

2015  
**New Hampshire Department of Agriculture's  
 Statewide Invasive Species Control Project**

A cooperative effort involving NH Dept. of Agriculture, Markets & Food and  
 NH Dept. of Transportation

*Re: Watershed Special Permit #SP-145*

**Introduction**

The following report details the herbicide applications conducted by the NH Dept of Agriculture, Markets & Food (DAMF), Division of Plant Industry for the 2015 growing season. This work was done in accordance with the approved Watershed Special Permit (SP-145). Funding for the purchase of herbicide products, and project support provided by the NH Department of Transportation.

In total, approximately 21.5 acres of invasive species, primarily Japanese knotweed (*Fallopia japonica*), were treated during the 2015 growing season (see Table 4 for a breakdown of species and Table 5 for yearly comparison). Altogether, the 2015 treatment year included five state highways and four federal highway systems, one state maintained local road and several state and town owned properties (see Table 1).

**2015 Invasive plant treatment sites**

Location	Town Beginning	Town End	Length	Acres of treatment	Land Use
Route 1A	Hampton	Rye	13 Miles	1.7 Acres	ROW
Route 1B	Portsmouth	Rye	.1 Mile	.25 Acre	ROW
Route 3/25	Ashland	Meredith	11 Miles	1.5 Acres	ROW
Route 103	Warner	Bradford	7 Miles	1.5 Acres	ROW
Route 106	Concord	Meredith	31 Miles	1.5 Acre	ROW
Route 108	Stratham	Stratham	.5 Miles	0.5 Acres	ROW
Route 113	Holderness	Sandwich	11.5 Miles	1 Acre	ROW
Route 175	Holderness	Plymouth	4.75 Miles	.75 Acre	ROW
I-89	Bow	Concord	1 Mile	1.5 Acres	ROW
I-93	New Hampton	Plymouth	11.5 Miles	1.5 Acres	ROW
I-95	Hampton	Hampton	1 mile	.5 Acre	ROW
I-393	Concord	Pembroke	3.5 Miles	.75 Acre	ROW
Ashland DES Dam Site	Ashland	Ashland		.1 Acre	State
Contoocook River	Bennington	Bennington		.25 Acre	Town
Depot St	Boscawen	Boscawen		2.5 Acres	ROW
Meredith Neck Rd	Meredith	Meredith	6 Miles	2.5 Acres	State Maintained
Odiorne State Park	Rye	Rye		2.5 Acres	State
Scruton Pond Rd	Barrington	Barrington		1 Acre	DOT
Total			83 Miles	-21.5 Acres	

**Table 1**

Herbicide applications began on July 27, 2015 and ended on October 30, 2015. The herbicide mix used is listed in Table 2, below. Garlon 4 Ultra was not used during the 2015 treatment season because the focus was on Japanese knotweed and foliar treatments for several woody invasive plants. Roundup Pro Concentrate was diluted to 5% and mixed with Milestone diluted to 0.05%. The active ingredients for these herbicides includes glyphosate and aminopyralid, both of which are systemic and readily translocated throughout the target plant resulting in necrosis.

Trade Name of Pesticide	Amount of A.I. in Product	EPA Registration #	No. of Acres	% Solution	Total Amount of Product Used
Roundup Pro Concentrate	50.2% glyphosate	524-529	-21.5 Acres	5%	4.23 gallons/16.015L
Milestone	40.6% aminopyralid	62719-519	-21.5 Acres	0.05%	5.41 ounces/160.15ml

**Table 2**

### Recipe for 10 Liter Tank Mix for Foliar Spray Applications

Herbicide	% Solution	Volume
Roundup Pro Concentrate	5%	500 ml
Milestone	0.05%	5 ml
Non-Ionic Surfactant		25 ml

Table 3

### Label Restrictions

Roundup Pro Concentrate: Except as otherwise specified, the combined total of all treatments must not exceed 8.5 quarts of this product per acre per year. (8044ml/acre/year)

Milestone: The total amount of Milestone applied broadcast, as a re-treatment, and/or spot treatment cannot exceed 7 fl oz per acre per year. (207ml/acre/year)

The application method used was a Foliar Spray (FS) treatment. The total amount of diluted tank mix used was 84.6 gallons (320.3 liters). Table 3 lists the total number of woody invasive plants and acreage of knotweed treated since 2012.

### Table of invasive species treated and application method used

Common name	Scientific name	Plant type	Application method
Autumn olive	<i>Elaeagnus umbellata</i>	Woody	Foliar Spray
Black swallow-wort	<i>Cynanchum louiseae</i>	Herbaceous Vine	Foliar Spray
Burning bush	<i>Euonymus alatus</i>	Woody	Foliar Spray
Common buckthorn	<i>Rhamnus cathartica</i>	Woody	Foliar Spray
Glossy buckthorn	<i>Frangula alnus</i>	Woody	Foliar Spray
Honeysuckle	<i>Lonicera spp.</i>	Woody	Foliar Spray
Japanese barberry	<i>Berberis thunbergii</i>	Woody	Foliar Spray
Japanese knotweed	<i>Fallopia cuspidatum</i>	Herbaceous	Foliar Spray
Oriental bittersweet	<i>Celastrus orbiculatus</i>	Woody vine	Foliar Spray
Perennial pepperweed	<i>Lepidium latifolium</i>	Herbaceous	Foliar Spray

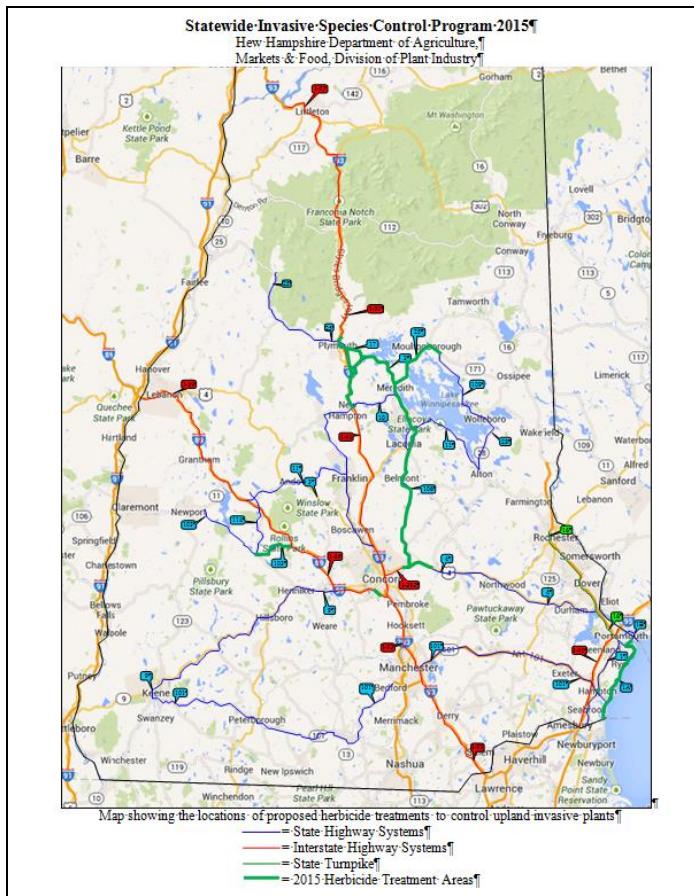
Table 4

Treatment Year	# of Stems	Acres of Knotweed
2012	2,690	23 Acres
2013	7,000	43 Acres
2014	6,589	25 Acres
2015	~1,000	21.5 Acres
Total	17,279	112.5 Acres

Table 5



In addition to herbicide control, smothering of knotweed was also done as part of the IPM effort. This site is in Boscawen and encompasses 1,200 sq ft. It utilizes a cushion layer of bark mulch over the cut stems followed by a layer of heavy thick wall black plastic and another 4 inch layer of bark mulch on top. This is a very effective alternative to herbicide.



The map above shows the roadways/highways that were permitted for the 2015 treatment period and the areas that received treatment are shown in bolded green.

Japanese knotweed – 21.5 acres (this is an approximation due to most sites having numerous individual populations of knotweed distributed throughout thus making it very difficult to calculate a precise total) were treated using Roundup Pro Concentrate (Glyphosate) at 5% solution mixed with a 0.05% solution of Milestone (aminopyralid) applied as a foliar spray. The applications were done using a backpack pump sprayer just after the knotweed went out of flowering. The treatments included unmanaged populations as well as follow-up applications to a few knotweed stands that didn't die off completely from the previous year's work. In these instances, success rates were estimated at approximately 85-95%. Of the stems that survived, some appeared normal while others were severely stunted and deformed from the previous years' treatment, see photo below.



The cluster shown in the photo above is Japanese knotweed after having been treated the previous year using Roundup Pro Concentrate (without Milestone). These reoccurrences were retreated in 2015, using a 5% solution of Roundup Pro Concentrate mixed with a 0.05% solution of Milestone.



This section of I-93 median just north of Ashland was treated in 2012 and 2013 to control a dense population of Japanese knotweed. This photo taken in August, 2014 shows that the treatments were approximately 99% successful and there are just a few small knotweed stems that emerged. Typically, knotweed at this time of year would be fully mature reaching >10 feet tall. A third application was done in September, 2015.

### Japanese knotweed at Scruton Pond Rd DOT Site in Barrington

The Scruton Pond Rd DOT site is a state owned property abutting the Isinglass River in Barrington. When treatments began at this site 2-years ago, the majority of the open portion of the site, approximately 2.75 acres, was overrun with knotweed. The property also contains isolated pockets of emergent/scrub/shrub wetlands as well as forested wildlife habitat around the perimeter, and the Isinglass River to the north, see circled area in photo below. The control of Japanese knotweed at this site began in 2013 and is anticipated to continue for a few more years. The reason for the length of time is due to the magnitude of the knotweed covering almost the entire site. With wetlands and the Isinglass River in close proximity to the treatment area extreme care has been and will be taken to ensure off-target impacts do not occur. Therefore, the application method entails a “whittling away” approach where a mere 10-foot swath of knotweed is treated per year, see photos on following pages.





Photo showing the 10-foot swath foliar treatment protocol used to ensure off-target impacts are avoided.



In the foreground is one of the persistent stands of knotweed treated in 2014 while the background shows a very large swath of knotweed that has been treated in 2015.



### Giant knotweed along Depot St in Boscawen

#### Northern Rail Trail Crossing



As mentioned in the 2014 Annual Report, there are very few numbers of Giant knotweed in NH and this is one of them. In all, there are / were three isolated populations occurring along Depot St in Boscawen and they were all treated using Roundup Pro Concentrate at a 5% solution mixed with 0.05% Milestone applied as a foliar spray. The photo above shows the population where the Northern Rail Trail crosses Depot St prior to treatment and the photo below shows the same area a year after treatment with all but one small stem eradicated. The vegetative clump in the middle of the former Giant knotweed stand in the photo below is a native scrub Oak and was unharmed by the treatment method.

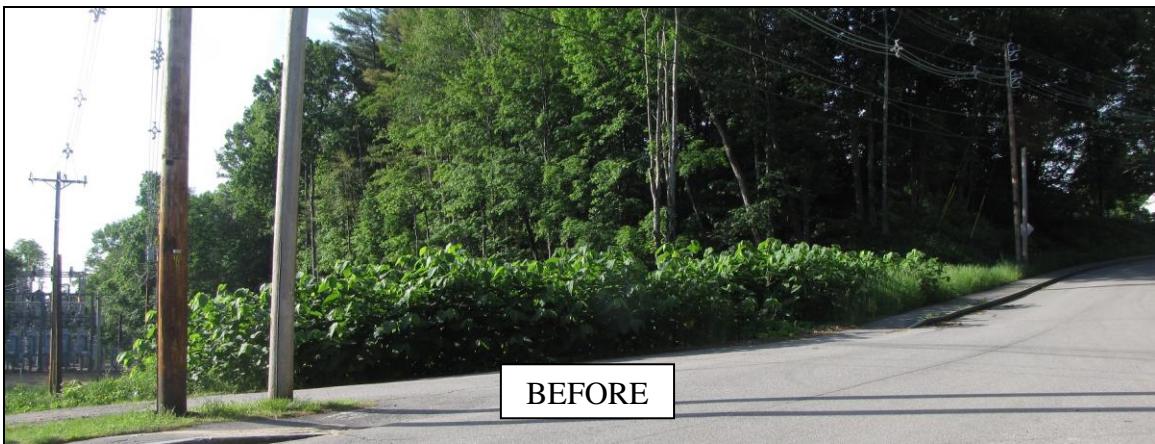


PHOTO ABOVE: This is one of the other stands of Giant knotweed occurring along Depot St in Boscawen that was treated in 2014. PHOTO BELOW: This picture was taken in the summer of 2015 and shows the same Giant knotweed stand about a year after treatment. Due to its large population size and the existence of desirable native vegetation, caution was employed while spraying the foliage to avoid off-target impacts. This is why about half of the population, shown in the left side of the photo, still exists. The remaining knotweed was treated as part of the 2015 initiative.



## Odiorne State Park, Rye

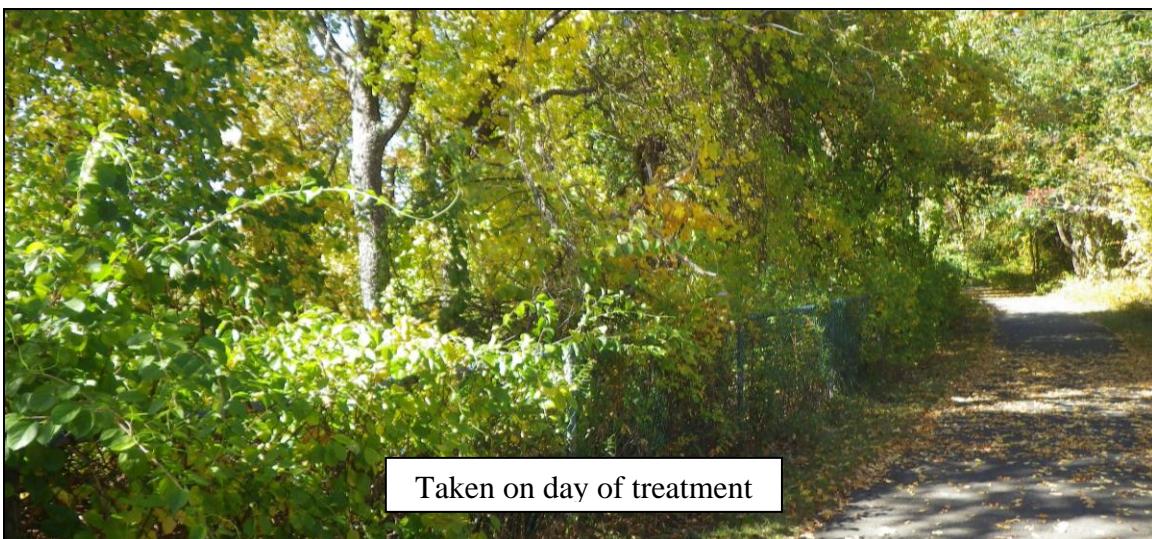


Treatment areas are highlighted in red



Taken on day of treatment

Location A - Oriental bittersweet, *Celastrus orbiculatus*, and Poison ivy, *Toxicodendron radicans*, climbing fence.



Taken on day of treatment

Location B - Oriental bittersweet, *Celastrus orbiculatus*, and Multiflora rose, *Rosa multiflora*, outcompeting native species



Location C – Photo showing heavy infestation of Black swallow-wort, *Cynanchum louiseae*

The photos on the previous page show the significance of the infestation of invasive species occurring along the paved pedestrian path fronting Route 1A. These photos also depict numerous other areas throughout Odiorne State Park, especially in areas with minimal tree canopy cover. The dominant invasives include Oriental bittersweet, Multiflora rose and Glossy buckthorn while Honeysuckle, Black swallow-wort and Autumn olive existed in few numbers. With the treatment having been done so late in the season, it was difficult to differentiate herbicide impacts with those of natural winter dormancy so the evaluation of success will take place in 2016.

With the approval of the NH Department of Resources & Economic Development (DRED), the management of invasive species will continue and move further into the park. The Rockingham County Conservation District (RCCD) is also engaged in invasive species management and habitat restoration in other areas of Odiorne. Coordination is paramount to ensure that the DAMF and RCCD efforts are commensurate and do not overlap. However, on numerous occasions, DAMF and RCCD work together to rid the park of unwanted invasives.

Conclusion – In all, 21.5 acres of land, primarily roadway rights-of-Way, has been treated for invasive species, with Japanese knotweed infestations being the primary target. Other treatment areas, such as Odiorne State Park targeted numerous invasives that included Oriental bittersweet, Multiflora rose, Glossy buckthorn, honeysuckle, Black swallow-wort, Autumn olive and Poison ivy. The Antrim Road / Contoocook River site in Bennington targeted the second population of Japanese honeysuckle known to occur in NH. The application method used for all of these sites was a low volume foliar spray. The herbicide solution was a mixture of 5% Roundup Pro Concentrate (a.i. glyphosate) mixed with .05% Milestone (a.i. aminopyralid). The total volume of Roundup Pro Concentrate used was 4.23 gallons (16.015 liters), and 5.41 ounces (160.15 milliliters) of Milestone. And, a non-ionic surfactant, which included a spreader / sticker agent, was added at a .25% rate. The total volume of each herbicide used was well below the allowable maximum application rates per acre per year:

Roundup Pro Concentrate: Except as otherwise specified, the combine total of all treatments must not exceed 8.5 quarts of this product per acre per year. (8044ml/acre/year)

Milestone: The total amount of Milestone applied broadcast, as a re-treatment, and/or spot treatment cannot exceed 7 fl oz per acre per year. (207ml/acre/year)

This project is continuing to make great strides in controlling invasive plants throughout the state especially with regards to diminishing populations of Japanese knotweed. In addition, a significant portion of the work accomplished in 2015 focused on monitoring previous treatment sites to evaluate percent regeneration from previous treatments. It appeared that areas treated just using Roundup Pro Concentrate exhibited lower levels (one to ten stems) of isolated

regrowth whereas knotweed treated using the mixture of Roundup Pro Concentrate with Milestone exhibited much higher success rates and very limited regeneration. Overall, the estimated percent control of knotweed continues to remain in the 85-100% success range, with the higher rates linked to the inclusion of 0.05% Milestone.

Next year's (2016) efforts will be greatly enhanced by the added support of the NH Department of Transportation (DOT) with each of the six regionalized districts having two individuals per district being licensed and trained to manage invasives along highway ROW's. It's anticipated that the combined efforts of DAMF and DOT will greatly increase the statewide ability to manage invasive plants along state and federal highway corridor as well as on state owned lands. The majority of these efforts will focus on Japanese knotweed since it poses the greatest vegetative impact to roadway infrastructure, and causes significant impacts to the natural environment and our ecological resources.

Submitted by:

Douglas Cygan

Invasive Species Coordinator

New Hampshire Department of Agriculture,

Markets & Food

Pesticide Applicator's License # S-1606883N

(603) 271-3488

S:\Plant Industry\Doug Shared\Pesticide Use-Invasive Control\DOT\2015\Pesticide Usage Reports