough reserves to flower and go to seed. Hand-pulling would still be necessary if mowing was done too early and should not be assumed that JH-P was controlled in these areas. Since much of our management is along roadsides, timing the county roadside mowing to coincide with the JH-P life-cycle is a valuable management tool. See the *recommendation* section (page 13) for the contact information for the county roadside mowers. Weed-eaters also provide a useful tool for controlling rather large populations in areas where mowers cannot navigate. In 2011, the crew took notice that mowing that occurred along roadsides and between the anniversary unit and birch row occurred at too early of a date. We noticed that the plants that were mowed earlier in the spring re-sprouted a couple weeks later, bearing flowers. Thus we prescribe cutting the plants when flowers are not present, or at a time in the plants growth when the flowers are fully developed, however, not yet bearing seeds. We took note that re-flowering plants occurred along Van Hoosen, Schepp, and Levee roads.

### *Chemical Control*

Chemical control efforts on the LMR have had varied results. Future chemical control efforts should involve using a 1-2% solution of glyphosate or triclopyr late in the fall or early in the spring or on re-sprouts (Midwest Invasive Plant Network, 2008). Chemical control of JH-P took place during the 2010 Garlic Mustard season and took place in the fall. When JH-P was discovered while controlling Garlic Mustard, crew members used the same 2% solution of glyphosate used to treat Garlic Mustard to treat JH-P basal rosettes. No data was collected nor was a flag placed at the JH-P location. Chemical control is effective at the basal rosette life stage and can be used during the early spring

or late fall depending on time and weather conditions. The 2010 crew has decided to implement a fall chemical treatment regime. It is suggested that the 2011 crew also conduct a fall chemical treatment to all roadside, specifically along Schepp and Van Hoosen roads, as well as the specified management units within the LMR.

## **Results**

Table 1 provides a comprehensive history of JH-P management from 2005 to present.

### *2005*

JH-P was hand pulled along Levee Road, Birch Row, the edge of the Anniversary Unit, and the east end of the Shack prairie. Large populations located on the north side of Levee across from the Schauf property and on the south side of Levee across from the anniversary unit were mowed.

### *2006*

A 1% chemical solution of 2,4-D amine was applied along Levee Road, Birch Row, Schepp Road, and Van Hoosen Road to the interstate bridge. JH-P was hand pulled along Levee Road and Birch Row after chemical treatment of 2,4-D amine was not effective. It is hypothesized that the chemical treatment was not effective because it was applied too late in the plant's life cycle (the seeds had time to form after chemical was applied).

### *2007*

JH-P was hand-pulled along Levee Road, Van Hoosen Road, Schepp Road, Birch Row, and the Shack Pines. Weed-whips were used in the large population on the Birrenkott property and along Levee Road from Schepp road to the boundary of the DNR lands at Pine Island. In 2007 grant money allowed for extra time and resources to be spent covering a larger area infested with JH-P.

### *2008*

JH-P was hand-pulled along Levee Road, Van Hoosen Road (to the interstate overpass), Schepp Road (to the interstate overpass), Birch Row, the Anniversary Unit and the eastern portion of the Shack prairie, and in areas behind the Shack and behind the Aldo Leopold Legacy Center in Frank's savanna. The county mowed the roadsides of Van Hoosen and Schepp and any remaining JH-P were hand-pulled. Emphasis was placed on educating landowners about JH-P on all property visits made through stewardship outreach programs.

2009

JH-P season began on July 9<sup>th</sup> and ended on July 28<sup>th</sup>. Due to the season beginning roughly a week earlier than the 2008 season, the crew was able to hand-pull and leave the plants on site during the first week of treatment. The plants had barely begun to flower and the crew felt confident that once pulled the plant would not be able to produce viable seed. This was confirmed during later visits, where pulled plants were brown, wilted and dead with further flower and seed production not evident.

2010

JH-P season began on June 30<sup>th</sup> and ended on August 3<sup>rd</sup>. Because the crew noticed that most plants along the roadside were much more developed than those on the ALF property, the roadsides were visited before the majority of the other areas. However, the roadsides had to be revisited because of late developing plants that were initially missed.

Monitoring, treatment and data collection took place in the Anniversary Unit, Birch Row, sands behind the shack, the eastern portion of the shack prairie, the orchard, the foundation area, Sandhill and Clay Hill. 45 new JH-P populations were located and recorded. Populations found on roadsides, in areas in front and behind the Leopold Center and Frank's savanna were not mapped or recorded.

Due to funding limitations, the county did not mow the ditches in 2010. If mowed late enough in the plant's life cycle but not too late that seeds have the potential to fully develop, this practice can greatly save time for the crew as well as help reduce the spread of the plant. Levee (from Schepp to Cty Hwy T) and Van Hoosen Road (from Schepp to the interstate overpass) were hand pulled in their entirety. However, at the intersection of Schepp and Van Hoosen Road, on the Birrenkott property, the JH-P population extended far into the property that the decision was made to stop further treatment and focus our attention on populations found on the LMR.



**Photo 16: Crew with truck full of hand-pulled Japanese hedge-parsley**



**Photo 17: Truck full of Japanese hedge-parsley after hand-pulling on Van Hoosen Road**

Unlike other years, the crew decided to do a fall chemical treatment of JHP. Check Appendix A for the details.

**2011**

The JH-P season started on July 12<sup>th</sup> and came to a conclusion on August 5<sup>th</sup>. Due to the late spring development of several plants this year, the crew noticed that most of the plants throughout the LMR were developing quickly and were already bearing flowers prior to treatment. We decided that it was a more reasonable to start treatment on the LMR larger management unit, and continue along roadsides, seeing that all plants seemed to represent a mean average size.

The larger unit within the LMR that included monitoring, treatment and data collection consisted of the Anniversary Unit, Birch Row, sands behind the Shack, the eastern portion of the Shack Prairie, the Shack Pines, the Orchard, the Foundation unit, Sand hill, and Clay Hill units. Of the previously marked populations within this LMR management unit, two new populations were established. It is noted that other units along Van Hoosen, Levee and Schepp roads, including the unit behind the center and Frank’s Savannah were not included in the data collection. However, roadsides, Frank’s Savanna, and the unit behind the center were transected and treated.

The sum total hours it took the 2011 crew to finish management of the LMR on JH-P, which includes monitoring, treatment, and data collection in some areas is 207.5. These areas where treatment was applied are the LMR management unit, roadsides, the area behind the center, also including some additional areas (Table 1). All of these hours were counted per unit of management, along with the total hours for all management units (Chart 1). Please note that it is recommended that future crews take the necessary steps to count hours spent on individual smaller units within the larger management unit, as well as individual roads, instead of roadsides as a whole. Also note that the total hours spent on management in the LMR from the initial year to present is also displayed (Chart 2). The total days spent on treatment across all treatment years thus far is also displayed below (Chart 3). One final interest of the crew, was to distinguish the span of times placed on management based on start dates and end dates of treatment(Chart 4).

**Table 1: Person hours, dates of treatment, area covered, and control method (hand-pulling, chemical, or mechanical treatment) for Japanese hedge-parsley 2005-2010.**

Year	Person Hours	Dates of Treatment	Area Covered/ Control Method		
			Hand Pulling	Chemical Treatment	Mechanical Treatment
2005	32.5	July 15, 28, August 3, 5	<ul style="list-style-type: none"> <li>Levee Road</li> <li>Birch Row</li> </ul>		<ul style="list-style-type: none"> <li>North of Levee across from Schauf</li> </ul>

					Property South side of Levee across from Anniversary Unit
2006	41	July 17-19, 24, 28, 31, August 2	<ul style="list-style-type: none"> <li>• Levee Road</li> <li>• Birch Row</li> </ul> <i>Note: these areas were hand-pulled because chemical treatment was not effective.</i>	<ul style="list-style-type: none"> <li>• Birch Row</li> <li>• Schepp Road</li> <li>• Van Hoosen Road to Interstate</li> </ul> <i>Note: 2-4, D amine chemical treatment not effective possibly because it was applied <b>after</b> plants had bolted.</i>	
2007	135	July 12, 13, 16, 17, 19, 23-25	<ul style="list-style-type: none"> <li>• Levee Road</li> <li>• Van Hoosen Road to Interstate</li> <li>• Schepp Road</li> </ul>	<ul style="list-style-type: none"> <li>• Trail from ALLC garage to Van Hoosen Road</li> <li>• Birch Row</li> <li>• Shack Pines</li> <li>• Levee Road from Schepp Road to Boundary of DNR lands at Pine Island</li> </ul>	<ul style="list-style-type: none"> <li>• Birrenkott Property (Weed Whips)</li> </ul>
2008	128.75	July 18, 21- 23, 25, 28, 31 August 1, 4, 6	<ul style="list-style-type: none"> <li>• Levee Road</li> <li>• Anniversary Unit</li> <li>• Eastern portion of Shack Prairie</li> <li>• Behind ALLC along path to Van Hoosen Road</li> <li>• Schepp Road</li> <li>• Van Hoosen Road to Interstate</li> </ul>		<ul style="list-style-type: none"> <li>• Van Hoosen Road</li> <li>• Schepp Road</li> <li>• Levee Road (county mowed roadsides)</li> </ul> <i>Note: Levee Road was hand-pulled before the county mowed. Van Hoosen and Schepp were hand-pulled outside of the mow zone after the county mowed.</i>
Fall 2008	6	November 19		<ul style="list-style-type: none"> <li>• Behind ALLC</li> <li>• Charlie's Woods</li> <li>• Shack JH-P populations</li> </ul>	

2009	131	July 9, 10, 14-16, 20-24, 27, 28	<ul style="list-style-type: none"> <li>• Anniversary Unit</li> <li>• Birch Row</li> <li>• Sand behind shack</li> <li>• Shack Pines</li> <li>• Sandhill</li> <li>• Clay Hill (triangle)</li> <li>• Levee Road</li> <li>• Van Hoosen Road</li> <li>• Schepp Road</li> <li>• ALF property in front and behind center to Van Hoosen Road</li> <li>• Frank's savanna</li> </ul>		<ul style="list-style-type: none"> <li>• Van Hoosen Road</li> <li>• Schepp Road</li> <li>• Levee Road (county mowed roadsides)</li> <li>• Orchard (mowed)</li> </ul> <p><i>Note: Levee Road, Van Hoosen and Schepp were hand-pulled outside of the mow zone after the county mowed.</i></p>
2010	232	June 30, July 2, 6, 8-9, 13-15, 19-21, 26-29, August 2-3	<ul style="list-style-type: none"> <li>• Anniversary Unit</li> <li>• Birch Row</li> <li>• Sand behind shack</li> <li>• Shack Pines</li> <li>• Sandhill</li> <li>• Clay Hill (triangle)</li> <li>• Levee Road</li> <li>• Van Hoosen Road</li> <li>• Schepp Road</li> <li>• ALF property in front and behind center to Van Hoosen Road</li> <li>• Frank's savanna</li> </ul>	<ul style="list-style-type: none"> <li>• Birch Row</li> <li>• Anniversary Unit</li> </ul>	<ul style="list-style-type: none"> <li>• Westside of Schepp Road south of Van Hoosen Rd.</li> <li>• Orchard</li> <li>• South half of Anniversary Unit</li> </ul>
Fall 2010	16	November 17 and 19 <sup>th</sup>		<ul style="list-style-type: none"> <li>• Anniversary unit</li> <li>• Birch row</li> </ul>	
2011	207.5	July 12-14, 18,19,21, 25, 26,28,' August 1,4, 5	<ul style="list-style-type: none"> <li>• Anniversary unit</li> <li>• Birch Row</li> <li>• Sands behind shack</li> <li>• Shack Pines</li> <li>• Sandhill</li> <li>• Clay Hill (triangle)</li> <li>• Levee Road</li> <li>• Van Hoosen Road</li> <li>• Schepp Road</li> <li>• ALF property behind the center to Van Hoosen Road</li> </ul>	<ul style="list-style-type: none"> <li>• Anniversary Unit</li> <li>• North Birch Row</li> <li>• South Birch Row</li> <li>• Shack Pines</li> <li>• Foundation Unit</li> <li>• Sandhill</li> <li>• Clay Hill</li> </ul> <p>( all chemically sprayed during garlic mustard season)</p>	<ul style="list-style-type: none"> <li>• Levee Road (mowed in front of and around the birch row path)</li> <li>• Schepp Road (mowed along west facing road by forest area)</li> <li>• Orchard (mowed)</li> </ul> <p><i>Note: Levee, Schepp, and Van Hoosen roads were hand-pulled outside of the mow zone after the county mowed.</i></p>

**Japanese Hedge-Parsley (*Torilis japonica*) Management 2011**

Unit	Hours of Management per Unit
<b>LMR Management Unit</b> ( Includes the Anniversary Unit, North of Birch Row, South of Birch Row, Shack Pines, Foundation unit, Orchard, Sand Hill and Clay Hill)	32
<b>Roadsides</b> ( Includes Levee, Schepp and Van Hoosen Roads)	146.5
<b>Area behind the center</b> (transected)	37
<b>Other</b> (Pulling along Charlie's Prairie and Nina's Woods)	1
<b>Total</b>	<b>207.5</b>

Table 2. The table displays the total management hours spent per unit/ interest on the LMR for 2011 and relates it to Chart 1.

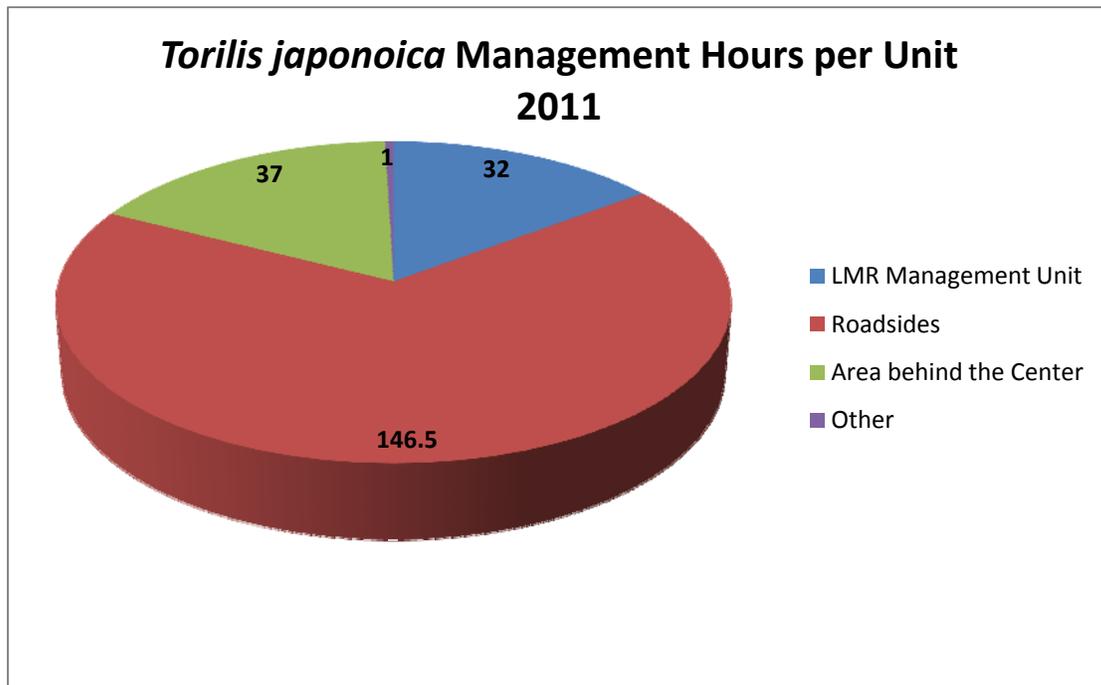


Chart 1. This chart illustrates the total hours spent on management per unit/interest on the LMR for 2011.

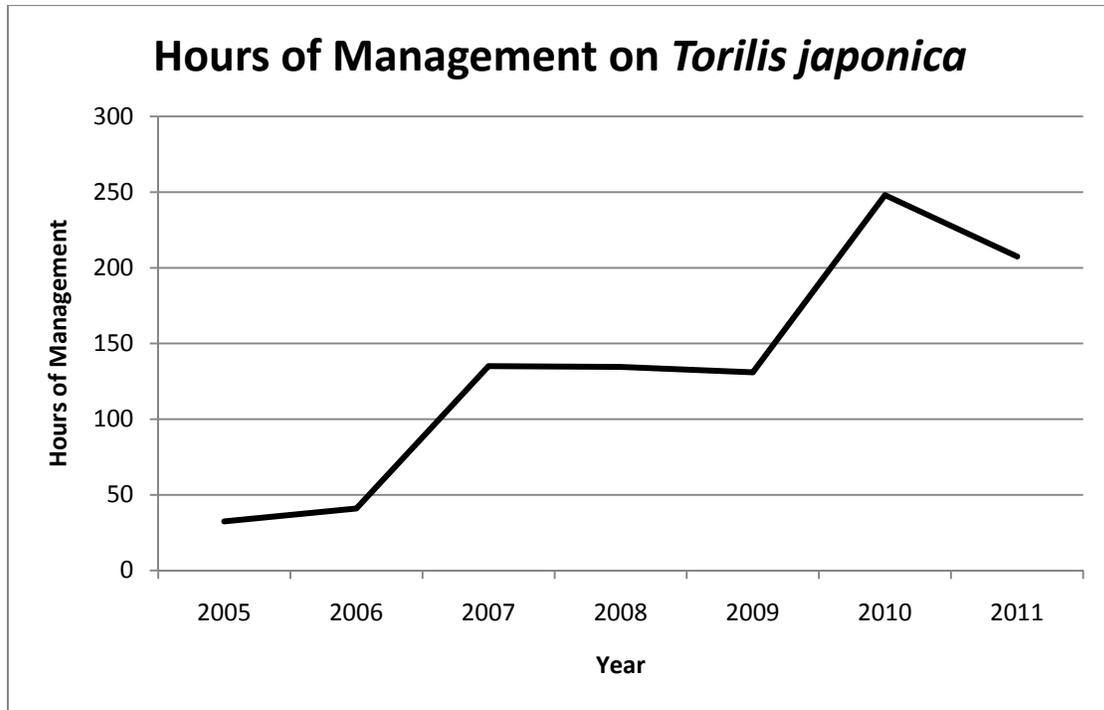


Chart 2. The chart above demonstrates the total management hours spent on monitoring, treatment, and data collection (for some years) by year, from 2005 to the present.

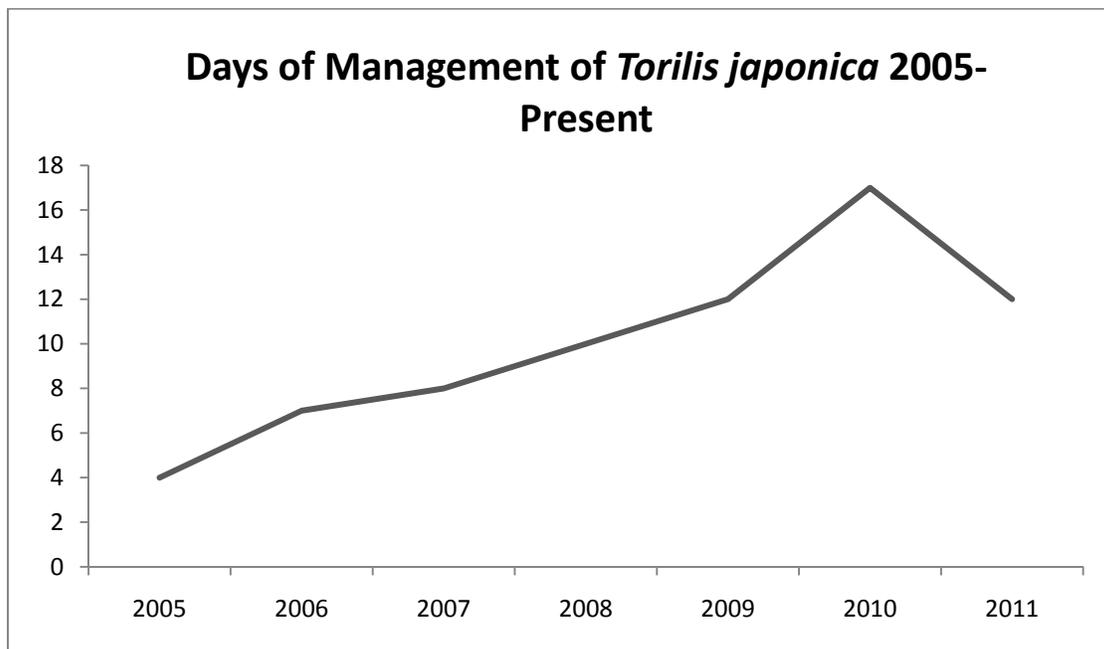


Chart 3. This chart indicates the total days of treatment applied to *Torilis japonica* within the LMR from 2005 to the present.

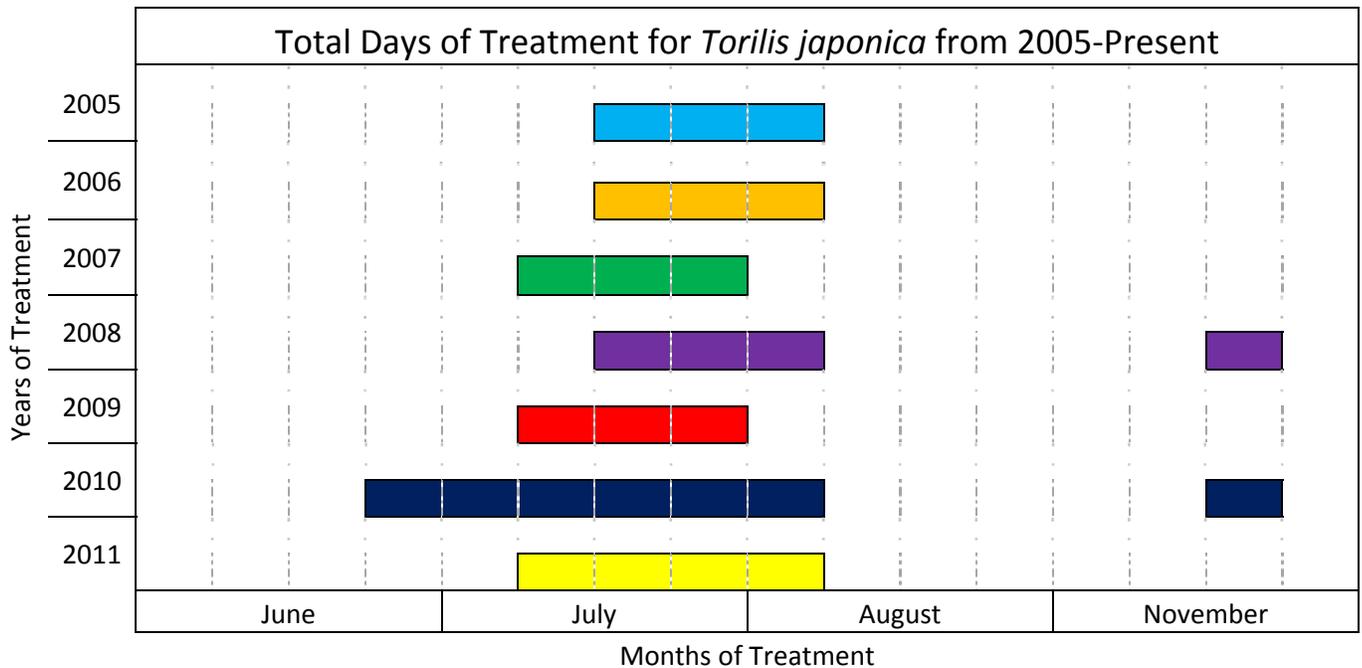


Chart 4. This chart displays the time span of the total amount of treatment days from start date to the end date (by weeks per month) of *Torilis japonica* in relation to years of treatment (2005 to the present).

### Recommendations

In 2008 the stewardship crew communicated with the county roadside mowers (contact: Steve Moucoo 608-356-3855) to coordinate the mowing of Levee Road, Van Hoosen Road, and Schepp Road. In an attempt to not spread weed seeds (garlic mustard and JH-P), we asked that the county mow Levee Road from Highway T towards Schepp Road and then mow Schepp Road and Van Hoosen Road. The county seemed receptive to helping control invasive species and since mowing is an effective means of controlling JH-P it is recommended that the stewardship crew continue to communicate with the county mowers. In 2009, the stewardship crew did not communicate with county roadside mowers and it is assumed that the county mowed according to the mowing scheme discussed in 2008. In 2010, no mowing was done on any roadsides due to budget cuts and communication should be continued next year to ensure a mowing regime that is consistent with JH-P management goals. In 2011, mowing was done on July 1<sup>st</sup>, and the timing was not, however, coordinated with the county roadside mowers. However, the crew did notice that some JH-P plants did start re-generating flowers as soon as July 19<sup>th</sup>, but these numbers did were not exponential.

The information of the life-cycle of JH-P is still inconsistent and with every year of treatment the crew hopes to better understand how JH-P behaves. It is essential that

future crews continue to transect, map and collect data on JH-P populations. Populations where first-year basal rosettes were discovered will continue to be monitored for further development. We have increasingly observed JH-P acting as a biennial similar to that of garlic mustard with seed possibly germinating in the fall as well as the spring. In the fall, the 2010 crew will visit Anniversary Unit, Birch Row, and Clay Hill where a large density of basal rosettes have been identified. These areas will be chemically treated with the hopes of more efficiently controlling the spread of the JH-P.

It is recommended that during the 2011 Garlic Mustard season that the crew not only visits the Garlic Mustard and JH-P flagged populations, but also scouts, transects and maps new populations of both species during the traditional Garlic Mustard season (May). Trying to treat and control both invasive species simultaneously allowing for JH-P to be chemically treated when it is most susceptible and will also be a great opportunity to transect areas where JH-P control efforts are currently not established (ex. Floodplain).

## **Conclusion**

JH-P is a relatively newly introduced invasive weed to Sauk County. The herbaceous biennial has the potential to be a very aggressive and dominant weed within the forest understory. Information on this invasive species is limited and with each year of treatment we hope to gather more details on the life-cycle of JH-P and the most effective methods of control. The consequences of not addressing this weed can be seen on the roadsides surrounding the LMR and in the forest understories of adjacent landowners. While the Aldo Leopold Foundation began management early in its introduction, the increased spread of JH-P has forced the stewardship crew to move to more intense control methods and begin mapping and recording populations. In our second year of the new monitoring system, our initial time spent on JH-P has increased, but we are hoping it will save the stewardship crew a great deal of time in the long run, ultimately keeping JH-P in a manageable state. We hope to not only control this species on the LMR, but we also hope to educate other landowners about the presence of JH-P and management approaches for controlling JH-P. We would also like to thank the Department of Natural Resources for making this work possible by continuing to fund our JH-P control efforts.

## Work Cited

- Czarapata, E. (2005). *Invasive Plants of the Upper Midwest: An illustrated guide to their identification and control*. Madison: The University of Wisconsin Press.
- Eagan, D. (2006). Green Invaders on the Horizon: Your help can keep troublesome new plants from taking root. In *Wisconsin Natural Resources Magazine*. Madison: Wisconsin Department of Natural Resources.
- Herbarium--Cofrin Center for Biodiversity: University of Wisconsin-Green Bay. (sent email asking author). *Invasive Plants of Wisconsin*. Retrieved August 11, 2008, from *Torilis Japonica*: Japanese hedge-parsley:  
[http://www.uwgb.edu/biodiversity/herbarium/invasive\\_species/torjap01.htm](http://www.uwgb.edu/biodiversity/herbarium/invasive_species/torjap01.htm)
- Houtt, D.C. (2005-2010). *Torilis japonica*. PFAF Plant Database. Retrieved August 8, 2011, from: <http://www.pfaf.org/user/Plant.aspx?LatinName=Torilis+japonica...>
- Midwest Invasive Plant Network. (2008). *Midwest Invasive Plant Network*. Retrieved August 7, 2008, from New Invasive Plants of the Midwest Fact Sheet: Japanese Hedge-Parsley, *Torilis japonica*:  
<http://www.mipn.org/Midwest%20Invasives%20Fact%20Sheets/PDF/hedgeparsley.pdf>
- Tengalia, D. (2007, February 8). *Missouri Flora*. Retrieved August 11, 2008, from *Torilis Japonica*: [http://www.missouriplants.com/Whitealt/Torilis\\_japonica\\_page.html](http://www.missouriplants.com/Whitealt/Torilis_japonica_page.html)
- USDA Natural Resources Conservation Service. (2008). *Plants Database*. Retrieved August 11, 2008, from Plant Profile: *Torilis Japonica*:  
<http://plants.usda.gov/java/profile?symbol=TOJA>
- Wisconsin Department of Natural Resources. (2004, September 3). *Invasive Species*. Retrieved August 11, 2008, from Japanese Hedge Parsley(*Torilis japonica*):  
<http://dnr.wi.gov/invasives/fact/japanparsley.htm>
- Wisconsin Department of Natural Resources. (2006, July 3). *Weekly News*. Retrieved August 11, 2008, from Two new invasive plants poised to invade Wisconsin forests: [http://dnr.wi.gov/news/DNRNews\\_Lookup.asp?id=21#art3](http://dnr.wi.gov/news/DNRNews_Lookup.asp?id=21#art3)

## Appendix A. 2010 Fall Treatment of JHP

The crew decided to conduct a fall chemical treatment in the Anniversary unit and birch row. The other areas were not treated due to time constraints, weather (too cold to use glyphosate) and curiosity. As the crew was out treating JHP, we noticed quite a change in the shapes and densities of the populations since the spring. We also noticed that some plants looked as to be senescing or dying due to a change in color from green to purple and in some cases yellow. These two changes caused the crew to think that maybe some if not all of these seedlings would die off in the winter and their efforts would have been a waste of time and chemical. So we finished the Anniversary unit and birch row and chose to stop treatment and see the following spring what the results are from this effort. We did however use 2 plots for an experiment to test this theory. Each plot was photographed to use as a visual comparison. One plot (21) was sprayed to see if this was effective next year and 1 plot (23) was left unsprayed to see if they would naturally die off or how the population changed next spring. Below are the photos of the experiment plots.



As a crew, we found it much easier to walk through the vegetation in the fall and since JHP is still very green, it was much easier to see and be able to treat. We would recommend doing a fall treatment every year of course depending on the results next spring.

## **Japanese Hedge-Parsley (*Torilis japonica*) Phenology**

In relation to other plants JH-P has several stages of importance in its growth and development to take note of in the phenology of the plant. While transecting and gathering data, it was evident to us that previous to management, with a start date on July 12<sup>th</sup>, some plants began to bolt, and were already flowering. On July 19<sup>th</sup>, the crew noticed while transecting an area along Van Hoosen Road that some plants that were mowed earlier in the month were beginning to re-sprout and thus producing flowers. When it became evident to us that the plants were developing exponentially and bolting was on July 25<sup>th</sup>. On August 1<sup>st</sup>, the crew noticed that the area between Birch Row and the Anniversary Unit containing JH-P started to re-sprout, bearing flowers. We also noticed at this time that plants first started bearing seeds. Our final day of treatment was on August 5<sup>th</sup>, and we expect that some time after this date the seeds from these plants would start sticking and getting transported on clothing.

Making observations and studying JH-P phenology over a time period can help us gain a greater understanding of the functions and development of the plant. The dates at which certain phenological events occur may change from year to year with seasonal effects and what time frame in which those events take place. In 2011, a cold and wet spring slowed the development and progression of several species, thus pushing back the start dates of treatment. When observing JH-P in the field, while monitoring and scouting there are several stages of the plants development to take note of: 1) when the plants start bolting or developing at an exponential rate, 2) When the plants first start showing their flowers (first flowers), 3) When plants first bear seeds (when plants need to be hawled or bagged), 4) When seeds first begin sticking (being carried on clothing), and 5) throughout the management note when plants begin to re-sprout along mowed areas.