We Energies
Iron Mountain Hydro Operations
800 Industrial Park Drive
Iron Mountain, MI 49801
www.we-energies.com

November 27, 2018

Ms. Kimberly D. Bose, Secretary
Federal Energy Regulatory Commission
888 First Street, NE
Washington, DC 20426

Dear Ms. Bose:

SUBJECT: 2018 Reports on Nuisance Plant Surveys

	FERC No.	NAT DAM#	License Article
Way/Michigamme Reservoir	**1759**	**MI00205**	**413**
Hemlock Falls	**2074**	**MI00172**	**412**
Lower Paint	**2072**	**MI00179**	**411**
Peavy Falls	**11830**	**MI00191**	**411**
Michigamme Falls	**2073**	**MI00156**	**412**
Brule	**2431**	**MI00184**	**410**
Twin Falls	**11831**	**MI00143**	**412**
Pine	**2486**	**WI00738**	**413**
Kingsford	**2131**	**MI00177**	**412**
Big Quinnesec Falls	**1980**	**MI00103**	**412**
Chalk Hill	**2394**	**MI00160**	**410**
White Rapids	**2357**	**MI00207**	**410**

The "Terrestrial Based Natural Resources Management Plan," filed in September of 1999 as part of the Wilderness Shores Settlement Agreement, which affects Way Dam (FERC No. 1759), Hemlock Falls (FERC No. 2074), Peavy Falls (FERC No. 11830), Michigamme Falls (FERC No. 2073), Lower Paint (FERC No. 2072), Twin Falls (FERC No. 11831), Kingsford (FERC No. 2131), and Big Quinnesec Falls (FERC No. 1980), and the "Order Modifying and Approving Purple Loosestrife and Eurasian Water Milfoil Monitoring Plan" issued on April 30, 1996, for the Pine (FERC No. 2486), August 14, 1997, for the Brule (FERC No. 2431), December 11, 1997, for the Chalk Hill (FERC No. 2394) and White Rapids (FERC No. 2357) projects, require We Energies to provide the final reports on the required annual and biennial monitoring for those projects no later than 30 days after the monitoring is completed. An annual extension for submitting these reports by the end of November was granted in 2010. Monitoring is scheduled each year for a portion of these twelve projects, with the field portion of the monitoring to be completed by August 25.

Report of 2018 Nuisance Plant Monitoring

Please find attached a report of Purple Loosestrife (PL) monitoring activities completed in 2018 consistent with the proposed plan submitted January 22, 2014 and Table 1. The results were presented by Mike Grisar of our environmental staff at our Annual Land Management Meeting held on October 17, 2018, with representatives from the Wisconsin and Michigan DNRs as well as some county and local

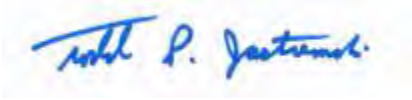
agency representatives that work on tracking and controlling invasive species. The information was made available to everyone in attendance upon request.

Table 1: Comparison of 2018 PL Data Collected vs Proposed Plan Requirements

	Proposed New Plan	
	2018	2018
	Plan	Actual
Way Dam	X	X
Hemlock Falls		
Peavy Falls		
Lower Paint	X	X
Michigamme Falls		
Brule	X	X
Twin Falls	X	X
Pine		
Kingsford	X	X
Big Quinnesec Falls	X	X
Chalk Hill	X	X
White Rapids		

Please call me at (906) 779-4099 if you have any questions concerning this filing.

Sincerely,



Todd P. Jastremski
Asset Manager Hydro Operations

Attachments

cc: John Zygaj – FERC – CRO
Cheryl Laatch – WDNR
Elle Gulotty – MDNR
Nicholas Utrup – FWS
James Fossum – RAW
Bob Stuber – MHRC

We Energies
2018 Annual Report - Nuisance Plant Control Survey
Chalk Hill Reservoir
FERC Project #2394

Background and Methods

We Energies Environmental Department staff, Mr. Scott Horzen and Mr. Mike Al-wathiqui, conducted a survey from a boat of the entire shoreline at the Chalk Hill project on August 17, 2018. All waters and appropriate wetlands accessible from the boat were evaluated for the presence of purple loosestrife (*Lythrum salicaria*).

If any occurrences of purple loosestrife were observed, they were mapped using a Trimble XH GPS unit. Each location was identified as a stand and the number of plants, stems per plant, and relative age of the plants were recorded. Any plants observed were removed by hand including flowers, stems, and roots.

Results and Discussion

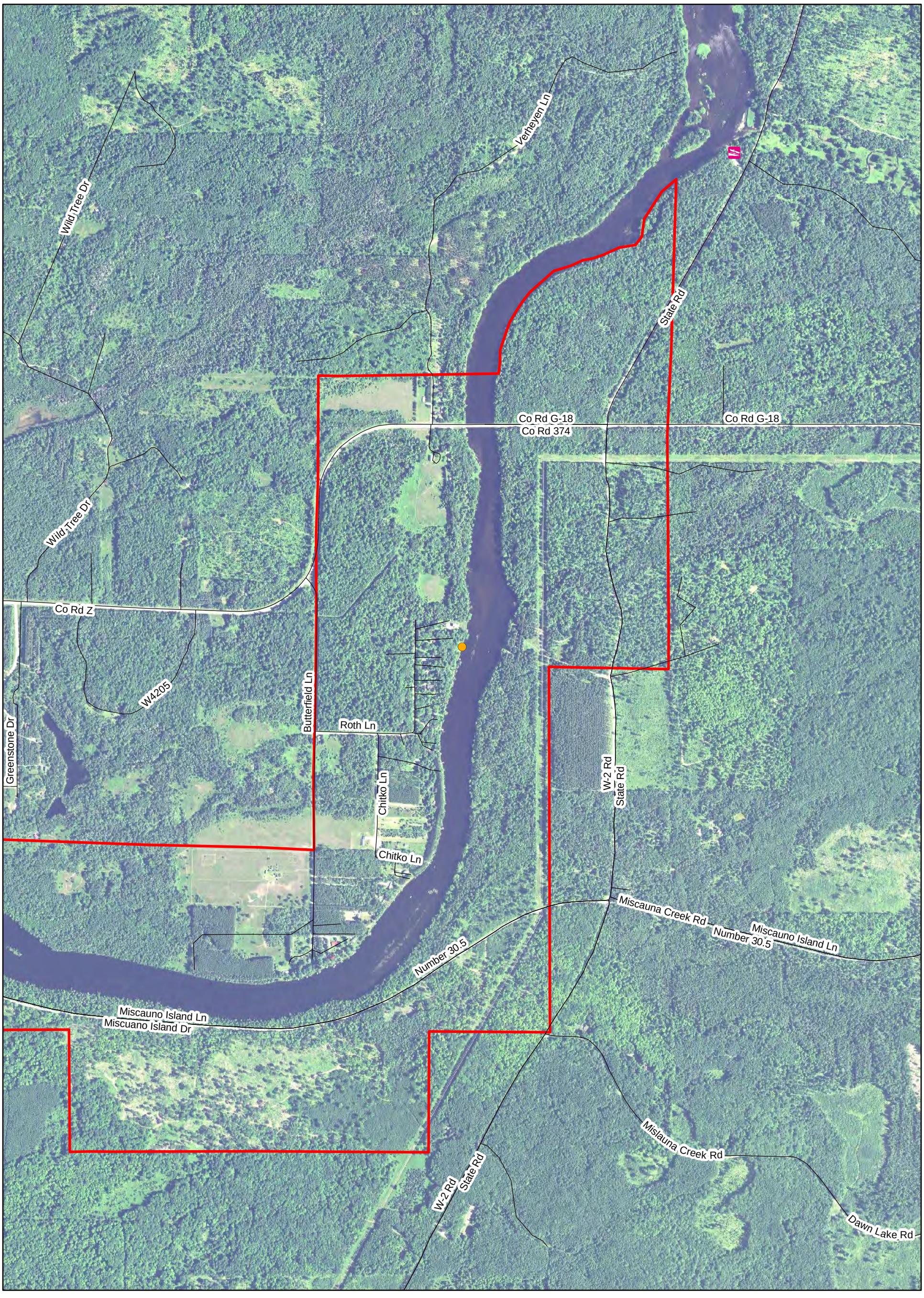
Prior to 2010, a very small population of purple loosestrife had been observed and managed for at the south end of Miscauno Island. In 2010, a single plant was located in the back of a secluded bay along the west side immediately adjacent to a wood duck house that was installed by a third party. Previously observed plants were removed including the flowering heads, stems, and root mass, and the plants were effectively managed.

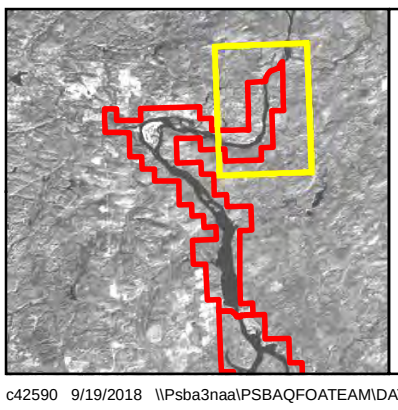
While the entire reservoir has been monitored for the presence of purple loosestrife, particular attention has been given to the locations where it had been previously observed. No purple loosestrife has been observed at these previous locations. A single plant was observed at a new location in 2017. It occurred approximately 0.4-mile south of the CTH Z bridge on the west bank of the river (see attached map). The entire plant was removed. The area was monitored for the presence of purple loosestrife in 2018 when two plants were observed in very close proximity to the plant found in 2017. The entire plants were removed.

Conclusions

It is discouraging that new locations of purple loosestrife have occasionally been observed in Chalk Hill since monitoring began in the late 1990's. By removing previously observed plants, the population encroachment has been effectively managed early in its infestation within the project boundary. Continued active removal of observed purple loosestrife will continue to prevent the infestation from spreading further within Chalk Hill.

An influx of purple loosestrife occurring along public roadways leading to several of the reservoirs was first reported in 2010. Since, purple loosestrife infestations were documented to be increasing exponentially along CTH K leading easterly toward the Menominee River between the Chalk Hill and White Rapids project areas. These populations have periodically been managed, although have not been eliminated. Continued management by other parties is necessary to reduce the potential for purple loosestrife to spread in the Menominee River system.





Purple Loosestrife: New Site August 2018

Public Boat Launch

Roadway

FERC Hydro Project Boundary

N

Miles
0 0.25 0.5

Chalk Hill Hydro Project - Year 2018
Purple Loosestrife Survey

Source: USDA -NAIP Imagery, 2016
GPS field data collected 8/17/2018

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We Energies
2018 Annual Report - Nuisance Plant Control Survey
Big Quinnesec Falls Reservoir
FERC Project #1980

Background and Methods

We Energies Environmental Department staff, Mr. Mike Grisar and Mr. Scott Horzen, conducted a survey from a boat of the entire shoreline at the Big Quinnesec Falls project on August 11, 2018. All waters and appropriate wetlands accessible from the boat were evaluated for the presence of purple loosestrife (*Lythrum salicaria*).

If any occurrences of purple loosestrife were observed, they were mapped using a Trimble XH GPS unit. Each location was identified as a stand and the number of plants, stems per plant, and relative age of the plants were recorded. Any plants observed were removed by hand including flowers, stems, and roots.

Results and Discussion

No purple loosestrife plants were observed along the shores of the Big Quinnesec Falls Reservoir project area.

Conclusions

Purple loosestrife has yet to be observed at the Big Quinnesec Falls project area since the nuisance plant surveys began. Diligent monitoring will continue to prevent an invasion of this species.

We Energies
2018 Annual Report - Nuisance Plant Control Survey
Kingsford Reservoir
FERC Project #2131

Background and Methods

We Energies Environmental Department staff, Mr. Mike Grisar and Mr. Scott Horzen, conducted a survey from a boat of the entire shoreline at the Kingsford project on August 12, 2018. All waters and appropriate wetlands accessible from the boat were evaluated for the presence of purple loosestrife (*Lythrum salicaria*).

If any occurrences of purple loosestrife were observed, they were mapped using a Trimble XH GPS unit. Each location was identified as a stand and the number of plants, stems per plant, and relative age of the plants were recorded. Any plants observed were removed by hand including flowers, stems, and roots.

Results and Discussion

No purple loosestrife plants were observed along the shores of the Kingsford Reservoir project area.

Conclusions

Purple loosestrife has yet to be observed at the Kingsford project area since the nuisance plant surveys began. Diligent monitoring will continue to prevent an invasion of this species.

We Energies
2018 Annual Report - Nuisance Plant Control Survey
Twin Falls Reservoir
FERC Project #11831

Background and Methods

We Energies Environmental Department staff, Mr. Mike Grisar and Mr. Scott Horzen, conducted a survey from a boat of the entire shoreline at the Twin Falls project on July 27, 2018. All waters and appropriate wetlands accessible from the boat were evaluated for the presence of purple loosestrife (*Lythrum salicaria*).

If any occurrences of purple loosestrife were observed, they were mapped using a Trimble XH GPS unit. Each location was identified as a stand and the number of plants, stems per plant, and relative age of the plants were recorded. Any plants observed were removed by hand including flowers, stems, and roots.

Results and Discussion

No purple loosestrife plants were observed along the shores of the Twin Falls Reservoir project area.

Conclusions

Purple loosestrife has yet to be observed at the Twin Falls project area since the nuisance plant surveys began. Diligent monitoring will continue to prevent an invasion of this species.

We Energies
2018 Annual Report - Nuisance Plant Control Survey
Brule Reservoir
FERC Project #2431

Background and Methods

We Energies Environmental Department staff, Mr. Mike Grisar and Mr. Scott Horzen, conducted a survey from a boat of the entire shoreline at the Brule Reservoir project on August 12, 2018. All waters and appropriate wetlands accessible from the boat were evaluated for the presence of purple loosestrife (*Lythrum salicaria*).

If any occurrences of purple loosestrife were observed, they were mapped using a Trimble XH GPS unit. Each location was identified as a stand and the number of plants, stems per plant, and relative age of the plants were recorded. Any plants observed were removed by hand including flowers, stems, and roots.

Results & Discussion

In 2009, a single plant was observed in the eastern bay east of the confluence of the Paint and Brule Rivers. The entire plant was removed and management of this encroaching stand appeared to be completely successful. No new plants were observed there, or anywhere else at Brule, from 2009 through 2017.

In 2018, a single plant was observed in very close proximity to the location of where the plant was removed in 2009. This new plant was removed entirely.

Conclusions

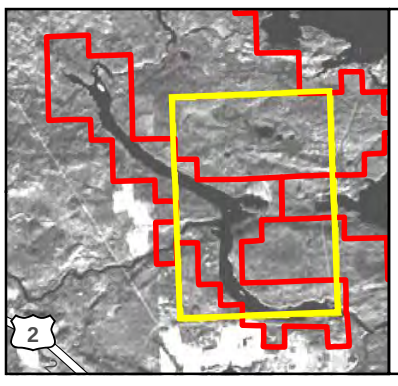
It was discouraging that purple loosestrife was first observed in the Brule Reservoir in 2009, and again in 2018. The removal of the plant observed in 2009 was successful with no reoccurrence of this stand through 2018. Continued active removal of observed purple loosestrife will continue to prevent the infestation from spreading further within Brule Reservoir.

Trudell Ln

Brule Landing Rd

Packer Dr

Florence Town Rd D



Purple Loosestrife: New Site August 2018

Public Boat Launch

Roadway

FERC Hydro Project Boundary

N

Miles

0 0.25 0.5

Brule Hydro Project - Year 2018
Purple Loosestrife Survey

Source: USDA -NAIP Imagery, 2016
GPS field data collected 8/12/2018

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We Energies
2018 Annual Report - Nuisance Plant Control Survey
Lower Paint Reservoir
FERC Project #2072

Background and Methods

We Energies Environmental Department staff, Mr. Mike Al-wathiqui and Mr. Scott Horzen, conducted a survey from a boat of the entire shoreline at the Lower Paint project on August 16, 2018. All waters and appropriate wetlands accessible from the boat were evaluated for the presence of purple loosestrife (*Lythrum salicaria*).

If any occurrences of purple loosestrife were observed, they were mapped using a Trimble XH GPS unit. Each location was identified as a stand and the number of plants, stems per plant, and relative age of the plants were recorded. Any plants observed were removed by hand including flowers, stems, and roots.

Results and Discussion

In 2010, purple loosestrife was observed for the first time on the Lower Paint Reservoir. A single purple loosestrife plant was observed and removed including the flowering heads, stems, and root mass. In 2014, a single plant was observed again in the upper shores of the reservoir, but approximately ½-mile downstream of where the plant was found in 2010. The entire plant was removed, and documented as an approximate 3 year old plant with 9 stems. Purple loosestrife was not observed in 2018.

Conclusions

It is discouraging that purple loosestrife has been observed twice in Lower Paint. Fortunately, the manual removal of the 2010 plant was successful as it has not returned at that location. However, the discovery of a new plant in 2014 is an indication that a source population likely occurs upstream. Anecdotal reports have been made of purple loosestrife occurring upstream near Crystal Falls on the Paint River. Management by other parties will be necessary to reduce the potential for purple loosestrife to spread in the Menominee River system.

We Energies
2018 Annual Report - Nuisance Plant Control Survey
Way Dam & Michigamme Reservoir
FERC Project #1759

We Energies Environmental department staff, Mr. Mike Grisar, Mr. Mike Al-wathiqui, Mr. Scott Horzen, and Mr. Tyson Schreiner conducted two separate surveys from a boat at the Way Dam and Michigamme Reservoir project on July 24, 25, and 26, 2018 and August 14, 15 and August 16, 2018. All waters and appropriate wetlands accessible from the boat were evaluated for the presence of purple loosestrife (*Lythrum salicaria*).

Additionally, We Energies and NRCS Dickinson County Conservation District staff surveyed the Michigamme River from the Highway 95 bridge north of Channing, MI downstream to Newberg Road at the Way Dam project boundary. These surveys occurred on July 23 and August 13, 2018. This is an approximate 5-mile stretch of the river that We Energies committed to surveying during the annual agency meeting in fall 2008. The effort was done to determine the extent of purple loosestrife immediately upstream of the Way Dam project, and to attempt to minimize the potential for a prolific invasion within the project limits and further down through the Menominee system.

If any occurrences of purple loosestrife were observed, they were mapped using a Trimble XH GPS unit. Each location was identified as a stand and the number of plants, stems per plant, and relative age of the plants were recorded. Any plants observed were removed by hand including flowers, stems, and roots.

<u>Way Dam and Michigamme Reservoir Project Area</u>

Purple loosestrife has been observed in the Michigamme Reservoir each year since 2006. Several years prior to 2006, it had been documented at a single location and as a single plant. Each year, every plant found has been removed. From 2006 through 2010 a rapid invasion occurred resulting in significant increases in the number of locations (i.e. stands), total plants, and total stems observed. Plants were found primarily in the east portions of the reservoir and upstream of where the Michigamme River outlets into the main reservoir basin. In 2010, it was the first time purple loosestrife had been observed beyond the mouth of the river and in the main basin, which was in two locations.

Dramatic declines in the number of locations, plants, and total stems were observed in 2011. However, the population spiked in 2012 when the highest recorded levels in the total number of plants and stems were observed. As a result of the 2012 spike, it was decided to conduct two separate surveys for purple loosestrife in an attempt to better locate plants that were developing later in the season and reduce the potential to find multi-year plants the following year. This also would reduce seed production and dispersal by plants not detected during the first survey. It has been noted that the flowering period for purple loosestrife in Way Dam has been variable. By conducting the two surveys each year from 2013 through 2018, it is evident that there is not a distinct peak flowering period, but rather the flowering of individual plants is spread out between mid-July and the end of August.

From the beginning of the recorded surveys in 2006, the total number of stands observed peaked in 2017. The 2012 spike in the total number of plants and stems remains the highest documented since 2006. The highest number of multi-year plants was observed in 2016. Between 2010 and 2016, there was a spike observed in the number of plants, stems, and multi-year plants on an every other year cycle. For the first time since 2010, this every other year

spike was not observed in 2018. Additionally, for the first time since 2013, the total number of stands observed decreased from the previous year.

Another analysis conducted is reviewing the annual data results of only the July survey. This is due to prior to 2013, only one survey was completed at Way Dam at the end of July each year. Analyzing only the July survey data allows for a direct annual comparison throughout the thirteen year monitoring period. Through this analysis, the data show the total number of plants and multi-year plants observed in 2018 were at their lowest levels since 2009. Further, the number of stems observed in 2018 was the fewest since 2008.

Since the 2013 survey year when two annual surveys began, the data strongly support the effort to conduct two surveys annually. The results indicate that approximately two to three times more plants and stems have been removed from the reservoir annually by conducting the second survey in August. In doing so, the reproduction potential of purple loosestrife within the reservoir has been substantially decreased.

Another measure of analyzing the management effectiveness is by removing the largest stands observed from the analysis. In each year since 2012, just three to four stands have accounted for a large percentage of the total plants and stems observed, particularly when evaluating only the July surveys. Statistically, with these stands removed from the calculations, the purple loosestrife population was on a consistent downward trend between 2010 and 2014. Between 2014 and 2018, the population has had slight increases and decreases with the lowest levels of plants, stems, and multi-year plants observed during the July survey since before 2010. Overall, there has been a very positive trend from 2010 through 2018.

One additional measure to determine management effectiveness is how many of the locations where purple loosestrife is found in a given year are locations where it was found in any previous year. Purple loosestrife has been found at 559 total locations in the past 12 years. Of these, only 50 (approximately 9%) stands documented between 2006 and 2017 were at locations where the purple loosestrife returned in 2018. This has been a consistent trend since 2010.

While a majority of the stand locations are centralized around the Weber Lake area and upstream, purple loosestrife occurrences expanded further downstream in 2012 into the main reservoir. This was beyond where it had been previously documented prior to 2010. Up until 2010, the furthest downstream observations occurred about ½-mile upstream of where the Michigamme River enters the main reservoir basin. By 2012, purple loosestrife had been observed throughout much of the main reservoir basin; however, it was widely distributed and in relatively few locations. In 2013, many of the stands documented to have spread through the main basin between 2010 through 2012 were no longer present. Through 2018, purple loosestrife has been observed at 11 locations in the main basin, only two of which were observed in 2018. There was a congregation of 12 stands observed in 2018 just upstream of where the river enters main basin in 2018, seven of which were newly recorded stands. Additionally, 36% (26 stands) of the new stands recorded in 2018 occurred from the Weber Lake area to the mouth of the river into the main basin. This trend will need to be monitored very closely in future monitoring years to try to minimize the potential for purple loosestrife to spread further downstream into the main basin.

When considering all factors including the trends in reduced plants and stems as well as the relatively small proportion of the total stands reoccurring from one year to the next, the management technique of manual removal of all plant material has been successful. While it is very labor intensive to conduct these manual removals, it is successful at least at those locations where the loosestrife can be observed.

Two primary objectives will continue to drive the management plan for controlling purple loosestrife within Way Dam. These include early detection of new infestation locations as well as finding and thoroughly managing the larger stands. By implementing the second survey strategy since 2013, the 2018 results suggest these goals are being achieved. By not conducting the second survey and removing the reproduction potential of these additional plants, the purple loosestrife population would likely have continued to increase exponentially as was being observed between 2006 and 2012.

We Energies plans to continue surveying and managing purple loosestrife at the Way Dam & Michigamme Reservoir project site annually to minimize the potential for mature plants setting and releasing seed into the reservoir.

Michigamme River – Highway 95 to Newberg Road

The increase in purple loosestrife within the Way Dam project lands is concerning as there is a viable purple loosestrife population occurring upstream of the Way Dam project area. In agreeing to conduct a survey on the Michigamme River further upstream from the project area, the Company is developing a better understanding of the extent to which purple loosestrife occurs upstream of the reservoir system. We Energies has been collaborating with the NRCS Dickinson County Conservation District office and the Wild Rivers Invasive Species Coalition, to combat the purple loosestrife infestation on the Michigamme River.

In 2009, surveys commenced along that stretch of the Michigamme River from the north end of the Way Dam project area up to the first road crossing at M-95 near the Dickinson and Marquette County line. Surveys have continued in this river stretch through 2018, and two distinct surveys were conducted each year from 2013 through 2018.

Similar to the population explosion that occurred in Way Dam, a dramatic increase in the purple loosestrife population occurred between 2009 and 2012. Similar to the trends between 2011 and 2012 on Way Dam, the river stretch experienced a substantial decline in the documented population in 2013. Then a spike in the population on the river stretch occurred again in 2014. Survey results between 2015 and 2017 showed declines in the number of stands, plants, and stems observed from the 2014 peak. Slight increases in these population values were observed in 2018, but the values remain well below the 2014 recorded data.

Comparing the July 2014 results to 2013 data as a more direct comparison to the initial survey beginning in 2009, the number of stands, total plants, and stems observed increased substantially over the July 2013 observations. When comparing July 2015 through 2018 to July 2014, a substantial decrease was observed in each of the population categories. Similar to the total values observed, slight increases were observed between 2017 and 2018.

To further improve the management effectiveness, the second survey conducted in each of the past five years has resulted in a significantly more thorough removal of purple loosestrife from the river stretch surveyed below M-95. The August 2018 survey resulted in the removal of an additional 49% of all the stands, 50% of all the plants, and 52% of all the stems detected in 2018 that would not have been removed from the system with the second survey.

Additionally, purple loosestrife has been found at 1292 total locations in the past 10 years. Of these, 171 (approximately 13%) stands documented between 2009 and 2017 were locations where the purple loosestrife returned in 2018.

The effort to expand our understanding of source populations upstream of the Way Dam project area expanded in 2010 by further collaboration with Ms. Ann Hruska. Ms. Hruska was awarded a Wilderness Shores Mitigation Enhancement Fund grant for conducting purple loosestrife management along the Michigamme River upstream of the Way Dam project area. In preparation for implementing this grant, Ms. Hruska conducted road surveys in August 2010 along access points from the M-95 crossing up to and north of Republic. Ms. Hruska found numerous dense monotypic stands of purple loosestrife along the shores of the Michigamme River in and around the Republic, MI area. Some of these stands were several acres in size. Many other small stands were observed along the Michigamme River banks at road vantage points from the M-95 crossing at the Marquette and Dickinson County line upstream to Republic. It was quite evident the source population(s) for the loosestrife occurring in the Way Dam project area is from the area in and around Republic, MI.

In 2011 and 2012, Ms. Hruska continued the purple loosestrife management efforts upstream of Way Dam by conducting a more detailed survey in the Republic area and on portions of the Michigamme River up and downstream of Republic. She also began implementing a biological control management program for purple loosestrife targeting the most problematic stands documented in the presence/absence surveys she conducted. Further monitoring and biological control measures continued to be implemented in 2013. Results indicated the prior releases of beetles had been effective in reducing the extent and productivity of the source populations upstream of Way Dam. Unfortunately, there was very minimal evidence the released beetles survived the winter of 2013-14. Evidence the beetle populations recovered from the cold winter was observed in 2015. Additional beetles were reared and released with the long-term goal to establish a viable population of beetles that will be able to manage the purple loosestrife population as a self-sustaining biological control agent for the Michigamme River system.

The management activities that have occurred both within the Way Dam project area and the approximate 5-mile stretch of the Michigamme River upstream have had a direct and positive impact on keeping the purple loosestrife infestation within Way Dam in check. We Energies plans to continue to survey and remove purple loosestrife from this stretch between Highway 95 and Newberg Road in 2019. We Energies intends to continue collaborating with the NRCS Dickinson County Conservation District office, the Wild Rivers Invasive Species Coalition, and others in further investigating source populations and management for purple loosestrife upstream of the Way Dam project area.

We Energies Hydroelectric Operations
Way Dam Purple Loosestrife Monitoring Summary (2006-2018)

July Survey Only

	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
# of Observed Stands	4	6	30	28	68	53	65	39	39	55	69	50	61
# of Plants Observed	4	9	57	94	558	176	1239	240	275	159	297	130	112
# of Stems Observed	51	128	160	271	1732	397	1863	497	521	338	524	258	225
Stems Observed per Plant	12.75	14.22	2.81	2.88	3.1	2.26	1.50	2.07	1.89	2.13	1.76	1.98	2.01
Multi-year Plants Observations	2	4	9	31	314	110	429	190	254	132	230	101	93

Total (July & August Surveys Combined)

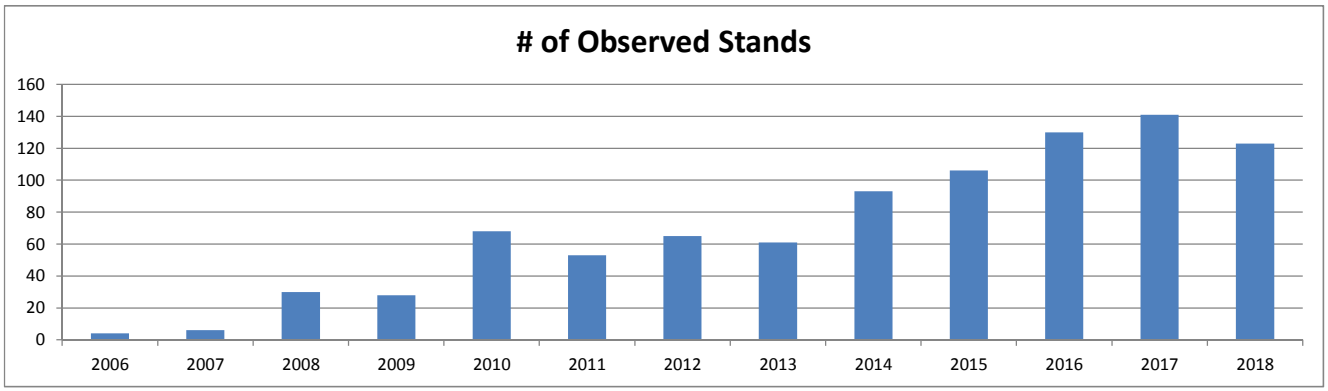
	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
# of Observed Stands	4	6	30	28	68	53	65	61	93	106	130	141	123
# of Plants Observed	4	9	57	94	558	176	1239	290	720	347	890	339	224
# of Stems Observed	51	128	160	271	1732	397	1863	680	1247	686	1714	588	463
Stems Observed per Plant	12.75	14.22	2.81	2.88	3.1	2.26	1.50	2.34	1.73	1.98	1.93	1.73	2.07
Multi-year Plants Observations	2	4	9	31	314	110	429	233	565	269	756	285	184

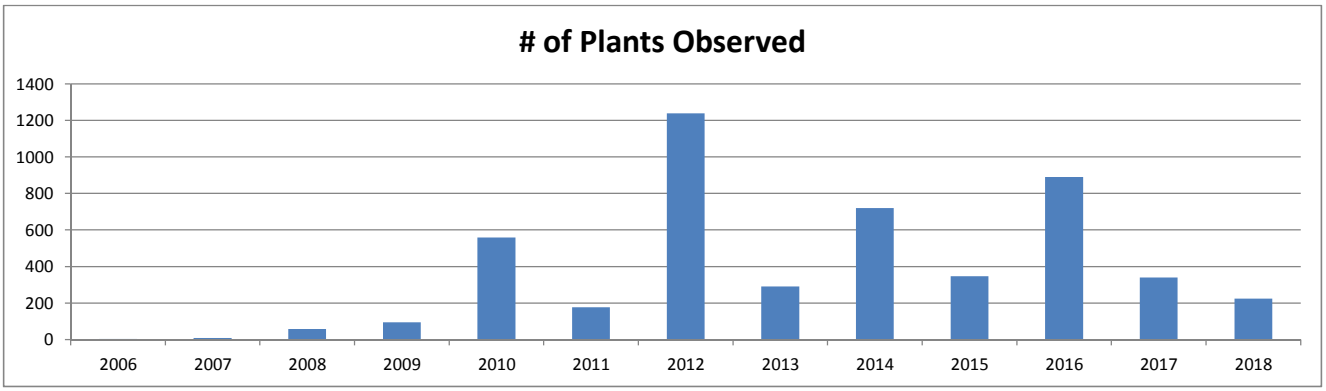
July Survey with Largest Stands Removed

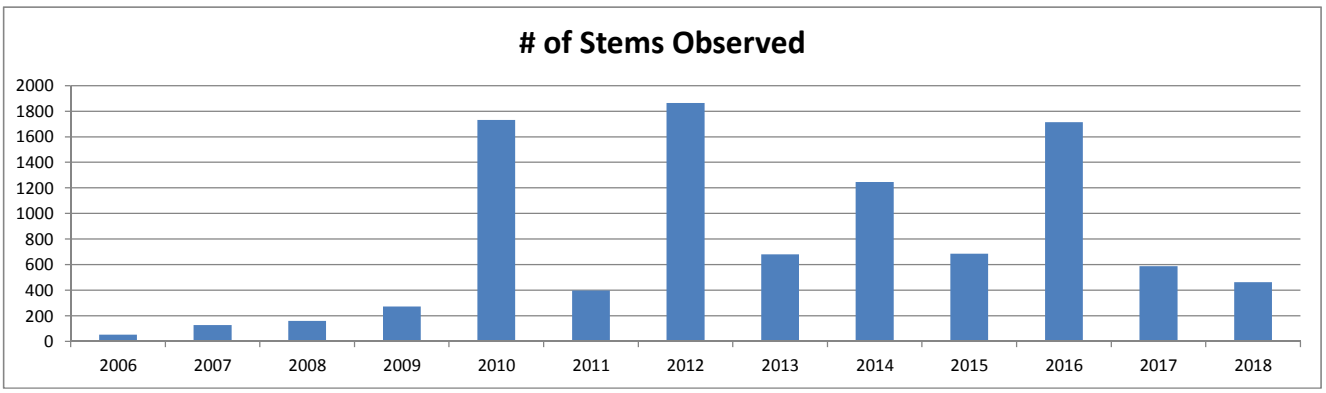
	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
# of Observed Stands	4	6	30	28	68	53	61	62	36	52	57	47	60
# of Plants Observed	4	9	57	94	558	176	111	93	86	113	132	71	91
# of Stems Observed	51	128	160	271	1732	397	358	248	247	277	259	185	202
Stems Observed per Plant	12.75	14.22	2.81	2.88	3.10	2.26	1.50	2.67	2.87	2.45	1.96	2.61	2.22
Multi-year Plants Observations	2	4	9	31	314	110	170	88	81	97	107	65	87

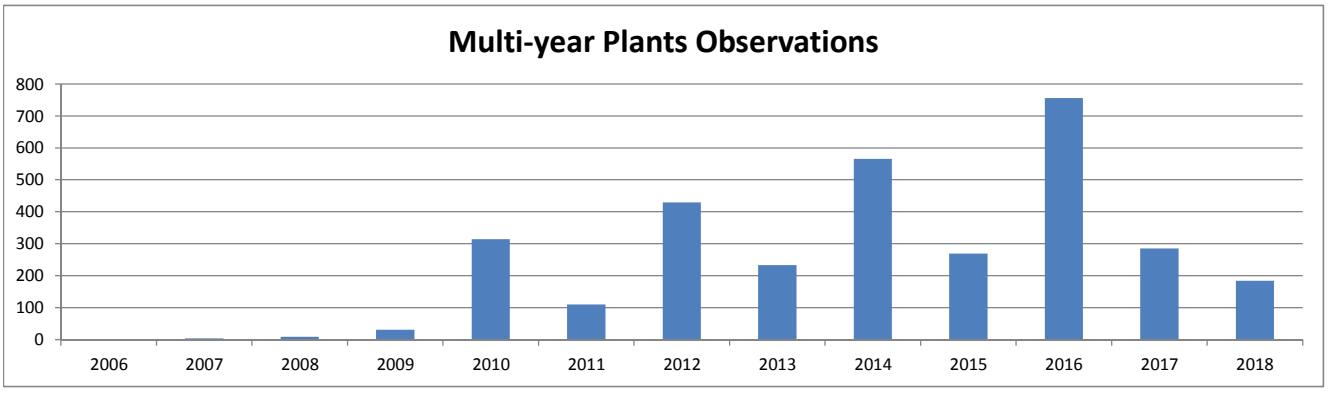
We Energies - Purple Loosestrife Monitoring 2006-2018 on Way Dam Reservoir

Total Observations



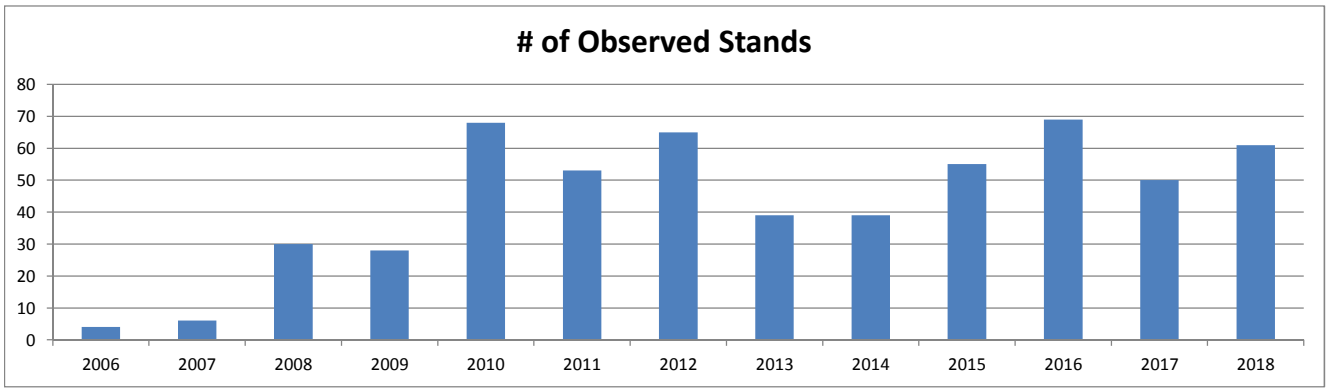


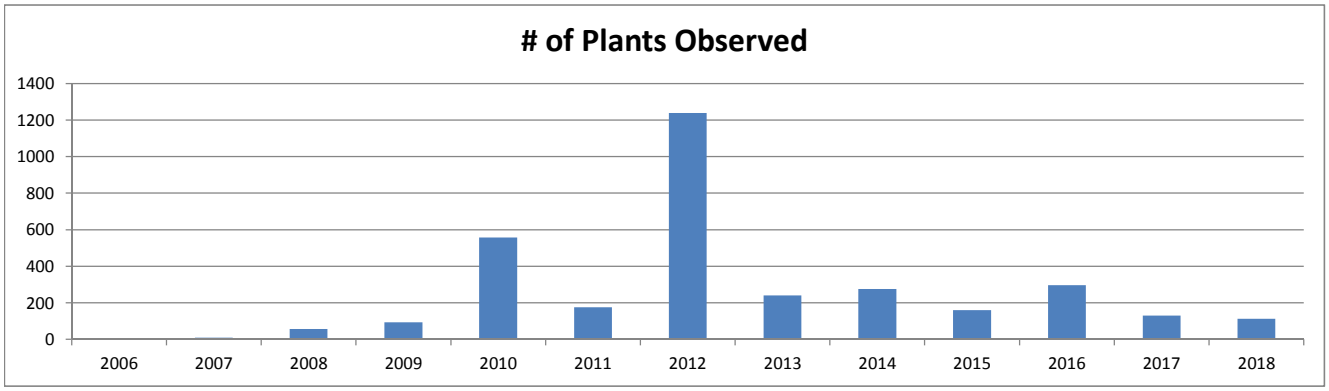


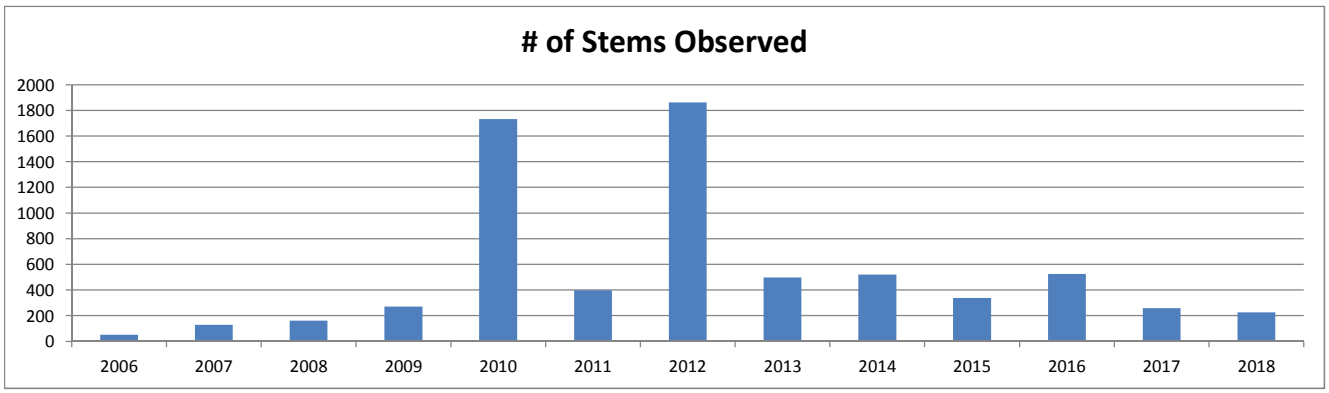


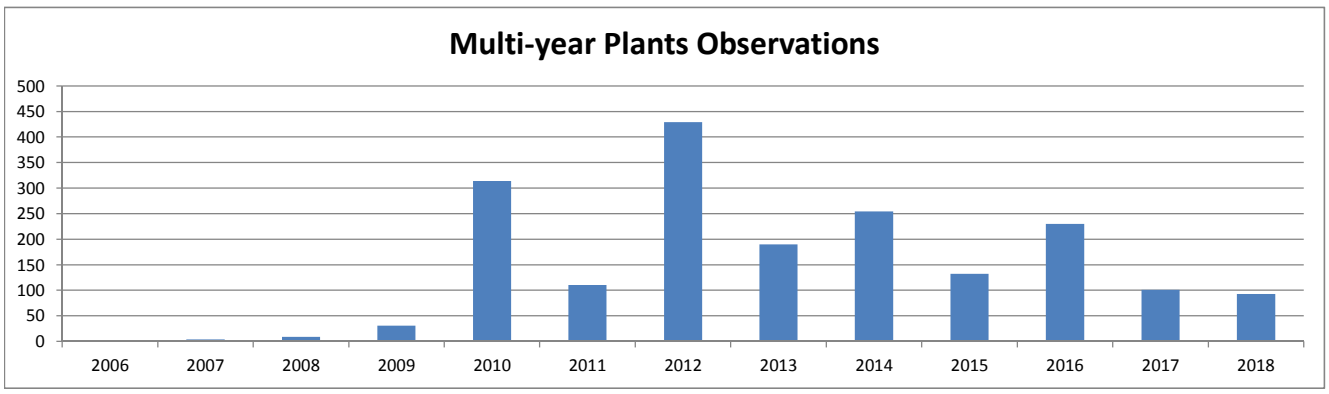
We Energies - Purple Loosestrife Monitoring 2006-2018 on Way Dam Reservoir

July Survey Only



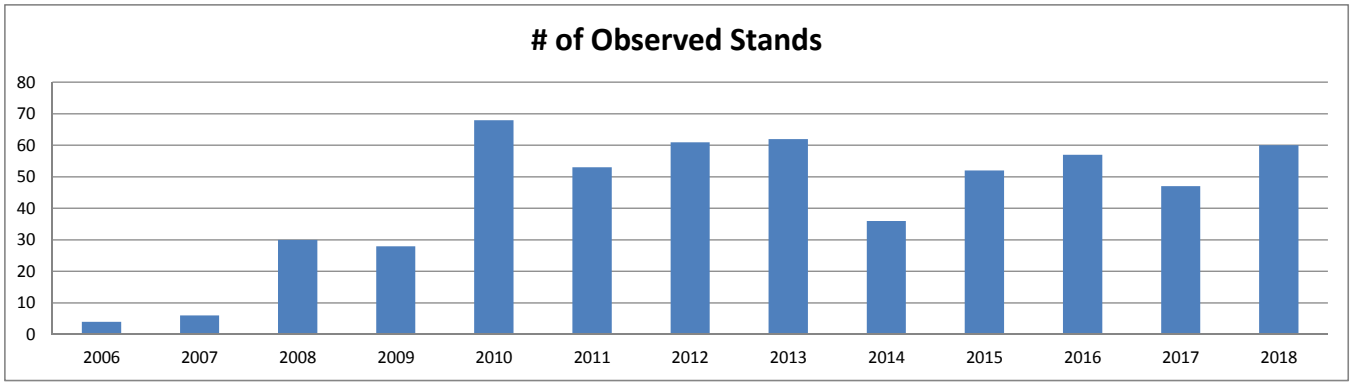


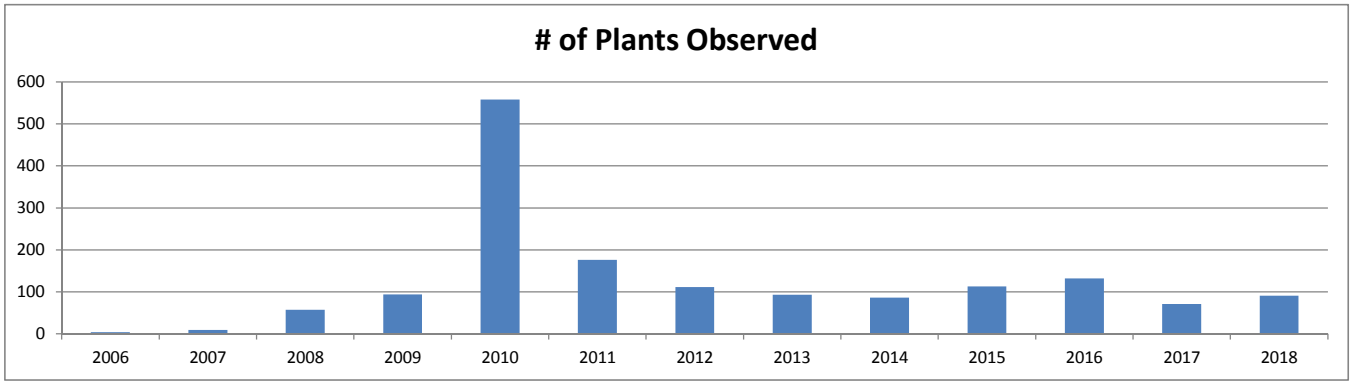


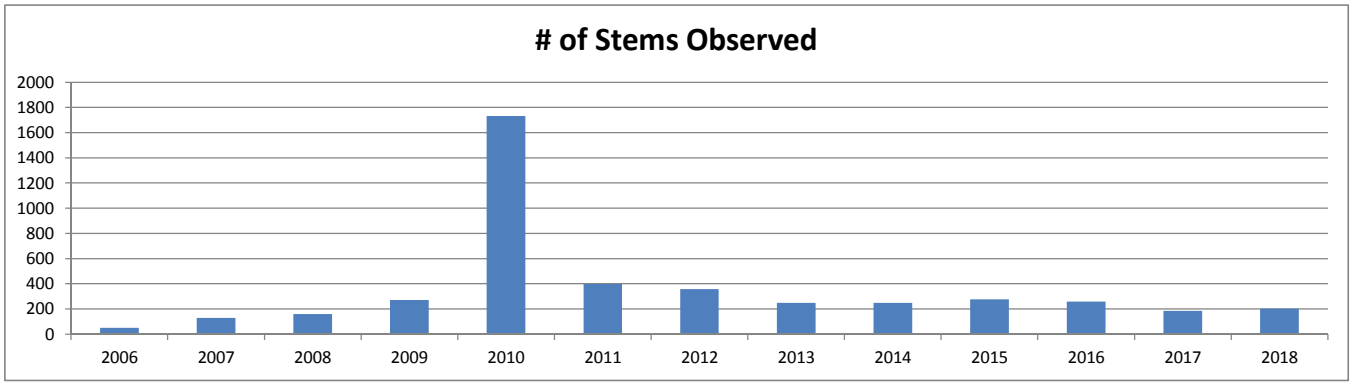


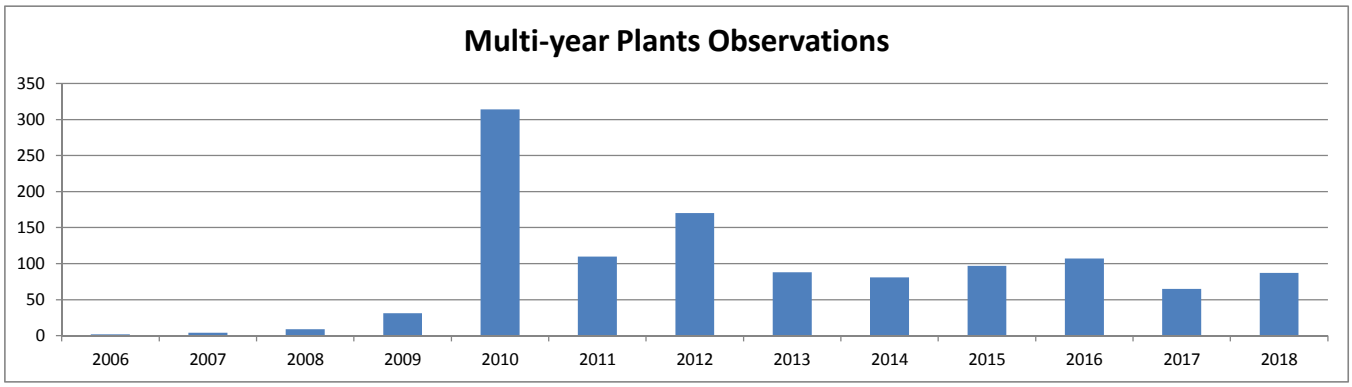
We Energies - Purple Loosestrife Monitoring 2006-2018 on Way Dam Reservoir

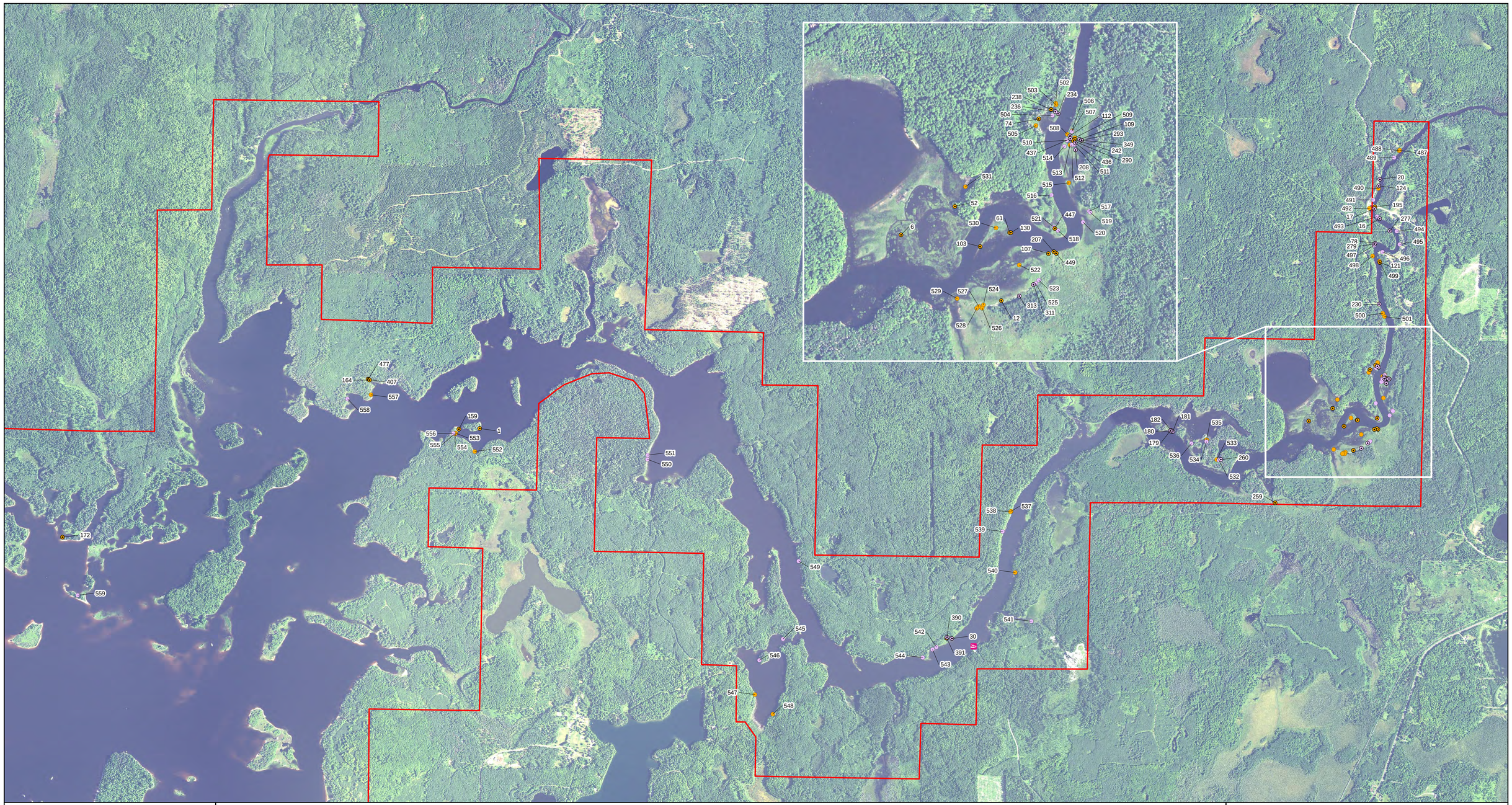
July survey only minus largest 2012-2018 stands

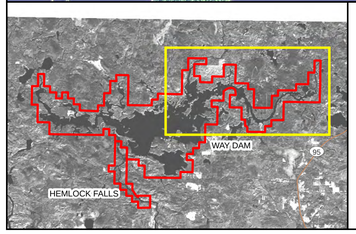












- Purple Loosestrife: Reoccurring Sites July 2018*
- Purple Loosestrife: Reoccurring Sites August 2018*
- Purple Loosestrife: New Sites July 2018
- Purple Loosestrife: New Sites August 2018
- Public Boat Launch
- FERC Hydro Project Boundary

* Reoccurring sites are those that have been mapped in previous years

Feet
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Way Dam Hydro Project - Year 2018
Purple Loosestrife Survey

Source: USDA -NAIP Imagery, 2016
GPS field data collected 7/23/2018,7/24/2018,7/25/2018,7/26/2018'
8/13/2018, 8/14/2018, 8/15/2018

c42590 9/19/2018 J:\DATA\FOE\Env_Strategy\GIS Projects\Hydro_lands\Maps\2018_Reportway dam 2018 PL monitoring.mxd

We Energies Hydroelectric Operations
Michigamme River Purple Loosestrife Monitoring (2009-2018)

July Survey Only

	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
# of Observed Stands	56	140	149	217	99	221	168	157	125	142
# of Plants Observed	113	362	592	915	361	535	292	352	260	275
# of Stems Observed	361	1234	1149	1732	585	873	487	584	413	491
Stems Observed per Plant	3.19	3.41	1.94	1.89	1.62	1.63	1.67	1.66	1.59	1.79
Multi-year Plants Observations	79	317	282	525	280	451	230	278	179	217

Total (July & August Surveys Combined)

	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
# of Observed Stands	56	140	149	217	192	384	328	354	248	278
# of Plants Observed	113	362	592	915	686	994	755	859	483	552
# of Stems Observed	361	1234	1149	1732	1132	1750	1473	1470	772	1023
Stems Observed per Plant	3.19	3.41	1.94	1.89	1.65	1.76	1.95	1.71	1.60	1.85
Multi-year Plants Observations	79	317	282	525	524	832	636	653	364	435

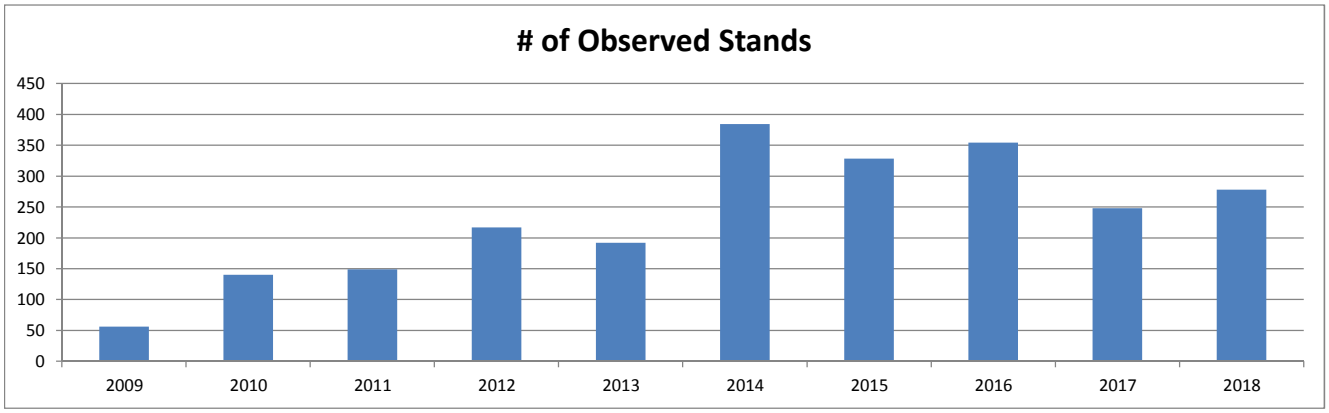
July Survey with Largest Stands Removed

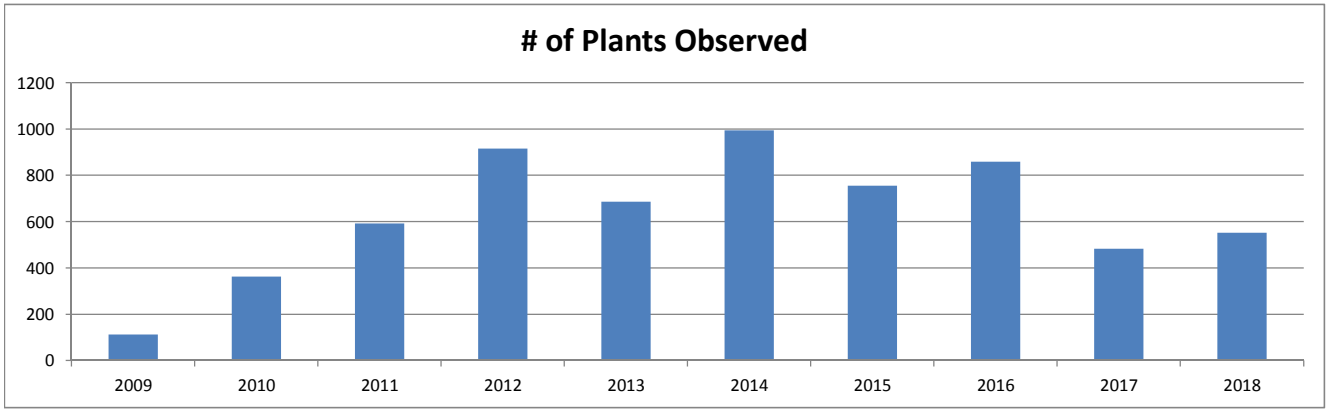
	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
# of Observed Stands	56	140	149	217	96	219	168	156	247	275
# of Plants Observed	113	362	592	915	242	498	292	324	471	516
# of Stems Observed	361	1234	1149	1732	399	817	487	529	755	975
Stems Observed per Plant	3.19	3.41	1.94	1.89	1.65	1.64	1.67	1.63	1.60	1.89
Multi-year Plants Observations	79	317	282	525	192	417	230	255	356	424

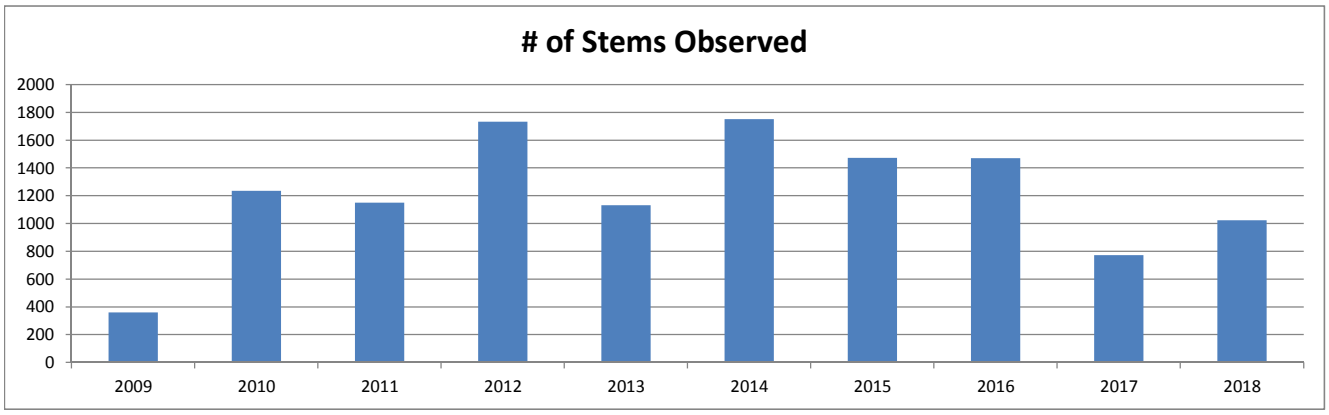
* No large stands observed during the July 2015 surveys.

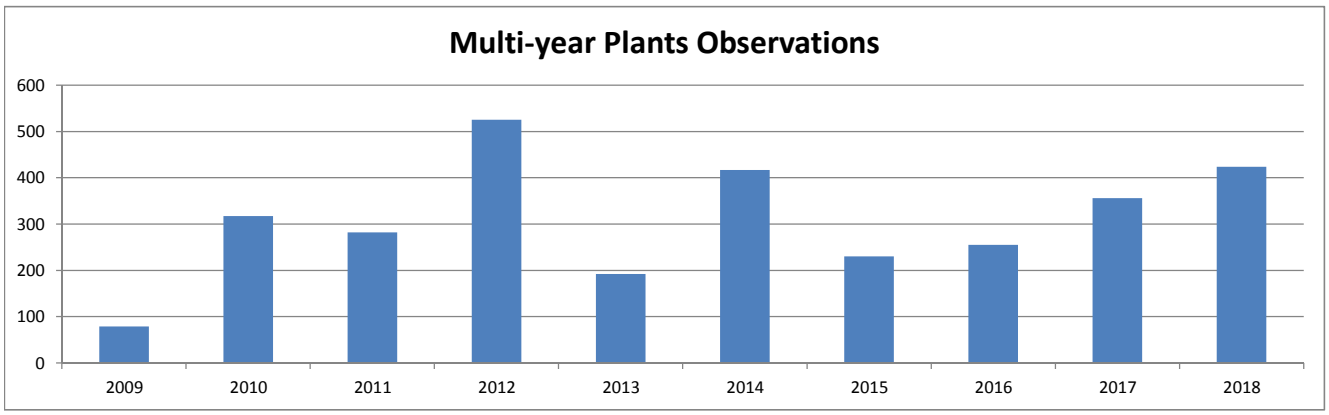
We Energies - Purple Loosestrife Monitoring 2009-2018 on Michigamme River

Total Observations



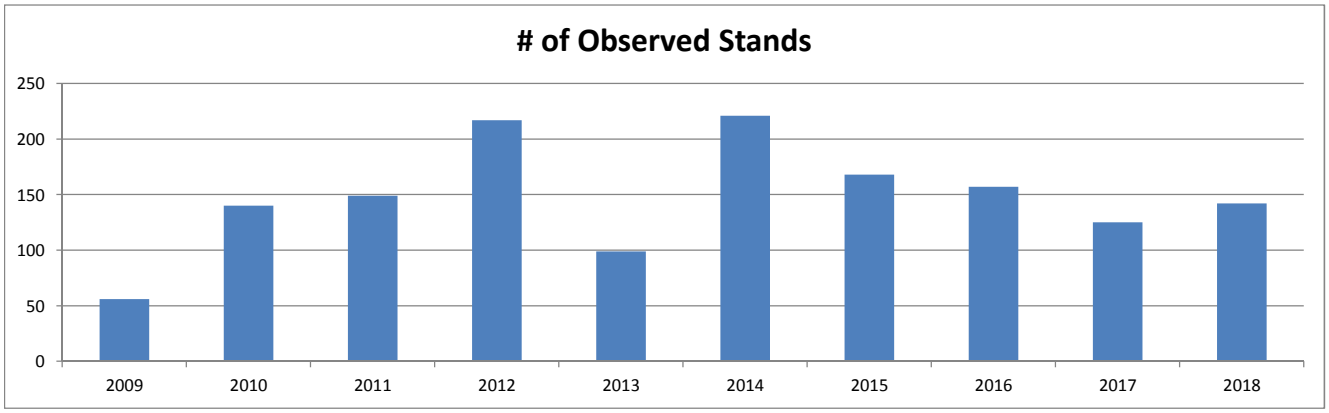


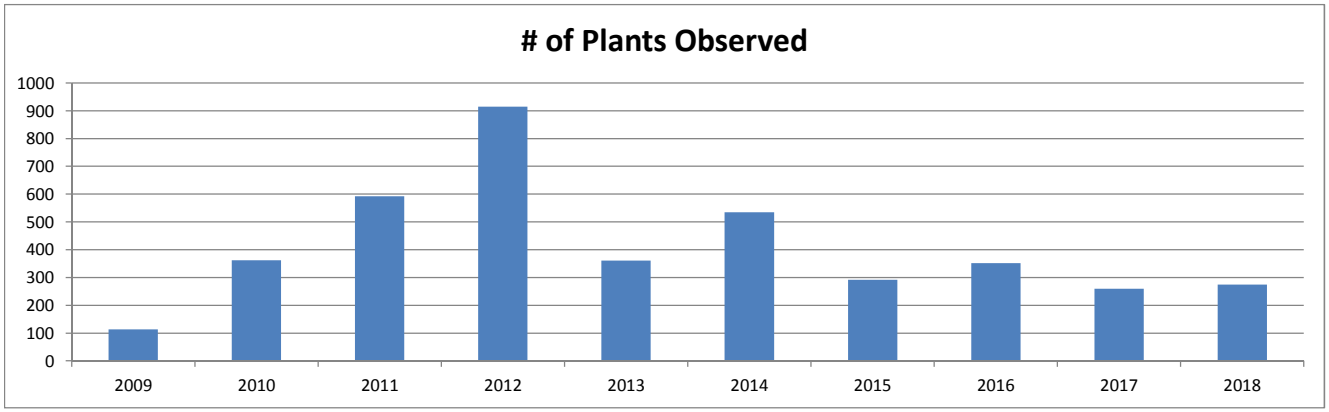


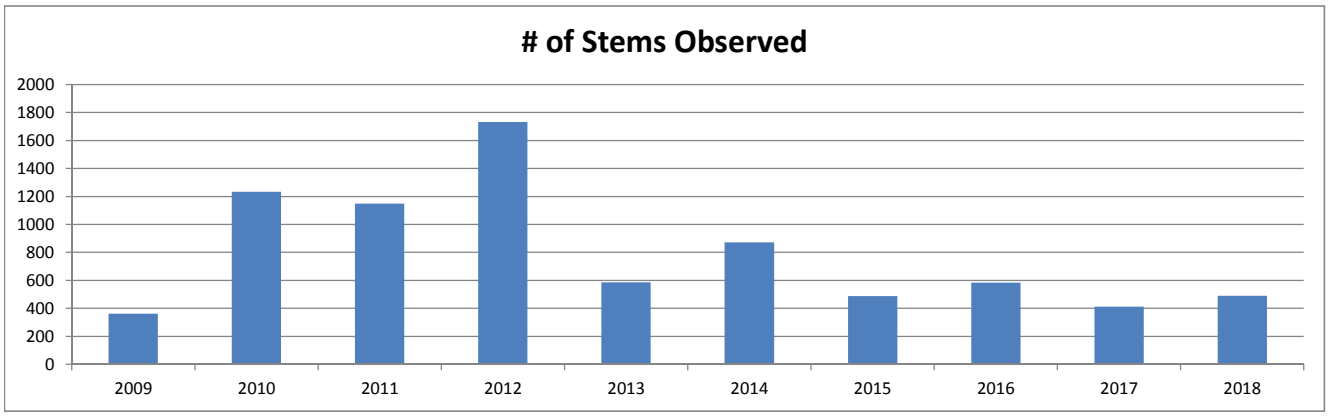


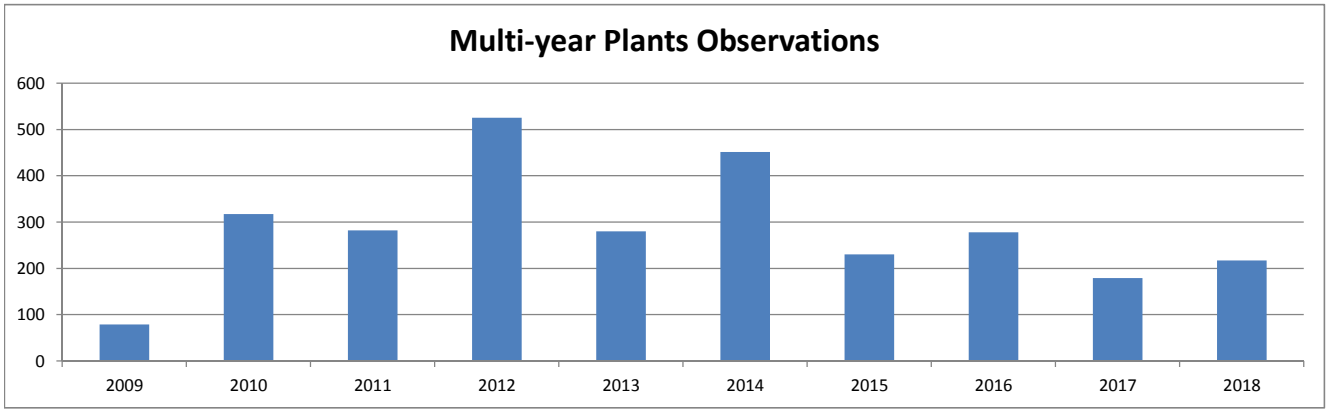
We Energies - Purple Loosestrife Monitoring 2009-2018 on Michigamme River

July Survey Only









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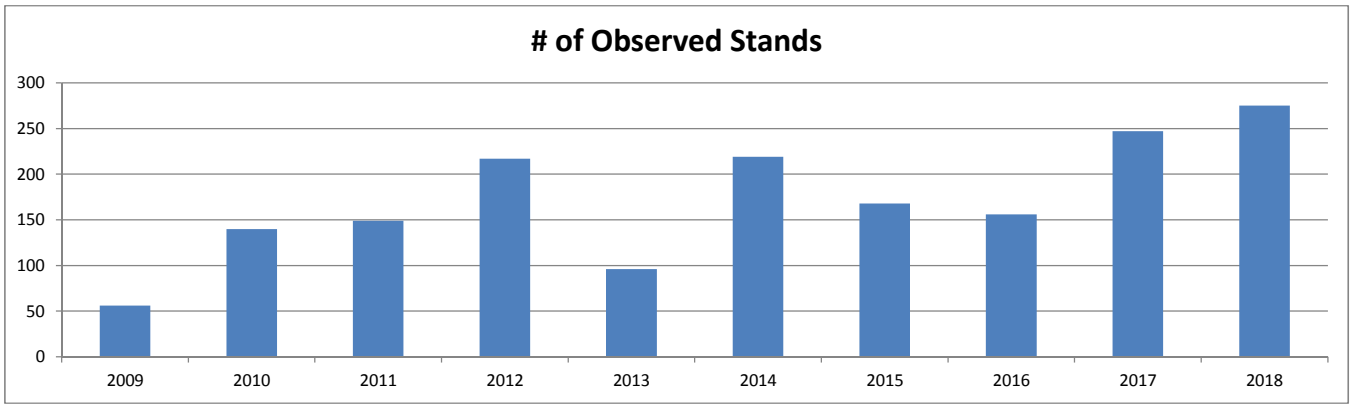
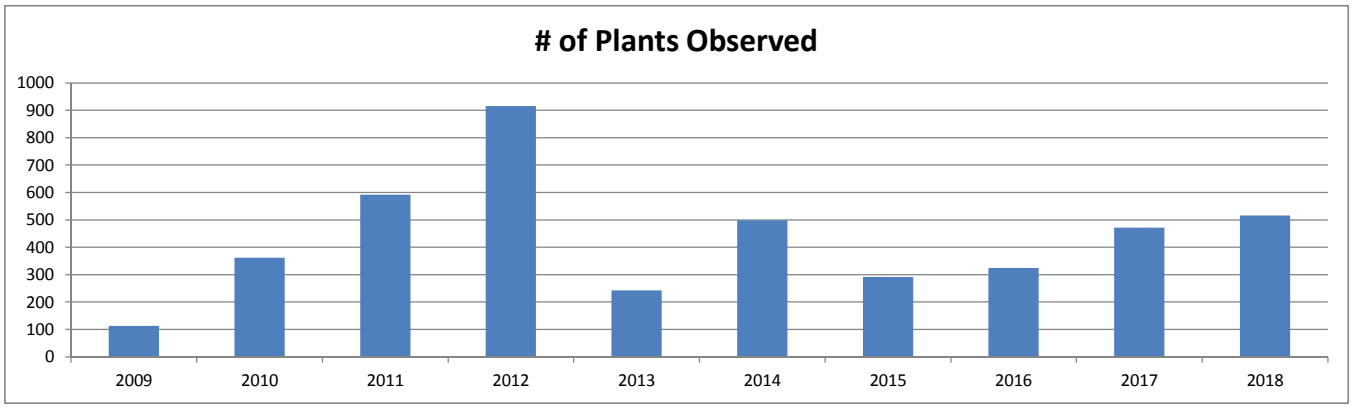
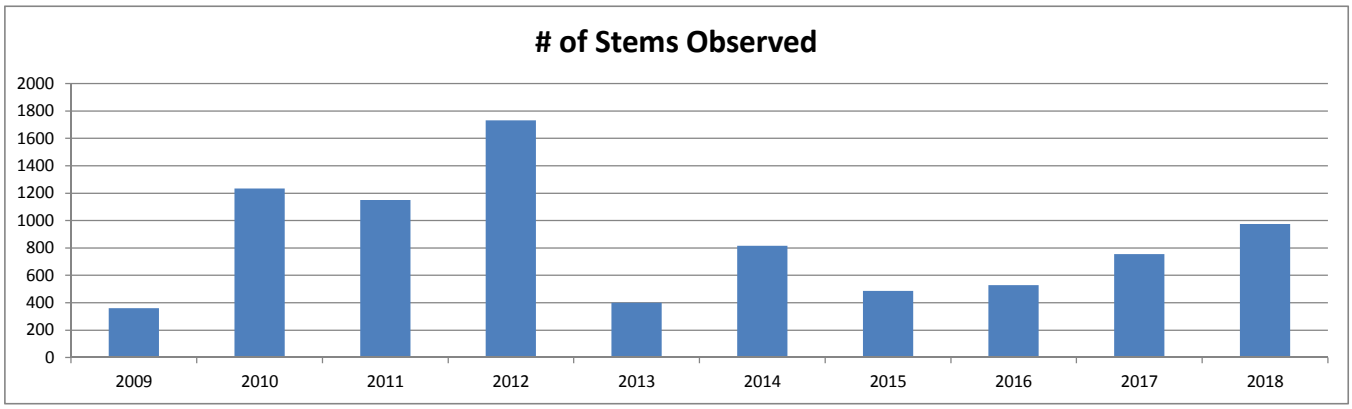
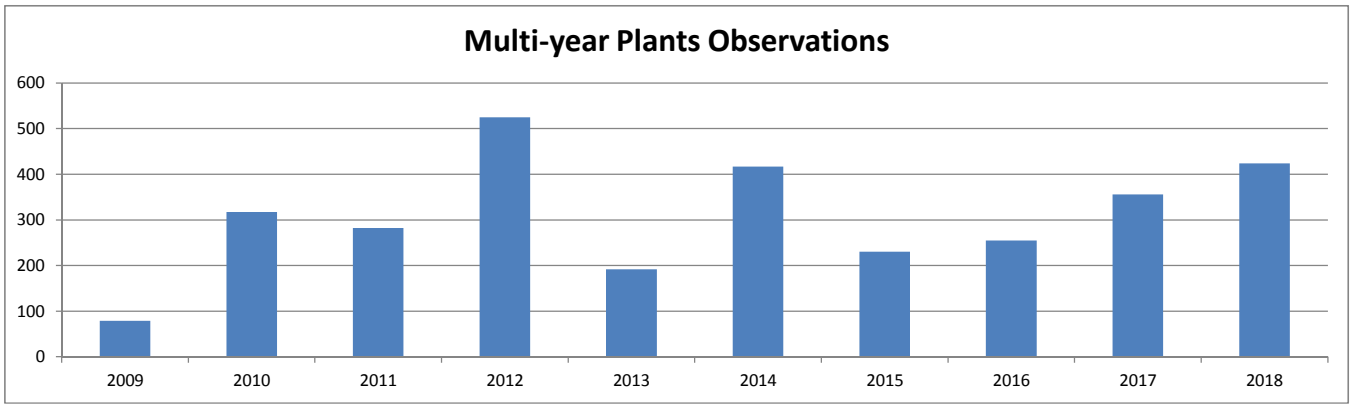
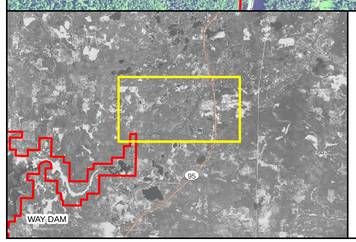
July survey only minus largest 2013-2018 stands











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Michigamme River - Year 2018
Purple Loosestrife Survey

Source: USDA -NAIP Imagery, 2016
GPS field data collected 7/23/2018 & 8/13/2018