

DRAFT

Lubber Run Park Invasive Plant Project Plan

Lubber Run Park

Lubber Run Park is a linear, municipal park with its main feature being Lubber Run, its namesake. The park is a steep valley with the tributary being in the center. On the perimeters of the park are highways and residential properties. As with most municipal parks, encroachment adds issues that the park staff has to deal with. For example, storm water runoff, automobile and food traffic, and private property can affect the flora that is represented in the park. Seed and plant material can be washed upon the banks of Lubber Run, seeds can be unexpectedly carried in the park or through the park on clothing or pet fur, or seeds and plant material can inadvertently be brought in to the park by neighbors through bird or wind. With the right amount of management and community involvement, Lubber Run Park can be a model of how to preserve our natural heritage.

Lubber Run Park is an example of a place where invasive exotic plants are threatening the ecology of the forest. However, it is also an example of a place where neighborhood initiative can help to stem the tide. Even before this project was initiated, residents of Arlington Forest have been working closely with Arlington's Invasive Plant Program staff and volunteers, and have made significant strides to reduce the invasive plant problem. Since 2002, staff have contributed 170 hours to invasive plant control work in Lubber Run park and volunteers have contributed 345 hours in the same period. Many areas of the park look much better than in 2002 when Arlington's Invasive Plant Program began and volunteer and staff invasive plant control in the park was first formally coordinated. However, progress was somewhat limited because Lubber Run is just one of over 30 work locations where Arlington's Invasive Plant Program and Remove Invasive Plant (RiP) volunteers work. In 2005, Arlington Forest residents decided to seek additional resources to help speed up invasive plant control efforts in Lubber Run Park. The hope is that this additional funding will allow Lubber Run to become the first large stream valley park in Arlington where invasive plants are controlled to a maintenance level and serve as an example and inspiration to other neighborhoods struggling to control invasive plants in their parks.



Map of Invasive Plant Infestations in Lubber Run Park – Late Winter 2006

Note – Annual herbaceous species including lesser celandine and Japanese stiltgrass are not visible during the winter months and therefore not shown on the above map. The majority of invasive plant control work done through Arlington’s Invasive Plant Program since 2002 has been done on the east side of the stream and this accounts for some of the marked differences in infestation levels on that side of the park.

The invasive plant management of Lubber Run has been divided according to plant types (trees, shrubs, vines, and herbaceous materials):

During the late winter 2006 site visit, IPC identified several invasive plant species, including all listed in the table below.

Common Name	Botanical Name	Invasiveness Ranking*
<u>Trees</u>		
Tree-of-heaven	<i>Ailanthus altissima</i>	High
Princess tree	<i>Paulownia tomentosa</i>	Moderate
<u>Shrubs</u>		
Japanese barberry	<i>Berberis thunbergii</i>	Moderate
Autumn olive	<i>Elaeagnus spp</i>	High
Burning bush	<i>Euonymus alata</i>	High
Rose-of-Sharon	<i>Hibiscus syriacus</i>	N/A
Chinese privet	<i>Ligustrum sinense</i>	High
Fragrant honeysuckle	<i>Lonicera fragrantissima</i>	Low
Bush honeysuckle	<i>Lonicera maackii</i>	Moderate
Multiflora rose	<i>Rosa multiflora</i>	High
Wineberry	<i>Rubus phoenicolasius</i>	High
<u>Vines</u>		
Porcelainberry	<i>Ampelopsis brevipedunculata</i>	High
Climbing euonymus	<i>Euonymus fortunei</i>	Moderate
English ivy	<i>Hedera helix</i>	Moderate*
Japanese honeysuckle	<i>Lonicera japonica</i>	High
Common periwinkle	<i>Vinca minor</i>	Low
Exotic wisteria	<i>Wisteria sinensis/floribunda</i>	Low?
<u>Herbaceous</u>		
Japanese stiltgrass	<i>Microstegium vimineum</i>	Medium?
Golden bamboo	<i>Phyllostachys aurea</i>	Moderate
Japanese knotweed	<i>Polygonum cuspidatum</i>	Low?
Lesser celandine	<i>Ranunculus ficaria</i>	High

Invasive Plants Found during Winter 2006 site visit to Lubber Run Park

*Findings by Virginia Dept. of Conservation and Recreation, Div. of Natural Heritage. These findings represent the invasiveness of plants throughout the state of Virginia and do not attempt to represent those plants of Arlington County. This ranking is only to be used as a reference, but invasiveness will be ranked according to individual site according to impacts on native species, abundance, and difficulty to control. For example, VA-DCR ranks English ivy as a moderate invasive species (because the VA DCR ranking system includes impacts, occurrence throughout Virginia and rate of spread) whereas; IPC ranks English ivy as highly invasive (because we are looking at impacts on native species, abundance, and difficulty to control) in Arlington County.

Highly invasive species exhibit the most invasive tendencies in natural areas and native plant habitats. They may disrupt ecosystem processes and cause major alterations in plant community composition and structure. They establish readily in natural systems and spread rapidly.

Moderately invasive species may have minor influence on ecosystem processes, alter plant community composition, and affect community structure in at least one layer. They may become dominant in the understory layer without threatening all species found in the community. These species usually require a minor disturbance to become established.

Occasionally invasive species generally do not affect ecosystem processes but may alter plant community composition by outcompeting one or more native plant species. They often establish in severely disturbed areas. The disturbance may be natural or human origin, such as ice storm damage, windthrow, or road construction. These species spread slowly or not at all from disturbed sites.

Trees

The following non-native invasive trees were identified at Lubber Run Park:

Tree-of-heaven	<i>Ailanthus altissima</i>
Princess tree	<i>Paulownia tomentosa</i>

Both species of trees exist in the same approximate location which is centrally located on the west side of Lubber Run next to the tributary. Basal barking of these trees allows for a higher degree of mortality and will thus reduce root sprouts which can be extensive. Trees that pose a threat to human health or structural damage due to falling debris may need to be cut and then treated. Those trees that are cut will be chipped back onto the site. Whereas trees that are away from high use areas will be basal barked and left standing.

Once the trees are removed, there will be somewhat of an open canopy which may invite germination of existing tree of heaven and Paulownia seeds, as well as other native and/or non-native seeds. Care will be taken to monitor the entire site for these invasive trees. After a few years of treatment, volunteers and contract staff or parks staff will be able to hand pull the tree saplings with no problems.

The following table describes the timing, methodology, and chemical that will be applied for the individual plant species:

Common Name	Timing	Methodology	Chemical
Trees			
Tree-of-heaven	Spring	Basal bark	20% Garlon 4
Princess tree	Spring	Basal bark	20% Garlon 4

Shrubs

The following non-native invasive shrubs were identified at Lubber Run Park:

Japanese barberry	<i>Berberis thunbergii</i>
Autumn olive	<i>Elaeagnus spp</i>
Burning bush	<i>Euonymus alata</i>
Rose-of-Sharon	<i>Hibiscus syriacus</i>
Chinese privet	<i>Ligustrum sinense</i>
Fragrant honeysuckle	<i>Lonicera fragrantissima</i>
Bush honeysuckle	<i>Lonicera maackii</i>
Multiflora rose	<i>Rosa multiflora</i>
Wineberry	<i>Rubus phoenicolasius</i>

With the exception of multiflora rose and bush honeysuckle which are ranked medium infestation, all the species are ranked low in terms of infestation level. Most species will be cut and treated, while the smaller plants such as multiflora rose, Japanese barberry, and Wineberry will be foliar treated.

After the initial treatment of the shrubs, IPC recommends five years of contractual maintenance. Contract staff and volunteers will be able to perform the monitoring and maintenance by hand pulling smaller saplings.

The following table describes the timing, methodology, and chemical that will be applied for the individual plant species:

Shrubs

Autumn olive	<i>Elaeagnus spp</i>	Su	Cut-and-treat	25% glyphosate
Burning bush	<i>Euonymus alata</i>	Su	Cut-and-treat	25% glyphosate
Rose-of-Sharon	<i>Hibiscus syriacus</i>	Su	Cut-and-treat	25% glyphosate
Chinese privet	<i>Ligustrum sinense</i>	Su	Cut-and-treat	25% glyphosate
Fragrant honeysuckle	<i>Lonicera fragrantissima</i>	Su	Cut-and-treat	25% glyphosate
Multiflora rose	<i>Rosa multiflora</i>	Su	Cut-and-treat	25% glyphosate
Japanese barberry	<i>Berberis thunbergii</i>	Sp/Su	Foliar	2% glyphosate
Wineberry	<i>Rubus phoenicolasius</i>	Su	Foliar	2% glyphosate
Bush honeysuckle	<i>Lonicera maackii</i>	Su	Cut-and-treat	25% glyphosate
Multiflora rose	<i>Rosa multiflora</i>	Sp/Su	Foliar	2% glyphosate

Vines

The following non-native invasive vines were identified at Lubber Run Park:

Porcelainberry	<i>Ampelopsis brevipedunculata</i>
Climbing euonymus	<i>Euonymus fortunei</i>
English ivy	<i>Hedera helix</i>
Japanese honeysuckle	<i>Lonicera japonica</i>
Common periwinkle	<i>Vinca minor</i>
Exotic Wisteria	<i>Wisteria sinensis/ floribunda</i>

English ivy is by far the most prevalent invasive species at Lubber Run Park. English ivy is a worrisome invasive because of its potential to impact biodiversity. English ivy creates a dense mat of foliage that impedes sunlight from the soil as well as competes with water uptake. One of the most comprehensive studies of the impacts of English ivy on natural ecosystems was done on Roosevelt Island in the 1970s by Lindsey Kay Thomas, Jr., a NPS Researcher. The findings of Lindsey's study were published in a NPS report in 1980. Lindsey found that areas that were heavily infested with English ivy had significant differences in forest structure (i.e. there were less shrub and tree layers in areas with English ivy). Lindsey "weeded" plots in English ivy areas and found a significant difference in herbaceous growth in weeded plots vs. non-weeded plots. His data did not show a significant difference in woody plant regeneration but he suggests in his conclusion that a significant difference may be found with a larger sample size (i.e. the difference may have statistically significant if more plots were sampled). Lindsey also compared the percentages of dead and dying trees with English ivy on them to number of dead and dying trees with no English ivy and concluded from these data and his forest structure data that English ivy was killing trees, especially American elm trees. He also speculates that Dutch elm disease may have weakened some trees and allowed English ivy to kill these trees at a faster rate (additive stress). A recent study (Quin and Best 2002) done in Vancouver, British Columbia also provides evidence for English ivy lowering native plant diversity. With this in mind, one will note that there is the lack of hardwood saplings and spring ephemerals growing in the densest patches of English ivy.

The timing to treat English ivy is best if performed in spring and fall. There are two reasons for this: 1) due to the amount of poison ivy that is co-existing with the English ivy, it is better to treat the English ivy while the poison ivy is dormant so as to allow complete chemical coverage of the foliage., and 2) in the same respect, treatment during dormancy adds to the selectivity and will thus decrease the chances of accidental non-target mortality. The waxy cuticle of English ivy is difficult to penetrate using chemicals and thus will need to be treated at least two times within the same year. English ivy will more than likely be a 4-5 year contract treatment.

All the vines listed above are climbing vines with the exception of *Vinca*. Most vines only produce fruit once it is able to begin climbing some structure. To reduce seed production, as well as undo weight stress put on the trees, the vines will be cut and then treated. Follow up maintenance with volunteers cutting the vines off the trees is a simple way to reduce seed output and improve the aesthetics of the park.

Due to the abundant canopy, deep root structures of established trees and shrubs and large amounts of leaf litter on the forest floor, IPC does not foresee and issues with erosion. Therefore, no erosion control fabrics or replanting will be initiated at this time.

The following table describes the timing, methodology, and chemical that will be applied for the individual plant species:

Porcelainberry	<i>A. brevipedunculata</i>	Su	Cut-and-treat	25% glyphosate
Climbing euonymus	<i>Euonymus fortunei</i>	Sp/Su/Fall	Foliar	5-7% Roundup Pro
English ivy	<i>Hedera helix</i>	Su	Cut-and-treat	25% glyphosate
English ivy	<i>Hedera helix</i>	Sp/Su/Fall	Foliar	5-7% Roundup Pro
Japanese honeysuckle	<i>Lonicera japonica</i>	Su	Cut-and-treat	25% glyphosate
Japanese honeysuckle	<i>Lonicera japonica</i>	Fall	Foliar	2-3% glyphosate
Common periwinkle	<i>Vinca minor</i>	Sp/Su/Fall	Foliar	5-7% Roundup Pro

Herbaceous Plants

The following non-native invasive herbaceous plants were identified at Lubber Run Park:

Japanese stiltgrass	<i>Microstegium vimineum</i>
Golden bamboo	<i>Phyllostachys aurea</i>
Japanese knotweed	<i>Polygonum cuspidatum</i>
Lesser celandine	<i>Ranunculus ficaria</i>

The initial treatment of lesser celandine was completed on March 19, 2006. Due to cooler temperatures, the “yellowing” of the foliage may not be noticeable until April 12. Once the population of lesser celandine starts declining, there will be monitoring for other invasive plants. As with most invasive plant control programs, when invasive plants are controlled, native plants as well as other non-native plants may succeed and repopulate the site. *Microstegium* is present in Lubber Run Park and IPC will monitor for new patches of *Microstegium* in the park.

Bamboo was observed on the west side of Lubber Run up along the drainages. Bamboo, with its extensive network of rhizomes, may take years to control. The initial treatment will be to cut and treat the stumps. During the next growing season, it will be advantageous to treat the suckers twice in the same year as to deplete the carbohydrate storage in the rhizomes. Depending on the maturity and age of the stand, the bamboo may still be an issue after five years.



Lesser celandine
(*Ranunculus ficaria*)

Invasive Plant Control, Inc. staff treating *Ranunculus ficaria*

The following table describes the timing, methodology, and chemical that will be applied for the individual plant species:

Herbaceous

Japanese stiltgrass	<i>Microstegium vimineum</i>	Su/Fall	Foliar	0.5% Plateau or 1% glyphosate
Golden bamboo	<i>Phyllostachys aurea</i>	Su/Fall	Cut-and-treat	50% glyphosate
Japanese knotweed	<i>Polygonum cuspidatum</i>	Su	Foliar	1.5% glyphosate/1% triclopyr
Lesser celandine	<i>Ranunculus ficaria</i>	Sp	Foliar	1.5% Aquaneat

Scheduling and Estimated Costs

Scheduling is only one aspect of IPM to aid in reducing chemical output. Other reasons scheduling is crucial is because each plant may be more susceptible to certain chemical treatments during certain periods of the seasons. For example, lesser celandine has a limited treatment window in late winter/early spring. Bush honeysuckle, on the other hand, may be treatable in summer, fall, and winter. IPC has found that cutting and treating bush honeysuckle during its active growing season (summer/early fall) will increase the results of mortality of the species. Foliar treating is best scheduled for early fall due to the later leaf-drop of bush honeysuckle as well as the sap is running down into the roots for winter storage and thus chemical is translocated to the roots.

The following tables indicate IPC's proposed treatment timing. Along with the scheduling, the estimated cost per plant type, i.e. trees, shrubs, vines, and herbaceous, is located at the end of the table with the annual estimated cost located at the bottom of the table. The table below notes the estimated annual costs for the next 5 years:

Year	2006	2007	2008	2009	2001
Estimated Annual Cost	\$35,600	\$17,700	\$10,700	\$6000	\$3,200

		2006				
Species	Methodology	Winter	Spring	Summer	Fall	Costs
Trees						
Tree-of-heaven	Basal/Cut & Treat					
Princess tree	Basal/Cut & Treat					
Estimated Cost						\$2,800.00
Shrubs						
Autumn olive	Cut & Treat					
Burning bush	Cut & Treat					
Bush honeysuckle	Cut & Treat					
Chinese privet	Cut & Treat					
Fragrant honeysuckle	Cut & Treat					
Japanese barberry	Foliar					
Multiflora rose	Foliar/Cut & Treat					
Rose-of-Sharon	Cut & Treat					
Wineberry	Foliar					
Estimated Cost						\$13,800.00
Vines						
Climbing euonymus	Foliar/Cut & Treat					
Common periwinkle	Foliar					
English ivy	Foliar/Cut & Treat					
Japanese honeysuckle	Foliar/Cut & Treat					
Porcelainberry	Foliar/Cut & Treat					
Exotic wisteria	Foliar/Cut & Treat					
Estimated Cost						\$ 24,000.00
Herbaceous						
Golden bamboo	Cut & Treat					
Lesser celandine	Foliar					
Japanese stiltgrass	Foliar					
Japanese knotweed	Foliar					
Estimated Cost						\$9,400.00
Monitoring						\$4,800.00
Volunteer days						\$2,400.00
Annual Cost 2006						\$57,200.00

		2007				
Species	Methodology	Winter	Spring	Summer	Fall	Costs
Trees						
Tree-of-heaven	Foliar					
Princess tree	Foliar					
Estimated Cost						\$600.00
Shrubs						
Autumn olive	Foliar					
Burning bush	Foliar					
Bush honeysuckle	Foliar					
Chinese privet	Foliar					
Fragrant honeysuckle	Foliar					
Japanese barberry	Foliar					
Multiflora rose	Foliar					
Rose-of-Sharon	Foliar					
Wineberry	Foliar					
Estimated Cost						\$2,100.00
Vines						
Climbing euonymus	Foliar					
Common periwinkle	Foliar					
English ivy	Foliar					
Japanese honeysuckle	Foliar					
Porcelainberry	Foliar					
Exotic wisteria	Foliar					
Estimated Cost						\$11,900.00
Herbaceous						
Golden bamboo	Foliar					
Lesser celandine	Foliar					
Japanese stiltgrass	Foliar					
Japanese knotweed	Foliar					
Estimated Cost						\$7,500.00
Monitoring						\$4,800.00
Volunteer days						\$2,400.00
Annual Cost 2007						\$ 29,300.00

		2008				
Species	Methodology	Winter	Spring	Summer	Fall	Costs
Trees						
Tree-of-heaven	Foliar					
Princess tree	Foliar					
Estimated Cost						\$300.00
Shrubs						
Autumn olive	Foliar					
Burning bush	Foliar					
Bush honeysuckle	Foliar					
Chinese privet	Foliar					
Fragrant honeysuckle	Foliar					
Japanese barberry	Foliar					
Multiflora rose	Foliar					
Rose-of-Sharon	Foliar					
Wineberry	Foliar					
Estimated Cost						\$1,200.00
Vines						
Climbing euonymus	Foliar					
Common periwinkle	Foliar					
English ivy	Foliar					
Japanese honeysuckle	Foliar					
Porcelainberry	Foliar					
Exotic wisteria	Foliar					
Estimated Cost						\$6,600.00
Herbaceous						
Golden bamboo	Foliar					
Lesser celandine	Foliar					
Japanese stiltgrass	Foliar					
Japanese knotweed	Foliar					
Estimated Cost						\$4,500.00
Monitoring						\$4,800.00
Volunteer days						\$2,400.00
Annual Cost 2008					\$ 19,800.00	

		2009				
Species	Methodology	Winter	Spring	Summer	Fall	Costs
Trees						
Tree-of-heaven	Foliar					
Princess tree	Foliar					
Estimated Cost						\$300.00
Shrubs						
Autumn olive	Foliar					
Burning bush	Foliar					
Bush honeysuckle	Foliar					
Chinese privet	Foliar					
Fragrant honeysuckle	Foliar					
Japanese barberry	Foliar					
Multiflora rose	Foliar					
Rose-of-Sharon	Foliar					
Wineberry	Foliar					
Estimated Cost						\$600.00
Vines						
Climbing euonymus	Foliar					
Common periwinkle	Foliar					
English ivy	Foliar					
Japanese honeysuckle	Foliar					
Porcelainberry	Foliar					
Exotic wisteria	Foliar					
Estimated Cost						\$2,100.00
Herbaceous						
Golden bamboo	Foliar					
Lesser celandine	Foliar					
Japanese stiltgrass	Foliar					
Japanese knotweed	Foliar					
Estimated Cost						\$3,300.00
Monitoring						\$4,800.00
Volunteer days						\$2,400.00
Annual Cost 2009						\$13,500.00

		2010				
Species	Methodology	Winter	Spring	Summer	Fall	Costs
Trees						
Tree-of-heaven	Foliar					
Princess tree	Foliar					
Estimated Cost						\$300.00
Shrubs						
Autumn olive	Foliar					
Burning bush	Foliar					
Bush honeysuckle	Foliar					
Chinese privet	Foliar					
Fragrant honeysuckle	Foliar					
Japanese barberry	Foliar					
Multiflora rose	Foliar					
Rose-of-Sharon	Foliar					
Wineberry	Foliar					
Estimated Cost						\$600.00
Vines						
Climbing euonymus	Foliar					
Common periwinkle	Foliar					
English ivy	Foliar					
Japanese honeysuckle	Foliar					
Porcelainberry	Foliar					
Exotic wisteria	Foliar					
Estimated Cost						\$1,500.00
Herbaceous						
Golden bamboo	Foliar					
Lesser celandine	Foliar					
Japanese stiltgrass	Foliar					
Japanese knotweed	Foliar					
Estimated Cost						\$800.00
Monitoring						\$4,800.00
Volunteer days						\$2,400.00
Annual Cost 2010						\$10,400.00

The following tables refer to the plant types, methodologies, the infestation levels, and the amount of acreage infested in at Lubber Run Park. Each of these varies in relation to the estimated costs.

ESTIMATED COSTS FOR THE TREATMENT OF LUBBER RUN (2006)

Common Name	Botanical Name	Timing	Methodology	Chemical	Level	Acres	Estimate
<u>Trees*</u>							
Tree-of-heaven	<i>Ailanthus altissima</i>	Sp	Basal, Cut & Treat	20% Garlon 4	Low	1	\$2,800.00
Princess tree	<i>Paulownia tomentosa</i>	Sp	Basal, Cut & Treat	20% Garlon 4	Low		
<u>Shrubs</u>							
Autumn olive	<i>Elaeagnus spp</i>	Su	Cut-and-treat	25% glyphosate	Low	7	\$7,000.00
Burning bush	<i>Euonymus alata</i>	Su	Cut-and-treat	25% glyphosate	Low		
Rose-of-Sharon	<i>Hibiscus syriacus</i>	Su	Cut-and-treat	25% glyphosate	Low		
Chinese privet	<i>Ligustrum sinense</i>	Su	Cut-and-treat	25% glyphosate	Low		
Fragrant honeysuckle	<i>Lonicera fragrantissima</i>	Su	Cut-and-treat	25% glyphosate	Low		
Multiflora rose	<i>Rosa multiflora</i>	Su	Cut-and-treat	25% glyphosate	Low		
Japanese barberry	<i>Berberis thunbergii</i>	Sp/Su	Foliar	2% glyphosate	Medium	5	\$3,000.00
Wineberry	<i>Rubus phoenicolasius</i>	Su	Foliar	2% glyphosate	Medium		
Bush honeysuckle	<i>Lonicera maackii</i>	Su	Cut-and-treat	25% glyphosate	Medium	2	\$5,000.00
Multiflora rose	<i>Rosa multiflora</i>	Sp/Su	Foliar	2% glyphosate	Medium	3	\$1,800.00

**This cost represents the methods of treatment, as well as the disposal of debris for felled trees.*

Vines

Japanese honeysuckle	<i>Lonicera japonica</i>	Su	Cut-and-treat	25% glyphosate	Low	1	\$1,200.00
Exotic wisteria	<i>Wisteria sinensis/loribunda</i>	Su	Cut-and-treat	25% triclopyr	Low	1	
Porcelainberry	<i>Ampelopsis brevipedunculata</i>	Su	Cut-and-treat	25% glyphosate	Low	2	\$2,400.00
English ivy	<i>Hedera helix</i>	Su	Cut-and-treat	25% glyphosate	Low	3	\$3,600.00
English ivy*	<i>Hedera helix</i>	Sp/Su/Fall	Foliar	5-7% Roundup Pro	High	7.5	\$ 13,500.00
Common periwinkle	<i>Vinca minor</i>	Sp/Su/Fall	Foliar	5-7% Roundup Pro	Low	2	\$400.00
Exotic wisteria	<i>Wisteria sinensis/loribunda</i>	Su	Foliar	2% triclopyr	Low	2	
Climbing euonymus	<i>Euonymus fortunei</i>	Sp/Su/Fall	Foliar	5-7% Roundup Pro	Low	3	\$600 .00
Japanese honeysuckle	<i>Lonicera japonica</i>	Fall	Foliar	2-3% Roundup Pro	Medium	7.5	\$4,500.00

Herbaceous

Golden bamboo	<i>Phyllostachys aurea</i>	Su/Fall	Cut-and-treat	50% glyphosate	Medium	1	\$2,500.00
Japanese knotweed	<i>Polygonum cuspidatum</i>	Su	Foliar	1.5% glyphosate/ 1% triclopyr	Low	1	\$300.00
Lesser celandine	<i>Ranunculus ficaria</i>	Sp	Foliar	1.5% Aquaneat	Medium		\$5,400.00
Japanese stiltgrass	<i>Microstegium vimineum</i>	Sept.	Foliar	0.5% Plateau or 1% glyphosate	Medium	2	\$1,200.00

Monitoring *1 day/quarter*

Volunteer days *2 days/year*

Total \$57,200.00

**Foliar treatment of English ivy includes a summer and fall treatment.*

ESTIMATED COSTS FOR THE TREATMENT OF LUBBER RUN (2007)

Common Name	Botanical Name	Timing	Methodology	Chemical	Level	Acres	Estimate
<u>Trees</u>							
Tree-of-heaven	<i>Ailanthus altissima</i>	Su	Foliar	2% glyphosate	Low	1	\$600.00
Princess tree	<i>Paulownia tomentosa</i>	Su	Foliar	2% glyphosate	Low		
<u>Shrubs</u>							
Autumn olive	<i>Elaeagnus spp</i>	Fall	Foliar	2% glyphosate	Low	7	\$2,100.00
Burning bush	<i>Euonymus alata</i>	Fall	Foliar	2% glyphosate	Low		
Rose-of-Sharon	<i>Hibiscus syriacus</i>	Su	Foliar	2% glyphosate	Low		
Chinese privet	<i>Ligustrum sinense</i>	Fall	Foliar	2% glyphosate	Low		
Fragrant honeysuckle	<i>Lonicera fragrantissima</i>	Fall	Foliar	2% glyphosate	Low		
Multiflora rose	<i>Rosa multiflora</i>	Sp	Foliar	2% glyphosate	Low		
Japanese barberry	<i>Berberis thunbergii</i>	Sp	Foliar	2% glyphosate	Low		
Wineberry	<i>Rubus phoenicolasius</i>	Su	Foliar	2% glyphosate	Low		
Bush honeysuckle	<i>Lonicera maackii</i>	Fall	Foliar	2% glyphosate	Low		

Vines

Exotic wisteria	<i>Wisteria sinensis/loribunda</i>	Su	Foliar	2% triclopyr	Low	2	\$400.00
Porcelainberry	<i>Ampelopsis brevipedunculata</i>	Su	Foliar	2-3% Roundup Pro	Low	5	\$1,000.00
Climbing euonymus	<i>Euonymus fortunei</i>	Fall	Foliar	5-7% Roundup Pro	Low		
Common periwinkle	<i>Vinca minor</i>	Fall	Foliar	5-7% Roundup Pro	Low		
Japanese honeysuckle	<i>Lonicera japonica</i>	Fall	Foliar	2-3% Roundup Pro	Low	7.5	\$4,500.00
English ivy	<i>Hedera helix</i>	Sp & Fall	Foliar	5-7% Roundup Pro	Medium	5	\$6,000.00

Herbaceous

Golden bamboo	<i>Phyllostachys aurea</i>	Su/Fall	Cut-and-treat	50% glyphosate	Medium	1	\$600.00
Japanese knotweed	<i>Polygonum cuspidatum</i>	Su	Foliar	1.5% glyphosate/ 1% triclopyr	Low?	1	\$300.00
Japanese stiltgrass	<i>Microstegium vimineum</i>	Sept.	Foliar	0.5% Plateau or 1% glyphosate	Medium?	2	\$1,200
Lesser celandine	<i>Ranunculus ficaria</i>	Sp	Foliar	1.5% Aquaneat	Medium		\$5,400.00

Monitoring*1 day/quarter***\$4,800.00****Volunteer days***2 days/year***\$2,400.00****Total \$29,300.00**

ESTIMATED COSTS FOR THE TREATMENT OF LUBBER RUN (2008)

Common Name	Botanical Name	Timing	Methodology	Chemical	Level	Acres	Estimate
<u>Trees</u>							
Tree-of-heaven	<i>Ailanthus altissima</i>	Su	Foliar	2% glyphosate	Low	1	\$300.00
Princess tree	<i>Paulownia tomentosa</i>	Su	Foliar	2% glyphosate	Low		
<u>Shrubs</u>							
Autumn olive	<i>Elaeagnus spp</i>	Fall	Foliar	2% glyphosate	Low	4	\$1,200.00
Burning bush	<i>Euonymus alata</i>	Fall	Foliar	2% glyphosate	Low		
Rose-of-Sharon	<i>Hibiscus syriacus</i>	Su	Foliar	2% glyphosate	Low		
Chinese privet	<i>Ligustrum sinense</i>	Fall	Foliar	2% glyphosate	Low		
Fragrant honeysuckle	<i>Lonicera fragrantissima</i>	Fall	Foliar	2% glyphosate	Low		
Multiflora rose	<i>Rosa multiflora</i>	Sp	Foliar	2% glyphosate	Low		
Japanese barberry	<i>Berberis thunbergii</i>	Sp	Foliar	2% glyphosate	Low		
Wineberry	<i>Rubus phoenicolasius</i>	Su	Foliar	2% glyphosate	Low		
Bush honeysuckle	<i>Lonicera maackii</i>	Fall	Foliar	2% glyphosate	Low		

Vines

Climbing euonymus	<i>Euonymus fortunei</i>	Fall	Foliar	5-7% Roundup Pro	Low	2	\$400.00
Common periwinkle	<i>Vinca minor</i>	Fall	Foliar	5-7% Roundup Pro	Low		
Exotic wisteria	<i>Wisteria sinensis/floribunda</i>	Su	Foliar	2% triclopyr	Low		
Porcelainberry	<i>Ampelopsis brevipedunculata</i>	Su	Foliar	2-3% Roundup Pro	Low	5	\$1,000.00
Japanese honeysuckle	<i>Lonicera japonica</i>	Fall	Foliar	2-3% Roundup Pro	Low	10	\$2,000.00
English ivy	<i>Hedera helix</i>	Sp & Fall	Foliar	5-7% Roundup Pro	Medium	3	\$3,200.00

Herbaceous

Lesser celandine	<i>Ranunculus ficaria</i>	Sp	Foliar	1.5% Aquaneat	Medium	4	\$2,400.00
Golden bamboo	<i>Phyllostachys aurea</i>	Su/Fall	Cut-and-treat	50% glyphosate	Medium	1	\$600.00
Japanese knotweed	<i>Polygonum cuspidatum</i>	Su	Foliar	1.5% glyphosate/ 1% triclopyr	Low?	1	\$300.00
Japanese stiltgrass	<i>Microstegium vimineum</i>	Sept.	Foliar	0.5% Plateau or 1% glyphosate	Medium?	2	\$1,200.00

Monitoring*1 day/quarter***\$4,800.00****Volunteer days***2 days/year***\$2,400.00****Total \$19,800.00**

ESTIMATED COSTS FOR THE TREATMENT OF LUBBER RUN (2009)

Common Name	Botanical Name	Timing	Methodology	Chemical	Level	Acres	Estimate
<u>Trees</u>							
Tree-of-heaven	<i>Ailanthus altissima</i>	Su	Foliar	2% glyphosate	Low	1	\$300.00
Princess tree	<i>Paulownia tomentosa</i>	Su	Foliar	2% glyphosate	Low		
<u>Shrubs</u>							
Autumn olive	<i>Elaeagnus spp</i>	Fall	Foliar	2% glyphosate	Low	2	\$600.00
Burning bush	<i>Euonymus alata</i>	Fall	Foliar	2% glyphosate	Low		
Rose-of-Sharon	<i>Hibiscus syriacus</i>	Su	Foliar	2% glyphosate	Low		
Chinese privet	<i>Ligustrum sinense</i>	Fall	Foliar	2% glyphosate	Low		
Fragrant honeysuckle	<i>Lonicera fragrantissima</i>	Fall	Foliar	2% glyphosate	Low		
Multiflora rose	<i>Rosa multiflora</i>	Sp	Foliar	2% glyphosate	Low		
Japanese barberry	<i>Berberis thunbergii</i>	Sp	Foliar	2% glyphosate	Low		
Wineberry	<i>Rubus phoenicolasius</i>	Su	Foliar	2% glyphosate	Low		
Bush honeysuckle	<i>Lonicera maackii</i>	Fall	Foliar	2% glyphosate	Low		

Vines

English ivy	<i>Hedera helix</i>	Sp & Fall	Foliar	5-7% Roundup Pro	Low	3	\$900.00
Porcelainberry	<i>Ampelopsis brevipedunculata</i>	Su	Foliar	2-3% Roundup Pro	Low	1	\$200.00
Climbing euonymus	<i>Euonymus fortunei</i>	Fall	Foliar	5-7% Roundup Pro	Low		
Exotic wisteria	<i>Wisteria sinensis/floribunda</i>	Su	Foliar	2% triclopyr	Low		
Common periwinkle	<i>Vinca minor</i>	Fall	Foliar	5-7% Roundup Pro	Low		
Japanese honeysuckle	<i>Lonicera japonica</i>	Fall	Foliar	2-3% Roundup Pro	Low	5	\$1,000.00

Herbaceous

Golden bamboo	<i>Phyllostachys aurea</i>	Su/Fall	Cut-and-treat	50% glyphosate	Medium	1	\$600.00
Japanese stiltgrass	<i>Microstegium vimineum</i>	Sept.	Foliar	0.5% Plateau or 1% glyphosate	Medium?	1	
Japanese knotweed	<i>Polygonum cuspidatum</i>	Su	Foliar	1.5% glyphosate/ 1% triclopyr	Low?	1	\$300.00
Lesser celandine	<i>Ranunculus ficaria</i>	Sp	Foliar	1.5% Aquaneat	Medium	4	\$2,400.00

Monitoring*1 day/quarter***\$4,800.00****Volunteer days***2 days/year***\$2,400.00****Total \$13,500.00**

ESTIMATED COSTS FOR THE TREATMENT OF LUBBER RUN (2010)

Common Name	Botanical Name	Timing	Methodology	Chemical	Level	Acres	Estimate
<u>Trees</u>							
Tree-of-heaven	<i>Ailanthus altissima</i>	Su	Foliar	2% glyphosate	Low	1	\$300.00
Princess tree	<i>Paulownia tomentosa</i>	Su	Foliar	2% glyphosate	Low		
<u>Shrubs</u>							
Autumn olive	<i>Elaeagnus spp</i>	Fall	Foliar	2% glyphosate	Low	2	\$600.00
Burning bush	<i>Euonymus alata</i>	Fall	Foliar	2% glyphosate	Low		
Rose-of-Sharon	<i>Hibiscus syriacus</i>	Su	Foliar	2% glyphosate	Low		
Chinese privet	<i>Ligustrum sinense</i>	Fall	Foliar	2% glyphosate	Low		
Fragrant honeysuckle	<i>Lonicera fragrantissima</i>	Fall	Foliar	2% glyphosate	Low		
Multiflora rose	<i>Rosa multiflora</i>	Sp	Foliar	2% glyphosate	Low		
Japanese barberry	<i>Berberis thunbergii</i>	Sp	Foliar	2% glyphosate	Low		
Wineberry	<i>Rubus phoenicolasius</i>	Su	Foliar	2% glyphosate	Low		
Bush honeysuckle	<i>Lonicera maackii</i>	Fall	Foliar	2% glyphosate	Low		

Vines

English ivy	<i>Hedera helix</i>	Sp & Fall	Foliar	5-7% Roundup Pro	Low	3	\$900.00
Porcelainberry	<i>Ampelopsis brevipedunculata</i>	Su	Foliar	2-3% Roundup Pro	Low	1	\$200.00
Climbing euonymus	<i>Euonymus fortunei</i>	Fall	Foliar	5-7% Roundup Pro	Low		
Exotic wisteria	<i>Wisteria sinensis/loribunda</i>	Su	Foliar	2% triclopyr	Low		
Common periwinkle	<i>Vinca minor</i>	Fall	Foliar	5-7% Roundup Pro	Low		
Japanese honeysuckle	<i>Lonicera japonica</i>	Fall	Foliar	2-3% Roundup Pro	Low	2	\$400.00

Herbaceous

Lesser celandine	<i>Ranunculus ficaria</i>	Sp	Foliar	1.5% Aquaneat	Medium	1	\$600.00
Golden bamboo	<i>Phyllostachys aurea</i>	Su/Fall	Cut-and-treat	50% glyphosate	Low	1	\$200.00
Japanese knotweed	<i>Polygonum cuspidatum</i>	Su	Foliar	1.5% glyphosate/ 1% triclopyr	Low?	1	
Japanese stiltgrass	<i>Microstegium vimineum</i>	Sept.	Foliar	0.5% Plateau or 1% glyphosate	Low?	1	

Monitoring*1 day/quarter***\$4,800.****Volunteer days***2 days/year***\$2,400.****Total \$10,400.**