

Biological Control for Purple Loosestrife (*Lythrum salicaria*)

Final Report
Nov. 19, 2013

Wood-Pawcatuck Watershed Association (WPWA) conducted a three year project to control Purple Loosestrife (*Lythrum salicaria*) on the Pawcatuck River in conjunction with the University of Rhode Island's Plant Science Department, Biological Control. This biological control project was done as part of larger project to remove the dam at Lower Shannock Falls and was funded by the USDA Natural Resource Conservation Service. *Galerucella* spp. beetles were supplied by the URI Plant Science Department. To establish and monitor the site WPWA used the protocols developed by the USDA Forest Health Technology Enterprise Team in a 2004 paper "Biology and Biological Control of Purple Loosestrife" (L. Wilson, et. al), including the field worksheets.

The project entailed establishing 5 quadrants in wetlands along the Shannock portion of the River near or at the confluence with Beaver River in June of 2011 (see attached map) using Form 1. After surveying for insects (Form 2) and cataloguing the existing flora at each quadrant 2,300 *Galerucella* spp. beetles were released in July of that year. Follow-up vegetation monitoring (Form 3) was conducted in October. Boneset (*Eupatorium perfoliatum*) was used in place of cattail (*Typha latifolia*) as a comparison native species. Quadrant 6 was added in the fall 2011 monitoring because the *L. salicaria* plant contained in it was large and vigorous, but located adjacent to Q5. It was reasonable to assume that *Galerucella* beetles would utilize that plant as well. Q6 was only examined for insects and insect damage, photographed and measured for overall height. The number of stems in Q6 was estimated.

The original plan called for releasing beetles only the first year of the project. However, in 2012 and 2013 the URI Plant Science Department had excess beetles and offered to let WPWA release them at their study site. In 2012 insect monitoring was done in June; 2,000 beetles were released in August; and vegetation monitoring was conducted in October. Due to weather, Q1 and 2 were not completely monitored. Some evidence of feeding damage was found in Q1 & 6. In 2013 insect monitoring was done in July with 2,866 beetles released at the same time. A final vegetation monitoring was conducted in September. At the initial visit in July of 2013 some evidence of feeding and a few *Galerucella* beetles were found at Quadrants 4, 5, & 6.

Results of data analysis for all three monitoring years from Form 3:

- Percent cover *L. salicaria*: Q3 shows a decrease but Q5 & 6 show an increase.
- Percent cover *E. perfoliatum*: increased in all quadrants.
- Number of stems: decreased in Q1, increased in Q2, 3, 4, & 5.
- Number of *E. perfoliatum* stems: increased in all quadrants except Q6.
- Number of *L. salicaria* inflorescences: decreased in all quadrants.
- Number of *E. perfoliatum* inflorescences: increased in all quadrants.
- Height of *L. salicaria* 5 tallest stems: general decreased in Q1 & 2; increased in Q3, 4, & 5.
- Number of inflorescences on *L. salicaria* 5 tallest stems: decrease in all quadrants.

- Number of buds in middle 5 cm of tallest *L. salicaria* stem: decrease in Q1 & 3; increase in Q 2, 4, & 5.

The results are mixed but the data shows a general decrease in most indicators for *L. salicaria* and a definite increase of indicators for *E. perfoliatum*. The decrease in vigor of *L. salicaria* plants may have been helped by the extra beetles donated URI Plant Sciences in 2012 and 2013. This decrease likely allowed *E. perfoliatum* to increase in the monitored quadrants.

The data indicates that there may be some benefit to use the *Galerucella* spp. for biological control of *L. salicaria* in a river system. However, it maybe that without a regular introduction of beetles to the area their populations may not be able to be sustained. If resources allow, WPWA will continue to monitor these quadrants over the next few years.

Submitted by:

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Attachments: Photos; map of quadrants; 2013 Forms 2 & 3; spread sheet with data from all years



Quadrant 1(Q1) on July 3, 2013



Q3 on July 3, 2013



Leaf condition in Q1, July 3, 2013



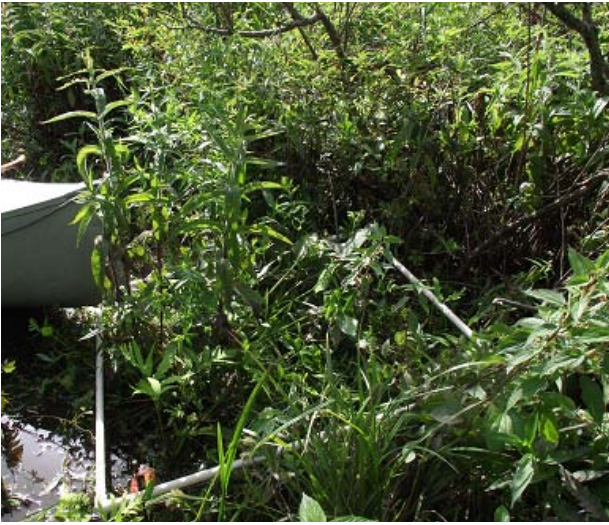
Q4 on July 3, 2013



Q2 on July 3, 2013



Q4 feeding evidence on July 3, 2013



Q5 on July 3, 2013



Q6, feeding evidence, July 3, 2013



Q5, feeding evidence and beetles, July 3, 2013



Q6, July 3, 2013 height of plant



Q1 on September 27, 2013



Q2 on September 27, 2013



Q3 on September 27, 2013



Q5 & Q6 on September 27, 2013



Q4 on September 27, 2013



Q5 on September 27, 2013



Beaver River

Pawcatuck

Pawcatuck

Pawcatuck

Q1

Q2

Q3

Q4

Q5

Form 3: Purple Loosestrife Biocontrol Monitoring - Vegetation Monitoring
 Site: Pawcatuck River at Shannock at the confluence with the Beaver River

Year		2011	2012	2013	2011	2012	2013	2011	2012	2013	2011	2012	2013	2011	2012	2013	2011	2012	2013
Quadrant		1	1	1	2	2	2	3	3	3	4	4	4	5	5	5	6	6	6
% Cover	PL	C	C	C	C		C	C	B	B	C	A	B	C	C	D	D		E
% Cover	BS	A	A	B	A		B	A	D	C	A	E	C	A	D	C	A		A
# Stems	PL	11	3	7	5		7	4	3	5	3	2	4	3	3	14	51		65
# Stems	BS	0	0	3	0		3	1	3	6	3	18	9	2	7	5	0		0
# Inflorescences	PL	87	10	45	93		43	68	15	19	52	15	23	57	17	34			
# Inflorescences	BS	0	0	3	0		13	0	15	24	1	15	12	1	17	14			
Height (cm)	PL 1	168		137	157		171	140	105	192	221	130	151	165	106	148	183		204
of 5 tallest PL	PL 2	127		116	124		91	124	132	116	178	127	168	137	104	134			
	PL 3	132		111	140		94	112	127	94	160	0	172	127	102	131			
	PL 4	132		90	135		91	127	0	116	0	0	104	0	0	122			
	PL 5	137		45	183		88	0	0	99	0	0	0	0	0	82			
# Inflorescences	PL 1	9		10	15		35	15	6	1	25	6	4	21	6	11	120		
	PL 2	23		15	6		0	23	9	9	10	9	12	27	15	6			
	PL 3	13		19	11		3	3	0	3	17	0	6	9	6	3			
	PL 4	8		3	5		4	27	0	5	0	0	1	0	0	14			
	PL 5	14		0	54		1	0	0	1	0	0	0	0	0	0			
Length (cm)	PL 1	51		44	33		43	30	34	89	76	35	38	41	23	24	51		
of terminal	PL 2	36		23	28		0	20	32	25	25	33	46	20	30	29			
inflorescence	PL 3	20		15	33		12	36	0	9	20	0	50	41	31	30			
	PL 4	15		14	20		12	30	0	20	0	0	30	0	0	18			
	PL 5	10		0	28		15	0	0	15	0	0	0	0	0	0			
# Buds	PL 1	18		11	6		13	13	7	0	13	7	16	16	7	20	22		
in middle 5 cm	PL 2	16		11	8		0	58	8	23	17	2	21	14	10	11			
	PL 3	26		9	8		0	13	0	0	19	0	13	7	13	5			
	PL 4	18		4	11		1	28	0	11	0	0	0	0	0	18			
	PL 5	25		0	19		0	0	0	17	0	0	0	0	0	0			
Height cm	BS 1								132			146			141				
	BS 2								105			263			135				
	BS 3								128			146			135				
	BS 4											155			103				
	BS 5											142			103				

Form 2: Purple Loosestrife Biocontrol Monitoring – Insect Monitoring

SITE: Shannock
 DATE: 13 / 7 / 3
year month day

STATE: RI
 GPS: N °
 W °

INVESTIGATORS:
Last name First name
Poyer Denise
Sullivan Liam

TIME: 8:45

TEMPERATURE: 76
 WEATHER: partly cloudy

Chart A
Insect Abundance (#/stem)

I	1-10
II	11-25
III	26-100
IV	101-500
V	>500

Chart B:
Damage or Percent Cover Class

A	<1%
B	1-5%
C	6-25%
D	26-50%
E	51-75%
F	76-95%
G	>95%

1 = present
 2 = abundant
 3 = very abundant

A = Adults Hyl = Hylobius
 L = Larvae Nano = Nanophyes
 E = Eggs

Quad #	Galerucella			Hyl	Nano	Purple Loosestrife			Cattail		Other Insects seen:
	A	L	E	A	A	%damage	%cover	#stems	%cover	#stems	
1	-	-	-			A	C	7			
2	-	-	-			A	C	14			
3	-	-	-			C	C	5			
4	-	-	-			A	B	5			
5	1	-	-			A	B	3			
6	12	-	-			D	F	50			
7											
8											
9											
10											

Notes: Released 2886 Galerucella sp. beetles - 500 to 600 @ each site
 #1 - New waypoint QD1 Two
 #3 - Couldn't find rebar; New waypoint QD3 Two

