

## Appendix 6.0

### The Nature Conservancy and Metro Parks and Greenspaces Stem Injection of Japanese and Giant Knotweed Final Report 2003



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# Table of Contents

## Page Number

Introduction	p.1
Methods	p.1-4
Data	p.2-4
Treatments	p.4-6
Post-Treatment Data	p.6-7
Results	p. 8-13
Follow Up Plans	p.13
Discussion	p.13

### List of Tables

Table 1 - Phase 1 Treatment Groups	p.1
Table 2 - Phase 2 Treatment Groups	p.2
Table 3 - Phase 1 Stem Counts	p.2
Table 4 – Phase 2 Summary Data	p.3
Table 5 – Phase 3 Stem Count Data	p.4
Table 6 – Phase 1 Summary Data	p.10
Table 7 – Phase 3 Summary Data	p.12
Table 8 – Phase 1 Pre-Treatment Data	p.14-17
Table 9 – Phase 1 Treatment Data	p.18-20
Table 10 - Phase 1 Post Treatment Data	p.21
Table 11– Phase 2 Summary Data	p.22-23
Table 12– Phase 3 Pre-Treatment Data	p.24-25
Table 13– Phase 3 Treatment Data	p.26-29
Table 14– Phase 3 Post Treatment Data	p.30

### List of Figures

Figure 1 - Photo of poking hole in stem	p.5
Figure 2 - Photo of injecting herbicide into stem	p.5
Figure 3 – Photo of knotweed injection gun	p.7
Figure 4 – Phase 1 Condition vs. %Treated Stems Graph	p. 8
Figure 5 – Phase 1 Treatment Group vs. Condition Graph	p.9
Figure 6 – Phase 3 Condition vs. % Treated Stems Graph	p.11
Figure 7 – Phase 3 Treatment Group vs. Condition Graph	p.12

### Appendix 1

Photo series of Phase 1 sites	p.31 p.32-62
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### Appendix 2

Photo Series of Phase 3 sites	p.63 p.64-94
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## Introduction

This report presents preliminary results of the experiment to determine appropriate dosage and effectiveness of direct stem injection of Japanese and giant knotweed (*Polygonum cuspidatum* and *P. sachalinense*) with Rodeo herbicide (Dow Agrosciences).

### *Phase 1*

The central questions Phase 1 addresses include determining a likely minimum dose to use for wider, landscape level testing, and to compare no treatment on stems too small to inject to supplemental foliar spraying. Final results will not be clear until mid-summer 2004.

### *Phase 2*

The central issues Phase 2 addresses include determining the efficacy of the stem injection method for wider, landscape level testing, and to compare 3ml treatment to 5ml treatments on both a larger scale and over an extended time period. Final results will not be clear until mid-summer 2004.

### *Phase 3*

Phase 3 addresses two main issues, 1) testing whether a late season stem injection application is effective, and 2), comparing no treatment on small stems to supplemental foliar spraying. Final results will not be clear until mid-summer 2004.

## Methods

### *Phases 1 and 3*

The original proposal called for 5 treatments (1-5ml) plus a control. However, it was not possible to find floodplain areas with more than 30 individual sites that were simultaneously: independent, generally similar size, had injectable size stems, (approximately  $\frac{3}{4}$  inch diameter), and were in 3 or fewer locations. We also found it to be difficult with our equipment to reliably and quickly deliver 1ml differences in volume. Finally, we have consistently found many stems in each patch are below the minimum diameter to be injected. As a result we reduced the number of treatment groups to 4 plus a control (see Table 1 below) and added a supplemental spray to one of the treatment groups.

Table 1 -- Treatment Groups for Phase 1 and 3

<b>Treatment</b>	<b>Description</b>
Control	Hole poked into stem only
1.5ml	1.5ml injected into lowest node of any stem large enough to hold it (0.75").
3ml	3ml injected into lowest node of any stem large enough to hold it (1")
5ml	5ml injected into lowest node of any stem large enough to hold it (1.25")
5ml plus spray	5ml injected into lowest node of any stem large enough to hold it. All other stems sprayed with 5% solution of Rodeo Herbicide with 1% Li-700

n = 6 in all cases

## *Phase 2*

Knotweed sites were identified along the Clackamas and Sandy Rivers, as well as some tributaries to these rivers. Staff from The Nature Conservancy and Metro Parks and Greenspaces conducted the treatments.

Individual sites were randomly assigned to one of two treatment groups (see Table 2 below). Either 3ml or 5ml of undiluted Rodeo (glyphosate) were injected into each stem large enough to hold the appropriate volume of herbicide. Treatment amounts were determined at random at each site.

Many stems in each patch were below the minimum diameter to be injected. These stems were injected with as much herbicide as they could hold, and were then foliar treated with a low-pressure hand sprayer. The tank mix was 5% Rodeo Herbicide with 1% Li-700 surfactant and a small amount of blue dye. Leaves were sprayed to be wet but not to drip.

Table 2 -- Treatment Groups Phase 2

<b>Treatment</b>	<b>Description</b>
Group 1 -- 3ml	3ml injected into lowest node of any stem large enough to hold it (3/4") All other stems sprayed with 5% solution of Rodeo Herbicide with 1% Li-700
Group 2 -- 5ml	5ml injected into lowest node of any stem large enough to hold it (1"). All other stems sprayed with 5% solution of Rodeo Herbicide with 1% Li-700

## **Data**

### *Phase 1*

On July 8,14, and 17, 2003 we collected stem number, typical diameter, typical height, patch size, shading and general soil type, and photographed 30 patches with between 23 and 185 stems (see appendix 1). We stratified the 30 patches into 2 groups by stem count: high (46 to 185) and low (23 to 45) then randomly assigned plots to treatment groups. Stem count data can be seen on Table 3 below.

Table 3: Phase 1 Stem Count Statistics

Treatment	Stem Count Information			
	Avg. stem #	St. Dev. stem #	Avg. stem # injected	% stems injected
0 ml	53.00	26.96	0.00	0%
1.5ml	53.67	27.62	40.50	75%
3ml	83.50	79.41	49.17	57%
5ml	65.17	35.54	37.83	68%
5ml +S	47.67	38.32	26.67	60%
<b>Overall</b>	<b>60.60</b>	<b>44.55</b>	<b>30.83</b>	<b>52%</b>

n= 6 for all treatment groups

### ***Phase 2***

Data for Phase 2 was collected during the months of August, September, and October by Metro employees on the Clackamas River, and by Nature Conservancy employees along the Sandy River.

Data collected included: patch location, patch size, treatment area, site area, stem count (which included number of stems injected and number of stems sprayed), treatment type, and general notes about the work site.

Treatment area was recorded as the area (in square meters) actively occupied by stems of the knotweed plant. The total site area, or floodplain area that contained treated knotweed patches was recorded as well in order to be certain that we did not surpass the legal limit of 8.0 quarts of glyphosate per acre per year. None of the site areas had over 8.0 quarts of glyphosate applied over a one acre area.

Data for Phase 2 was recorded into a database using Handspring Visor personal digital assistant units. Notes on the locations, including GPS coordinates were recorded in order to facilitate locating the same sites next season.

Table 11 contains most of the information collected, and can be found at the end of this report. Table 4, found below, contains summary information of Phase 2 data regarding stem counts and treatment types at both locations.

Table 4: Phase 2 Summary Data

<b>Type of treatment</b>					
<b>Location</b>	<b>3ml inject</b>	<b>5ml inject</b>	<b>Total stems injected</b>	<b>Foliar spray</b>	<b>Total stems treated</b>
Clackamas	3166	10295	13461	7594	21055
Sandy	5253	14027	19280	13630	32910
Total stems =	8419	24322	32741	21224	53965
Numbers shown are individual stem counts					

### ***Phase 3***

On September 15, 2003 we collected stem number, typical diameter, typical height, patch size, shading and general soil type (see Table 12, attached) and photographed 30 patches (see appendix 2). The stem counts among the 30 patches varied from a low of 21 up to the high of 114. Table 5, shown below, compares the average patch size by stem number, as well as the number of stems that were injected in each treatment group

Table 5: Phase 3 Stem Count Statistics

Treatment	Stem Count Information			
	Avg. stem #	St. Dev. stem #	Avg. stem # injected	% stems injected
0 mls	65.25	38.47	0.00	0%
1.5mls	58.67	29.80	57.17	98%
3mls	66.17	21.12	59.17	91%
5mls	63.33	34.58	44.83	78%
5mls +S	60.00	28.40	53.67	91%
<b>Overall</b>	<b>62.34</b>	<b>28.63</b>	<b>41.55</b>	<b>71%</b>

n= 6 for all treatment groups

## Treatment

### *Phases 1 and 3*

Phase 1 treatments were done on July 11, 12, 2003. Data was recorded at each site (see table 8). Many stems were entering the bud phase, but none had open flowers. See the photo set attached at the end of the report (Appendix 1 and 2).

Phase 3 treatments were done on September 16<sup>th</sup> and 17<sup>th</sup>, 2003. Many plants had produced flowers by this point, (see photo set).

Control plots had a hole poked through the stem but no liquid was injected.

Injection Treatment -- After using a probe to poke a 0.1 inch (0.2cm) hole through both sides of the stem, undiluted Rodeo herbicide was carefully injected downwards into the hollow of the first node using a 14 gauge needle and a 60 ml syringe, (See Figures 1 and 2). Stems too small to hold the treatment volume were left untreated, except in the 5ml + spray group.

Although we estimated the smallest size stem likely to be able to hold the entire treatment volume pretty well, sometimes we tried but failed to inject the full amount. The missing volume was recorded. Because the total volumes involved turned out to be very small (85 ml total for more than 1000 stems in Phase 1, and 34 ml for over 1900 stems in Phase 2), they were ignored in the data analysis.

5ml Injection + spray plots -- In this treatment, stems too small to inject were foliar treated with a low-pressure hand sprayer. The tank mix was 5% Rodeo Herbicide with 1% Li-700 surfactant and a small amount of blue dye. Leaves were sprayed to be wet but not to drip.

Figure 1: Poking a hole into a Japanese knotweed stem.



Note that the hole goes through both sides of the stem.

Figure 2: Injecting the stem with undiluted Rodeo



Note the injection site is towards the top of the first stem node to allow space for the herbicide inside the hollow cavity of the stem. Also note the numerous brown, dead canes in background from previous years growth.

***Phase 2***

Treatments were performed starting on August 13th, 2003, and continued until October 28th, 2003. (Note: Efficacy data for treatments beginning earlier than July can be obtained from Clark County Weed Board, or in the future from The Nature Conservancy, dependent upon data that could be collected during and after the 2004 field season.)

Injection Treatment -- After using a probe to poke a 0.1 inch (0.2cm) hole through both sides of the stem, undiluted Rodeo herbicide was carefully injected downwards into the hollow of the first node using a 14 gauge needle attached to a 60 ml syringe. Some of the 5ml injected patches along the Sandy River were performed with a stem injection tool developed by members of the Clark County Weed Board, (see Figure 3). Stems too small to hold the treatment volume were foliar treated with a low-pressure hand sprayer. The tank mix was 5% Rodeo Herbicide with 1% Li-700 surfactant and a small amount of blue dye. Leaves were sprayed to be wet but not to drip.

**Post-treatment Data*****Phases 1 and 3***

Post-treatment data for Phase 1 was collected on August 11th and 12th, 2003.

Post-treatment data for Phase 3 was collected on October 6<sup>th</sup>, 2003.

Each patch of Phase 1 and Phase 3 was photographed from the same location as the pre-treatment photos. (see appendix 1 and 2)

After training as a group on two patches, individual stems were ranked into 4 condition class categories (ranks) by a single individual (or two working independently) at each patch.

Condition Classes:

0: apparently healthy, no discoloration (chlorosis) or leaf death (necrosis)

1: some minor damage, small spots of necrosis or minor general chlorosis but clearly alive

2: clearly damaged and not healthy, with patches of necrosis, but some green leaves or partial leaves remain. Some flower buds still green

3: All leaves on the stem are gone or apparently dead, buds are brown.

Lastly, at least 3 people per patch made an independent overall estimation of the vigor of the entire plant on a continuous 0-3 scale based on the ranked scale above.

***Phase 2***

Post-treatment data will be collected during the 2004 field season. Initial results could be available as early as July of 2004.

Figure 3: Knotweed Injection Tool



This photo was taken from the JK International Injection Tool's website : [www.jkinjectiontool.com](http://www.jkinjectiontool.com)

Phil Burgess, of Clark County Weed Management has developed this tool for use on Japanese and giant knotweed. It will be made available for purchase in the Spring of 2004. The tool that was used by The Nature Conservancy for Phase 2 sites along the Sandy River was a prototype version of this model.

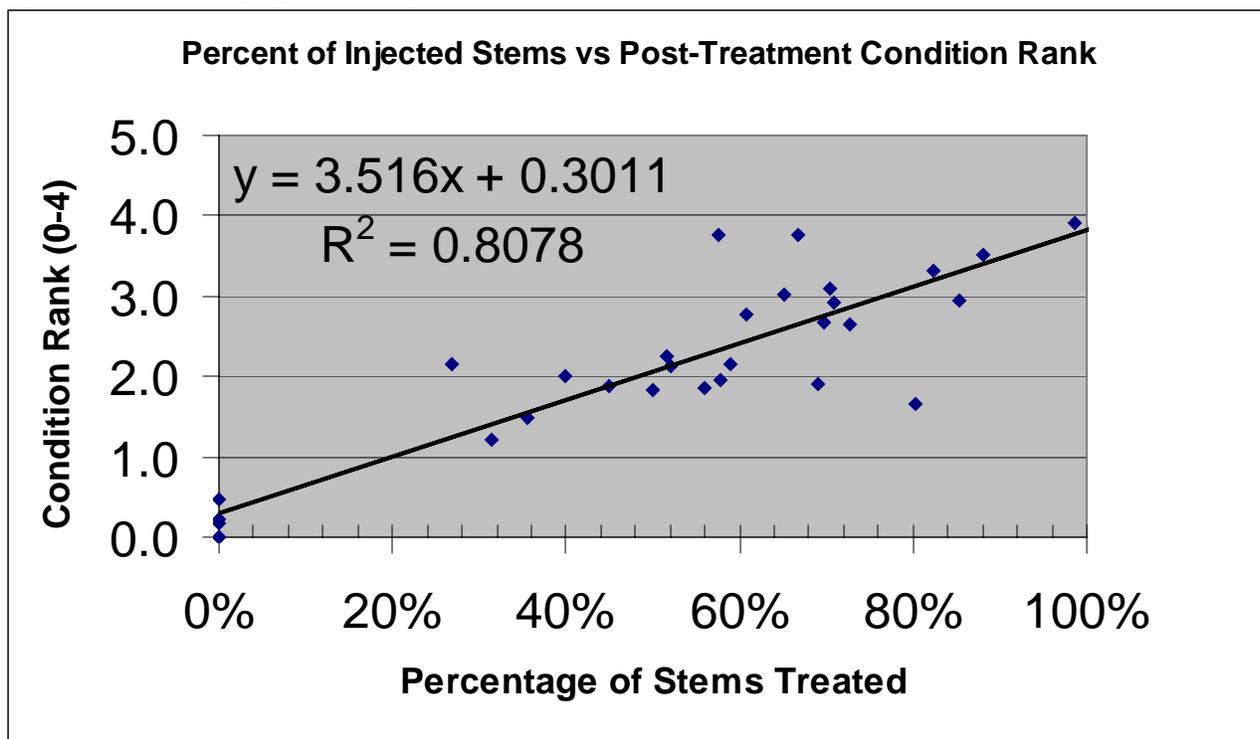
This tool has many advantages over a needle and syringe when injecting knotweed. The cartridge can hold enough herbicide to treat over 200 stems before refilling, versus a 60cc syringe, which could only treat 12 stems at a time at the 5ml dosage. The needle design on this tool allows the user to poke a hole and deliver herbicide with one movement, instead of using one tool to poke a hole, then inserting the needle into that same hole to inject herbicide. The treatment amount on this tool can be adjusted between 1 and 7 ml.

## Results

### Phase 1

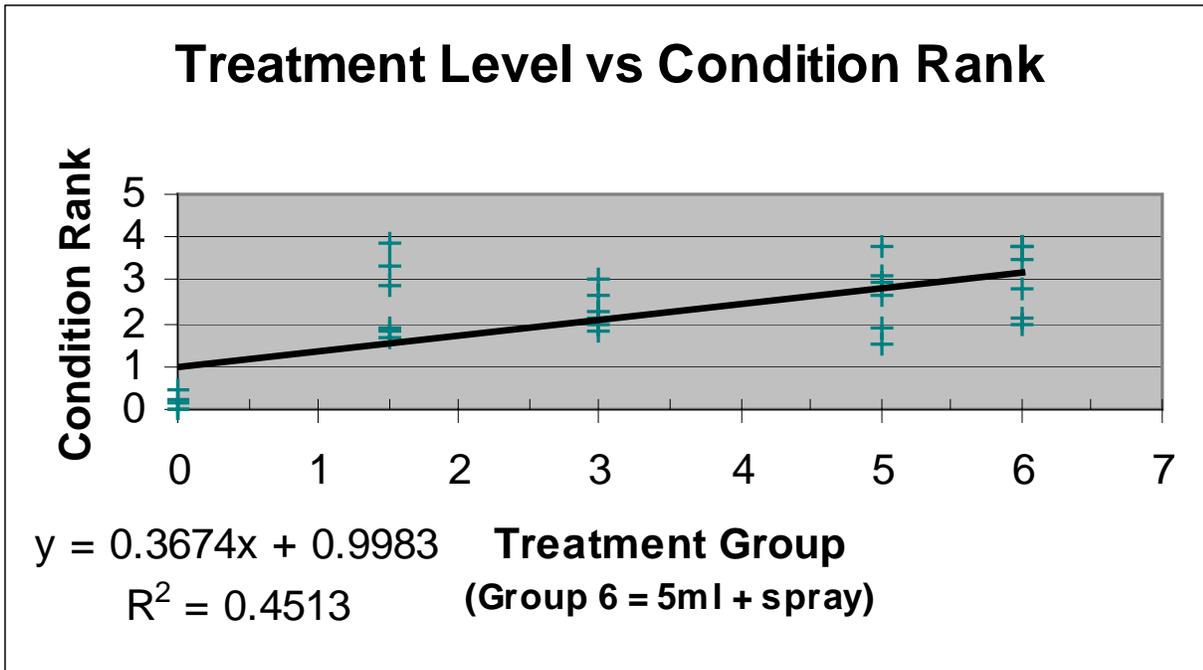
Although minor decline was noted in some control patches (probably due to drought stress on cobbly, poor soils), the treatment effect is clearly very strong, but at this point only on stems that are actually treated. After three weeks, there was a closer relationship of number of stems injected to control effectiveness (Figure 4,  $r = 0.81$ ) than to dosage (Figure 5,  $r = 0.45$ ). The 5ml + spray group is the only group to have all stems treated and had the highest ranking (and lowest standard deviation as well).

Figure 4: Phase 1 graph showing stem treatment scores.



This figure shows the close correlation between the number of stems treated and the summary treatment score. With a few exceptions, as the percentage of treated stems increases, so does the condition ranking, which was calculated using a formula to produce a single number where: Treatment Score = (% of stems in condition group 1) + (2\* percentage of stems in condition group 2) + (4\*percentage of stems in condition group 3). A completely dead plant would receive a score of four (4) and a perfectly healthy plant a zero (0). Our treatment score weights condition rank of 3 twice as much as condition rank 2 and 4 times that of rank 1. This was done because anything less than full control is considered an inadequate treatment.

Figure 5: Phase 1 graph showing the range of treatment scores for each group.



Treatment groups are 0ml, 1.5ml, 3ml, 5ml, and 5ml plus foliar spray (shown as 6 on the graph). This figure shows the similarity between treatment groups and suggests that for short term response, treating each stem is more important than how the stem is treated. These initial results, collected only three weeks after treatment, could be misleading. It seems unlikely that a treatment of 1.5 ml will be as effective as a treatment of 5ml plus a foliar spray when looking at these same sites next year. Final results will not be clear until at least July of 2004.

**Table 6: Summary Statistics for Phase 1 Preliminary Results**

Treatment Group	Shoot Number	Shoot Number	Injected Number	Injected Percent	Treatment Score by Percent	
	MEAN	STDEV	MEAN	MEAN	MEAN	STDEV
Control	53.00	26.96	0.00	0.00	0.14	0.20
1.5	53.67	27.62	40.50	0.75	2.58	0.52
3	83.50	79.41	49.17	0.57	2.32	0.33
5	65.17	35.54	37.83	0.68	2.64	0.61
5+S	47.67	38.32	26.67	0.60	2.99	0.29
Overall Average	60.60		30.8	0.52	2.14	
Overall Stdev	44.55		29.4	0.31	1.22	
Avg. Treated Groups	62.5	48.2	38.5	0.65	2.64	0.76

n = 6 for all groups, n = 30 total, n-treatment = 24

The overall effect of treatment on a patch was calculated using a formula to produce a single Treatment Score = (% of stems in condition group 1) + (2\* percentage of stems in condition group 2) + (4\*percentage of stems in condition group 3). A completely dead plant would receive a score of four (4) and a perfectly healthy plant a zero (0). Our treatment score weights condition rank of 3 twice as much as condition rank 2 and 4 times that of rank 1. This was done because anything less than full control is considered an inadequate treatment.

### ***Phase 2***

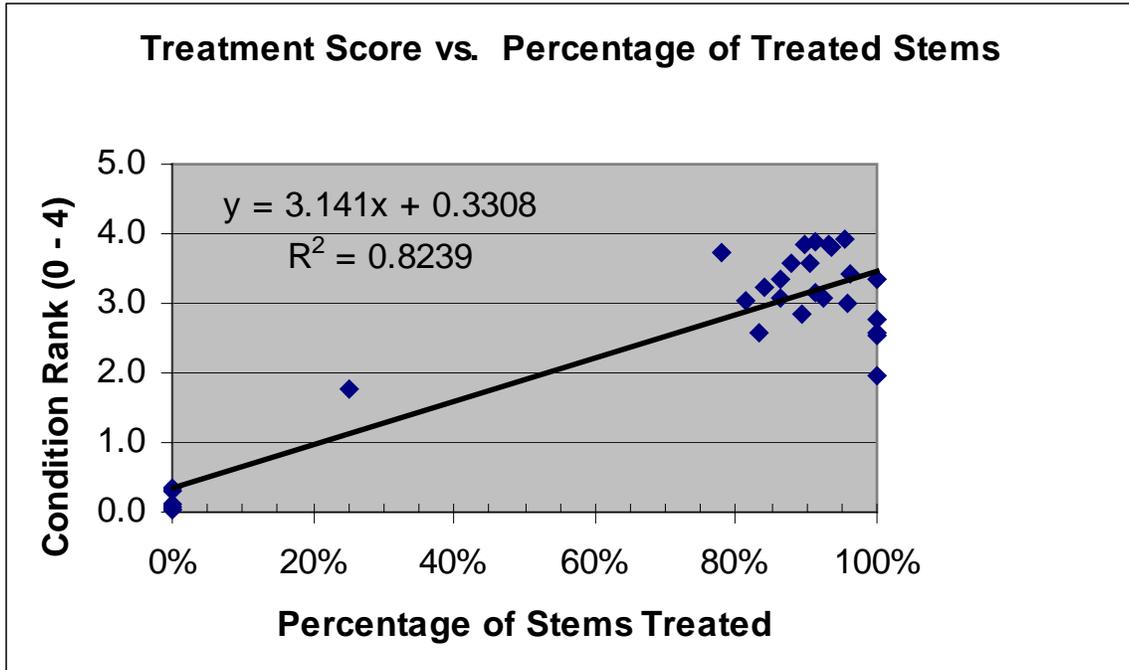
Since treatments continued through the end of the 2003 season, no follow-up data has been collected, so preliminary results are not available at this time. Follow-up data will be recorded beginning in the 2004 field season.

### ***Phase 3***

Once again, as in Phase 1, there was minor decline in some of the control patches after three weeks (probably due to drought stress on cobbly, poor soils). However the treatment effect is clearly very strong, but once again only on stems that are actually treated. Much like Phase 1, there was little variation between the results of the different treatments. Average treatment score by percent ranged from 2.36 for the 1.5ml group, to 2.86 for the 5ml + spray group.

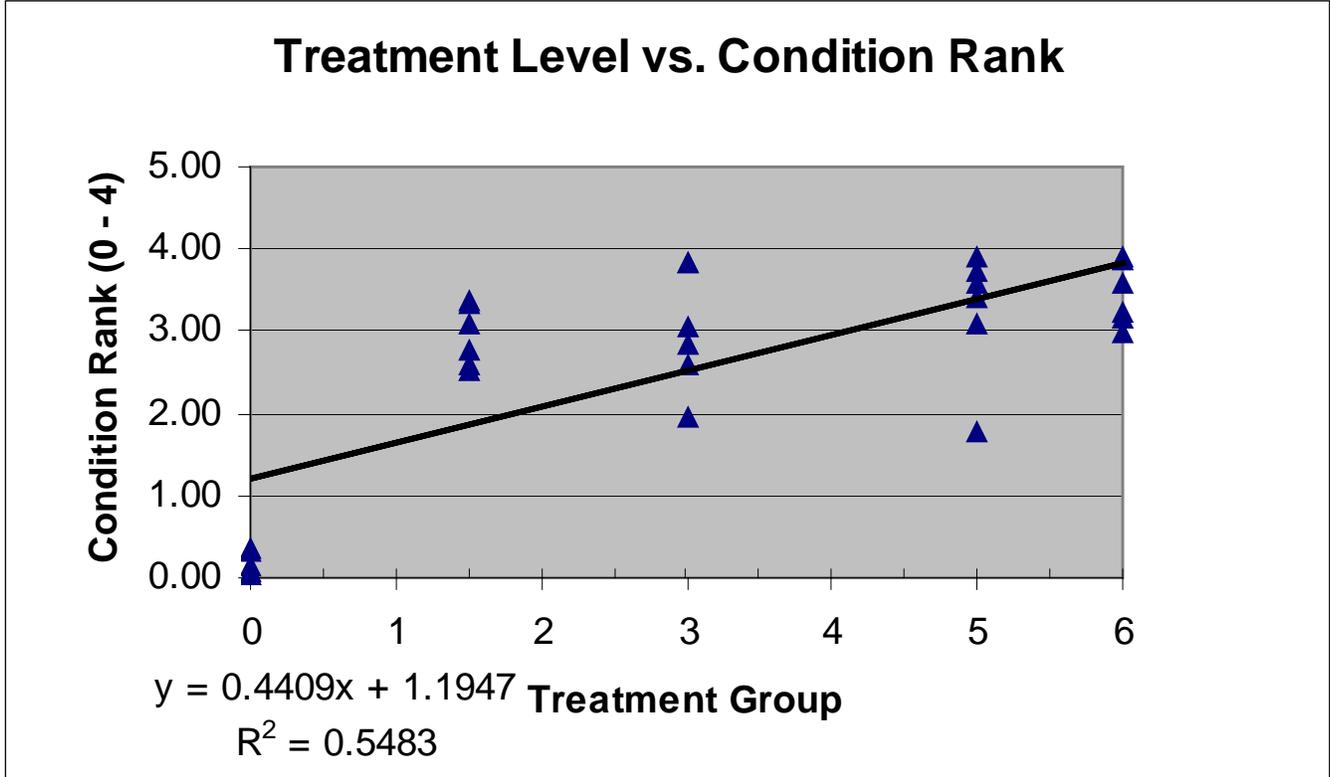
The overall effect of treatment on a patch was calculated using the same formula as described above for the Phase 1 summary.

Figure 6: Phase 3 graph showing treatment scores.



This graph shows the relation between the amount of stems treated and the overall treatment score of a site. The formula for condition ranking was the same as used for Phase 1, (see Figure 1). The high R value exists primarily because the control plots (0% treated) were included in the graph. The majority of sites had between 80 and 100 percent of stems treated, and the treatment scores were quite similar. Keep in mind that Phase 3 plots were scored on October 6, 2003, late in the season when many knotweed plants were going into senescence. This could account for similar scoring across treatment groups due to the fact that many of the plants had yellowing or wilting leaves due to dry conditions in rocky soils as well as the different glyphosate treatments. Once again, results will not be truly clear until mid-summer of 2004.

Figure 7: Phase 3 graph showing the range of treatment scores for each treatment group.



Treatment groups are 0ml, 1.5ml, 3ml, 5ml, and 5ml plus foliar spray (shown as 6 on the graph). This graph once again shows the similarity between treatment groups and the condition rank for each site. As could be expected, the 5ml plus foliar spray group had the highest scores, however the other treatment groups are not far behind. These results may change when we re-visit sites and score them again next summer.

**Table 7: Summary Statistics for Phase 3 Preliminary Results**

Treatment Group	Shoot Number	Shoot Number	Injected Number	Injected %	Treatment Score by Percent	
	MEAN	STDEV	MEAN	MEAN	MEAN	STDEV
Control	65.25	38.47	0.00	0%	0.14	0.15
1.5	58.67	29.80	57.17	98%	2.36	0.37
3	66.17	21.12	59.17	91%	2.39	0.73
5	63.33	34.58	44.83	78%	2.50	0.77
5+S	60.00	28.40	53.67	91%	2.68	0.39
Overall Average	62.34		41.55	71%	2.01	
Overall St. Dev.	28.63		30.14	39%	1.01	
Average of just Treated Groups	62.04	53.71	42.97	89%	3.16	0.59

n =6 for all groups, n = 30 total, n-treatments = 24

## **Follow-up plans**

### ***Phases 1 and 3***

These sites will be spot checked periodically through the 2004 field season beginning as early as May, 2004. Stem counts and ranking will be repeated in May or June, and then again in October.

### ***Phase 2***

These sites will be visited again beginning in May of 2004. Data will be collected as described for Phases 1 and 3 above, including stem counts, patch size, and notes on the overall health of the knotweed plants. Data will be recorded in order to provide information on the efficacy of the different treatments. Additional treatments will be performed if necessary.

## **Discussion**

The preliminary results of Phase 1 of this experiment, current research by Clark County Weed Management, and earlier work by Monsanto and Clark County consistently demonstrate that individual untreated stems are not affected by the stem injection treatment on the plant as a whole. Since our observations suggest that many small stems will not grow to be adequate size for injection during the course of a given field season, we added the foliar treatment of small stems to all sites in Phase 2. We believe that treating all stems with stem injection, foliar application, or a combination of the two methods is important when working to eliminate an established patch of knotweed.

Our short-term results for mid-summer treatment (Phase 1) showed that 1.5ml, 3ml, 5ml, and even 5ml + spray treatments had similar initial effectiveness. However, Clark County's data results suggest that even 3ml is not as effective as 5ml (spring treatment). Not wanting to test an ineffective method on a large scale for Phase 2, we used 3ml and 5ml as our treatment amounts. Because of the close relationship between herbicide effect and treatment (or lack thereof) of a given stem, we chose to conduct further testing of 3ml and 5ml amounts with the additional foliar treatments of smaller stems in all sites of Phase 2.

Besides treatment amount / rate, treatment timing can have a significant role in determining the effectiveness of any herbicide treatment. By starting Phase 1 in July, Phase 3 in September, and spreading out treatments in Phase 2 from August through October, we hope to obtain valuable information regarding treatment timing. Combined with the work of Clark County, data we collect during the 2004 field season will likely tell us not only how much glyphosate is needed to effectively treat knotweed with the stem injection method, but should also define the window of opportunity for that method.

Table 8: Phase 1 Pre-Treatment Data

**Phase 1 Site Data Prior to Treatment**

Data collected on 7/8,14,17/2003 by The Nature Conservancy and Metro on the Clackamas River

Plot#	Site Location	Treatment Assigned (0-5ml)	Total Stems	Avg Height (m)	Avg Dia.* (cm)	Length (m)	Width (m)	Shading	Soil type*	Site Comments
1	Houton Is	0	59	2.5	3.5	3	2	P	C/G	Flag on cottonwood 2 m E of patch. 15m from channel, drier center part of island. 1/2 surrounded by scots broom.
2	Houton Is	1.5	28	2	1.5	1.5	1.5	N	C	Flag on knotweed. Located on edge of cobble floodplain intersecting grass vegetation. At least 50m from channel on either side.
3	Houton Is	3	38	2.5	1	2	2	N	C	Flag on small cottonwood directly on east side. Near large log. 20m from channel, adjacent to butterfly bush. Right side of island.
4	Houton Is	1.5	92	2.5	2	3	3	N	S/G	Right at level where winter high water deposits sediment. At this time 20m from channel. Right side of island. Flag on cottonwood SW.
5	Houton Is	5	132	2	1	3	3	P	C/S	Right side of island. Flag on willow immediately upstream. Bound by willows on right side. Scots broom on left. Beaver chewed. 30m from channel.
6	Houton Is	5	37	2.5	2	8	4	P	C/S	One large patch in center, one grouping on either side, all included in general-more center of island. Flag on cottonwood to right.

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7	Richardson Is	3	124	2.4	1.8	3.5	3	N	C/W	
8	Richardson Is	1.5	72	2.4	1.8	2.5	2.5	N	C/S	Upstream- center of island.
9	Richardson Is	0	46	2.8	2	3.5	3	P	S	DS 30m from #8. Past big patch in rootwad.
10	Richardson Is	5	42	2.5	3	2	2.5	P	S	
11	Richardson Is	0	56	3	3	3	2	Y	S	
12	Richardson Is	3	47	3	2	5	8	P	S	Includes 3 patches. Flag on SB long blue 10m upstream of #31.
13	Richardson Is	0	32	2.5	2.5	3	2	P	S	15m upstream of #32. Flag on POCU 10m from willow with pink flag. (pipeline?)
14	Richardson Is	5	103	2	1.75	5	5	N	C/S	15m up wetland delineation flag- near big patch on left island near water in front of log jam.
15	Richardson Is	3	185	4	4	7	5	P	S/G	On point of island. Flag on POCU.
16	Richardson Is	5 / F	121	3	3	5	4	N	S	25m down point
17	Richardson Is	5 / F	33	4	3	4	4	P	S/C	8m right of #36
18	Richardson Is	1.5	38	3	3	3	4	N	C	On very top above cut bank. Some shoots on bank.

19	Richardson Is	0	35	2.5	2	3	2	P	S/M	Site on small slope, grouping of 2m tall POCU. 2m E of plot patch is not part of the test plot.
20	River Is channel	1.5	24	2	2	1	1	P	G/S	25m from channel- 50 ft. Cottonwood 3m SW of the patch. Area dry and full of SB.
21	River Is channel	3	31	1.8	1.5	1	1	P	C/S	25m upstream along and towards channel from #20. Cottonwoods and small alders surround-dead cottonwood behind site w/ flag
22	River Is channel	5 / F	50	2.1	1	2.5	2	N	C/S	Line of butterfly bush between channel and site. 40m upstream of #21.
23	River Is channel	5 / F	23	2.1	2	2	2	N	G/S	Across channel are trees - Exposed cliffs are to the N and S.
24	River Is channel	1.5	72	2.5	2	3	2	N	C/S/M	"Lower" level 50m upstream of #23. Past "dams" on the channel. Some very small stems on perimeter.
25	Barton Floodplain	5	45	2.5	2.5	1.5	1.5	P	C/S/M	Across and DS of Barton. Furthest upstream patch close to the treeline. Lots of smaller shoots. Plants beginning to flower.
26	Barton Floodplain	5	65	2	1.8	2.5	2	P	C/S/M	5m DS from #25. Beneath big old alder. Patch spreads back into nettles and Him Blackberry.
27	Barton Floodplain	5 / F	29	2	2	4	2	P	C/S/M	60m DS from #26 at treeline on hillside. Only included plants below hill. Do not count stems growing behind on top of hillside. Laid blue flagging behind patch to indicate border. Everything on the river side of tape was treated. Tall

										plants behind flagging were left alone.
28	Barton Floodplain	0	100	2.1	2	2.5	2.5	P	C/S/M	25m DS of #27. Base of hill at treeline. Huge split cedar tree in background - 30m away from river.
29	Barton Floodplain	3	29	2	2	2	1	P	C/S/M	3 dead alders behind site on treeline at base of hill. 30 m DS of #28- back in among small willow trees.
30	Barton Floodplain	5 / F	25	2.5	2	0.5	0.5	P	C/S/M	30m DS of #29. Tall patch close to willows on treeline. Most stems are big- some still holding water.
<b>Total</b>			1813	74.7	64.65	92.5	80			
<b>Average</b>			60.43	2.49	2.16	3.08	2.67			
<b>STDEV</b>			39.72	0.54	0.71	1.65	1.52			

C= Cobble S= Sand G= Gravel M= Mud Is = Island

\*Average diameter of stems was estimated at point where injection would take place.

Table 9: Phase 1 Treatment Data

**Phase 1 data for treatments**

Collected on 7/17/2003 by The Nature Conservancy and Metro on the Clackamas River

Plot#	Site Location	Treatment (0-5ml)	Total Stems	Total # of Injected Stems	Stems untreated	% injected	Total # ml* herb left out	Avg Height	Length (m)	Width (m)	Shading	Treatment Comments
1	Houton Is	0	59	43	16	72.88	0	2.5	3	2	P	
2	Houton Is	1.5	28	20	8	71.43	3	2	1.5	1.5	N	
3	Houton Is	3	38	23	15	60.53	7	2.5	2	2	N	
4	Houton Is	1.5	92	69	23	75.00	1	2.5	3	3	N	
5	Houton Is	5	132	53	79	40.15	21	2	3	3	P	
6	Houton Is	5	37	29	8	78.38	0	2.5	8	4	P	
7	Richardson Is	3	124	86	38	69.35	5	2.4	3.5	3	N	Lots of beaver-chewed stems. If alive, were injected
8	Richardson Is	1.5	72	70	2	97.22	0	2.4	2.5	2.5	N	
9	Richardson Is	0	46	33	13	71.74	0	2.8	3.5	3	P	
10	Richardson Is	5	42	39	3	92.86	1	2.5	2	2.5	P	Patch 3m east (90 degrees) from main patch is not included
11	Richardson Is	0	56	52	4	92.86	0	3	3	2	Y	Site has several scattered shoots included in test site that are within 1m of groupings.

12	Richardson Is	3	47	32	15	68.09	1	3	5	8	P	
13	Richardson Is	0	32	27	5	84.38	0	2.5	3	2	P	
14	Richardson Is	5	103	36	67	34.95	6	2	5	5	N	
15	Richardson Is	3	185	126	59	68.11	4	4	7	5	P	2 injected twice. Does not include patch NE 2m
16	Richardson Is	5 / F	121	71	50	58.68	12	3	5	4	N	
17	Richardson Is	5 / F	33	19	14	57.58	5	4	4	4	P	
18	Richardson Is	1.5	38	28	10	73.68	2	3	3	4	N	
19	Richardson Is	0	35	28	7	80.00	0	2.5	3	2	P	15m DS of # 12
20	River Is channel	1.5	24	17	7	70.83	0	2	1	1	P	
21	River Is channel	3	31	12	19	38.71	4	1.8	1	1	P	
22	River Is channel	5 / F	50	14	36	28.00	3	2.1	2.5	2	N	
23	River Is channel	5 / F	23	14	9	60.87	4	2.1	2	2	N	
24	River Is channel	1.5	72	39	33	54.17	0	2.5	3	2	N	
25	Barton Floodplain	5	45	31	14	68.89	0	2.5	1.5	1.5	P	
26	Barton Floodplain	5	65	39	26	60.00	3	2	2.5	2	P	
27	Barton Floodplain	5 / F	29	20	9	68.97	0	2	4	2	P	

28	Barton Floodplain	0	100	65	35	65.00	0	2.1	2.5	2.5	P	
29	Barton Floodplain	3	29	16	13	55.17	0	2	2	1	P	
30	Barton Floodplain	5 / F	25	22	3	88.00	3	2.5	0.5	0.5	P	
<b>Total</b>			1813	1173	640		85	74.7	92.5	80		
<b>Average</b>			60.43	39.10	21.33	66.88	2.83	2.49	3.08	2.67		
<b>STDEV</b>			39.72	25.61	20.06	16.79	4.43	0.54	1.65	1.52		

Shading Key: Y= Yes N= No P=Partial

\*Total # ml left out refers to the amount that did *not* make it in to partially treated stems.

Table 10: Phase 1 Post Treatment Data Summary  
Data collected 8/11 and 8/12/2003

Site #	Treatment	Stem #	# Injected	% Injected	Treatment Score	Treatment Score %
1	0	41	0	0.0%	0.46	0.46
9	0	45	0	0.0%	0.00	0.00
11	0	58	0	0.0%	0.31	0.17
13	0	32	0	0.0%	0.00	0.00
19	0	37	0	0.0%	0.27	0.22
28	0	105	0	0.0%	0.00	0.00
2	1.5	29	20	69.0%	1.93	1.90
4	1.5	86	69	80.2%	1.86	1.65
8	1.5	71	70	98.6%	2.93	3.90
18	1.5	34	28	82.4%	2.74	3.32
20	1.5	24	17	70.8%	2.42	2.92
24	1.5	78	39	50.0%	1.65	1.82
3	3	39	23	59.0%	2.10	2.15
7	3	132	86	65.2%	2.66	3.02
12	3	44	32	72.7%	2.23	2.66
15	3	225	126	56.0%	1.83	1.85
21	3	30	12	40.0%	1.83	2.00
29	3	31	16	51.6%	1.81	2.26
5	5	118	53	44.9%	1.70	1.87
6	5	34	29	85.3%	2.32	2.94
10	5	38	39	100.0%	2.87	3.69
14	5	101	36	35.6%	1.18	1.50
25	5	44	31	70.5%	2.36	3.09
26	5	56	39	69.6%	2.18	2.68
16	5 / F	123	71	57.7%	2.21	1.97
17	5 / F	33	19	57.6%	2.94	3.76
22	5 / F	52	14	26.9%	2.44	2.15
23	5 / F	23	14	60.9%	2.70	2.78
27	5 / F	30	20	66.7%	2.90	3.77
30	5 / F	25	22	88.0%	2.88	3.52
	Total =	1818	925	50.9%		
	AVG.=	60.6	30.83		1.86	2.13

Table11: Summary Statistics for Phase 2 Treatment Data

**Phase 2 2003 Stem Injection Data**

Metro Phase 2 Data from Clackamas River

REACH #	total # injected	3 ml	5 ml	# sprayed	# not treated	Area m <sup>2</sup>
1	0	0	0	0	0	0
2	9	0	9	0	2	0.75
3	1	0	1	0	3	0.25
4	1	0	1	0	0	0.25
5	0	0	0	0	0	0
6	5	0	5	0	0	2
7	0	0	0	0	0	0
8	830	0	830	0	800	80
9	1417	0	1417	0	2913	209
10	163	0	163	0	272	38
11	1394	4	1390	0	759	183.75
12	1792	1761	31	835	30	127.5
13	306	171	135	162	0	97.5
14	2817	1190	1627	540	1351	546.25
15	1794	40	1754	111	1133	357
16	128	0	128	0	331	90.75
19	2804	0	2804	100	0	216
<b>TOTAL</b>	<b>13461</b>	<b>3166</b>	<b>10295</b>	<b>1748</b>	<b>7594</b>	<b>1950 m<sup>2</sup> = .5 acres</b>

**TNC Phase 2 Summary Data from Sandy River**

Macro site #	# of microsites	total # injected	Stems Injected		# sprayed	total # of shoots treated	# of patches	Injected POCU Basal Area (m <sup>2</sup> )
			3 ml	5 ml				
6	2	11	0	11	3	14	2	1.1
7	6	558	0	558	460	1018	64	23
15	2	278	278	0	741	1019	124	12.8
17	2	374	374	0	1191	1565	217	26
19	1	611	611	0	1699	2310	167	52
40	1	71	0	71	23	94	4	1
41	1	39	0	39	0	39	1	0.5
42	3	137	87	50	348	485	40	10

43	1	298	0	298	302	600	62	15
44	1	11	11	0	60	71	28	1
45	5	789	159	630	410	1199	209	22.7
46	5	536	275	261	1680	2216	99	26
48	1	8	0	8	8	16	1	0.5
49	1	3	3	0	1	4	1	0.1
50	1	117	117	0	6	123	9	13
51	1	1400	1400	0	240	1640	95	140
52	1	185	0	185	65	250	8	10
53	2	53	25	28	5	58	4	0.25
54	1	9	9	0	0	9	1	0.25
55	2	83	24	59	8	91	3	1.1
56	3	351	0	351	141	492	17	8
57	6	545	109	436	714	1259	75	18
58	6	4223	65	4158	1093	5316	129	168.6
59	3	733	315	418	461	1194	63	41.5
60	1	400	0	400	2	402	59	15
61	1	181	0	181	3	184	1	9
CE	10	3220	322	2898	1562	4782	266	177.3
SL	17	3953	1053	2900	2315	6268	170	155.7
SM	3	103	16	87	89	192	8	3.8
<b>TOTAL</b>	<b>90</b>	<b>19280</b>	<b>5253</b>	<b>14027</b>	<b>13630</b>	<b>32910</b>	<b>1927</b>	<b>953.2</b>

**Metro Phase 2 #'s**

<b>TOTAL</b>		<b>13461</b>	<b>3166</b>	<b>10295</b>	<b>7594</b>	<b>21055</b>		<b>1950</b>
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<b>GRAND TOTALS</b>		<b>32741</b>	<b>8419</b>	<b>24322</b>	<b>21224</b>	<b>53965</b>		<b>2903.2</b>
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<b>TOTAL LITERS=</b>	<b>25.26</b>	<b>121.61</b>	<b>146.87</b>
<b>TOTAL QUARTS=</b>			<b>155.19</b>
<b>TOTAL GALLONS=</b>			<b>38.80</b>

Table 12: Phase 3 Pre-Treatment Data

site #	site conditions		(river reference)		Total shoot #	avg. height (m)	avg. dia (cm)	Test Site comments (characteristics, flag location, etc.)
	Shading no,yes,part	Soil type s,m,c,g	length (m)	width (m)				
1	part	s	2	1.5	127	2.5	2.25	Patch directly inland from #2. Flag on small cottonwood. 20m inland from river.
2	part	s/c	2	1	36	2	2.4	Flag on cottonwood. Patch across from #1. Dead log lies through patch
3	No	s	0.5	0.5	32	3	2.5	Site is 7m US of #2. Flag on cottonwood 3m US of patch.
4	part	s	1	1.5	93	2.5	2.5	Flag on red osier dogwood behind POCU. 35m upstream from #1
5	No	s	1	3	70	3	3.1	Site next to #4. Flag on cottonwood 3m US of patch.
6	No	c	1.5	1.5	106	2	2.2	Flag on willow next to patch US. Flagged stems not included.
7	part	s	1	1	65	2.5	2	Flag on cottonwood. Small patch near flagged cottonwood not included.
8	part	s	3.5	1	89	3	2.5	Flag on huckleberry inland behind patch. 3 patches. DS from #4
9	No	s	2.5	1	92	2	2.5	Flag on cottonwood 5m east of patch next to photomarker stake.
10	No	s	1	1	38	2.5	2.5	Flag on cottonwood directly DS from patch.
11	No	c/s	1.5	0.5	59	2.5	2.4	Flag on patch next to #12 on DS end.
12	No	s	1	1	47	3	3	Flag on cottonwood US from patch. There are a few little ones. Shoot between 12 & 13 not included in either.
13	No	c/s	0.5	0.5	23	2.1	2.2	Flag on patch next to #12 on US end.

14	No	c/s	0.5	0.5	31	2	2.4	Flag on cottonwood 2m DS
15	No	s	1	1	23	3	2.25	Flag on POCU. Site in between 14 & 15.
16	No	c/s	1.5	1.5	62	2	2.2	Flag on patch next to 15 on US end.
17	No	c/s	0.5	1.5	37	2	2.6	Flag on 10m tall cottonwood that is 5m east of patch.
18	No	s	1	1	117	1.5	0.75	Flag on willow towards river. Patch fairly dry- many leaves partly brown. <50% injectable.
19	part	c	1.5	2.5	112	2.5	2.8	Flag on cottonwood. Site 8m US of #18
20	part	s	1	1	72	3	3	Flag on cottonwood. Patch in group of cottonwood and willows about 30m from river.
21	part	s	1	1	22	2.5	2.5	Flag on willow towards river 1m. Site US of #20 by 10m.
22	part	s	1.5	1	96	3	3	Yellowing leaves. Flag on cottonwood just US from patch.
23	part/No	c	1	1	76	2.5	2.8	Flag on cottonwood 5m east of patch. Site next to #22 on US end.
24	part/No	c	1	1	77	1.75	2.2	Flag on cottonwood 3m east of patch and 7m US of #23.
25	part	s	1.5	1.5	80	3.5	3.5	DS and inland from #24. Flag on cottonwood just US.
26	part/No	c/s	1	1	43	1.75	2	Flag on douglas fir 5m US from patch.
27	No	s	1	1	43	3	2.5	Flag on willow DS from POCU
28	part	c/s	1.5	1.5	88	2.3	2.4	Flag on willow near water and 10m DS of #21
29	Yes	s	0.75	0.75	21	1.75	2.1	Flag on dogwood near #3. Blackberry growing through.
30	part	s	1	3	62	3	3	DS from #4. Flag on POCU. Patch surrounded by POCU.

Soil Types : s=sand, m=mud, c=cobble, g=gravel  
Average diameter was estimated at injection site

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Table 13: Phase 3 Treatment Data

**Phase 3 Treatment Data from 9/15,16/2003**

Data collected by The Nature Conservancy and Metro at Calcagno Floodplain, Clackamas River

Plot#	Treatment (0-5ml)	Total Stem #	Total # of Injected Stems	Stems Un-treated or sprayed	% injected	Total # ml herb left out	Avg Height	Avg Diameter	Length (m)	Width (m)	Shading	Treatment Comments
1	5 / F	104	84	20	80.7	3	2.5	2.25	2	1.5	part	Patch directly inland from #2. Flag on small cottonwood. 20m inland from river.
2	1.5	38	37	1	97.3	1	2	2.4	2	1	part	Flag on cottonwood. Patch across from #1. Dead log lies through patch
3	0	32	31	1	96.8	0	3	2.5	0.5	0.5	No	Site is 7m US of #2. Flag on cottonwood 3m DS of patch.
4	0	96	78	18	81.2	0	2.5	2.5	1	1.5	part	Flag on red osier dogwood behind POCU. 35m upstream from #1
5	1.5	72	68	4	94.4	1	3	3.1	2	3	No	Site next to #4. Flag on cottonwood 3m US of patch.
6	0	103	76	27	73.8	0	2	2.2	1.5	1.5	No	Flag on willow next to patch US. Flagged stems not included.
7	5 / F	75	69	6	92.0	2	2.5	2	1	1	part	Flag on cottonwood. Small patch near flagged cottonwood not included.

<b>8</b>	<b>1.5</b>	86	84	2	97.6	0	3	2.5	3.5	1	part	Flag on huckleberry inland behind patch. 3 patches. DS from #4
<b>9</b>	<b>3</b>	90	70	20	77.7	0	2	2.5	2	2.5	No	Flag on cottonwood 5m east of patch next to photomarker stake.
<b>10</b>	<b>5</b>	36	28	8	77.7	4	2.5	2.5	1	1	No	Flag on cottonwood directly DS from patch.
<b>11</b>	<b>0</b>	58	57	1	98.2	0	2.5	2.4	1.5	0.5	No	Flag on patch next to #12 on DS end.
<b>12</b>	<b>3</b>	44	42	2	95.4	0	3	3	1	1	No	Flag on cottonwood US from patch. There are a few little ones. Shoot between 12 & 13 not included in either.
<b>13</b>	<b>5</b>	20	19	1	95.0	0	2.1	2.2	0.5	0.5	No	Flag on patch next to #12 on US end.
<b>14</b>	<b>1.5</b>	46	38	6	82.6	1	2	2.4	1.5	2	No	Site includes small patch 0.5 m toward treeline from main patch. Flag on cottonwood 2m DS
<b>15</b>	<b>0</b>	23	23	0	100	0	3	2.25	1	1	No	Flag on POCU. Site in between 14 & 15.
<b>16</b>	<b>5 / F</b>	59	53	6	89.8	2	2	2.2	1.5	1.5	No	Flag on patch next to 15 on US end.
<b>17</b>	<b>5 / F</b>	33	31	2	93.9	4	2	2.6	0.5	1.5	No	Flag on 10m tall cottonwood that is 5m east of patch.
<b>18</b>	<b>5</b>	114	29	85	25.4	2	1.5	0.75	1	1	No	Flag on willow towards river. Patch fairly dry- many leaves partly brown. <50%

													injectable.
<b>19</b>	<b>0</b>	111	107	4	96.4	0	2.5	2.8	1.5	2.5	part		Flag on cottonwood. Site 8m US of #18
<b>20</b>	<b>5 / F</b>	68	64	4	94.1	0	3	3	1	1	part		Flag on cottonwood. Patch in group of cottonwood and willows about 30m from river.
<b>21</b>	<b>5 / F</b>	22	21	1	95.4	0	2.5	2.5	1	1	part		Flag on willow towards river 1m. Site US of #20 by 10m.
<b>22</b>	<b>1.5</b>	98	95	3	96.9	0	3	3	1.5	1	part		Yellowing leaves. Flag on cottonwood just US from patch.
<b>23</b>	<b>5</b>	76	74	2	97.3	5	2.5	2.8	1	1	part/No		Flag on cottonwood 5m east of patch. Site next to #22 on US end.
<b>24</b>	<b>3</b>	73	68	5	93.1	0	1.75	2.2	1	1	part/No		Flag on cottonwood 3m east of patch and 7m US of #23.
<b>25</b>	<b>5</b>	83	77	6	92.7	0	3.5	3.5	1.5	1.5	part		DS and inland from #24. Flag on cottonwood just US.
<b>26</b>	<b>5</b>	43	42	1	97.6	1	1.75	2	1	1	part/No		Flag on douglas fir 5m US from patch.
<b>27</b>	<b>3</b>	43	43	0	100	0	3	2.5	1	1	No		Flag on willow DS from POCU
<b>28</b>	<b>3</b>	97	84	13	86.6	8	2.3	2.4	1.5	1.5	part		Flag on willow near water and 10m DS of #21
<b>29</b>	<b>1.5</b>	22	21	1	95.4	0	1.75	2.1	0.75	0.75	Yes		Flag on dogwood near #3. Blackberry growing through. Site includes 1 stem (.5m tall) growing 0.5m toward treeline from main patch.

<b>30</b>	<b>3</b>	60	48	12	80.0	0	3	3	1	3	part	DS from #4. Flag on POCU. Patch surrounded by POCU.
		Total Stem #	# Inject- ed	Stems Un- Treated	% Injec ted	Total ml. left out	Avg. Height	Avg. Dia.	Length (m)	Width (m)		
<b>Total</b>		<b>1925</b>	<b>1661</b>	<b>262</b>		<b>34</b>			<b>38.75</b>	<b>39.75</b>		
<b>Average</b>			<b>55.37</b>	<b>8.73</b>	<b>89.2</b> <b>1</b>	<b>1.13</b>	<b>2.46</b>	<b>2.47</b>	<b>1.29</b>	<b>1.33</b>		
<b>ST.</b>	<b>DEV.</b>	<b>29.55</b>	<b>24.79</b>	<b>15.99</b>	<b>14.2</b>	<b>1.93</b>	<b>0.51</b>	<b>0.48</b>	<b>0.60</b>	<b>0.67</b>		



Table 14: Phase 3 Post-Treatment Data  
Data collected by The Nature Conservancy and Metro on 10/6/2003

Site #	Treatment	Stem #	# Injected	% Injected	Trt Score	Trt Score %	Overall Rankings (0-3)
3	0	31	0	0.0%	0.13	0.13	0.3,0.3,0.4
4	0	96	0	0.0%	0.02	0.02	0,0,0
6	0	103	0	0.0%	0.06	0.08	0,0,0
11	0	55	0	0.0%	0.36	0.36	0.1,0.2,0.1
15	0	23	0	0.0%	0.04	0.04	0,0,0
19	0	111	0	0.0%	0.24	0.32	0,0,0
2	1.5	37	37	100.0%	2.06	2.58	1,1,1
5	1.5	68	68	100.0%	2.22	2.76	2.0,2.1,1.9
8	1.5	91	84	92.3%	2.40	3.08	2,2,2
14	1.5	44	38	86.4%	2.68	3.36	2,2,2
22	1.5	95	95	100.0%	2.15	2.53	2,2,2
29	1.5	21	21	100.0%	2.67	3.33	2.4,2.7,2.8
9	3	84	70	83.3%	2.13	2.60	2.7,2.6,2.2
12	3	42	42	100.0%	1.76	1.95	2,1,1
24	3	73	68	93.2%	2.89	3.84	3,3,3
27	3	46	43	93.5%	2.91	3.83	2.9,2.8,2.7
28	3	94	84	89.4%	2.29	2.83	2,2,2
30	3	59	48	81.4%	2.37	3.05	2,2,2
10	5	36	28	77.8%	2.81	3.72	3,3,3
13	5	22	19	86.4%	2.45	3.09	2,2,2
18	5	114	29	25.4%	1.41	1.77	1.5,1.8,1.8
23	5	77	74	96.1%	2.68	3.42	3,3,2
25	5	85	77	90.6%	2.69	3.56	2.6,2.8,2.8
26	5	46	42	91.3%	2.93	3.89	2.9,2.9,2.8
7	5 / F	72	69	95.8%	2.40	2.99	2,2,2
16	5 / F	59	53	89.8%	2.92	3.86	3,3,3
17	5 / F	34	31	91.2%	2.53	3.15	2.5,2.5,2.6
20	5 / F	73	64	87.7%	2.75	3.58	2.8,2.8,2.7
21	5 / F	22	21	95.5%	2.95	3.91	2.9,2.9,3
1	5 / F	100	84	84.0%	2.51	3.22	2.3,2.3,2.2
<b>Totals</b>		1913	1289	67.4%	Avg.=2.01	Avg.=2.56	

# **Appendix 1**

## **Phase 1 Japanese Knotweed Injection Experiment Photo Series**

Plots 1–30

**Phase 1 Japanese Knotweed Injection Experiment Photomonitoring Series**  
**Plot # 01 - 0mL**



Photo 1, 22 July 2003      *Before treatment*  
Total Stems: 41



Photo 2, 11 August 2003      *After treatment (0mL)*  
Total Injected Stems: 0      Foliar: No  
Treatment Score: 0.46/4

Photo 3,

Photo 4,

Summary:

**Phase 1 Japanese Knotweed Injection Experiment Photomonitoring Series**  
**Plot # 02 - 1.5mL**



Photo 1, 22 July 2003 *Before treatment*  
Total Stems: 29



Photo 2, 11 August 2003 *After treatment (1.5mL)*  
Total Injected Stems: 20  
Foliar: No  
Treatment Score: 1.90/4

Photo 3,

Photo 4,

Summary:

**Phase 1 Japanese Knotweed Injection Experiment Photomonitoring Series**  
**Plot # 03 - 3mL**



Photo 1, 22 July 2003  
Total Stems: 39

*Before treatment*



Photo 2, 11 August 2003  
Total Injected Stems: 23  
Treatment Score: 2.15/4

*After treatment (3mL)*  
Foliar: No

Photo 3,

Photo 4,

Summary:

**Phase 1 Japanese Knotweed Injection Experiment Photomonitoring Series**  
**Plot # 04 - 1.5mL**



Photo 1, 22 July 2003 *Before treatment*  
Total Stems: 86



Photo 2, 11 August 2003 *After treatment (1.5mL)*  
Total Injected Stems: 69  
Foliar: No  
Treatment Score: 1.65/4

Photo 3,

Photo 4,

Summary:

**Phase 1 Japanese Knotweed Injection Experiment Photomonitoring Series**  
**Plot # 05 - 5mL**



Photo 1, 22 July 2003 *Before treatment*  
Total Stems: 118



Photo 2, 11 August 2003 *After treatment (5mL)*  
Total Injected Stems: 53  
Foliar: No  
Treatment Score: 1.87/4

Photo 3,

Photo 4,

Summary:

**Phase 1 Japanese Knotweed Injection Experiment Photomonitoring Series**  
**Plot # 06 - 5mL**



Photo 1, 22 July 2003 *Before treatment*  
Total Stems: 34



Photo 2, 11 August 2003 *After treatment (5mL)*  
Total Injected Stems: 29  
Foliar: No  
Treatment Score: 2.94/4

Photo 3,

Photo 4,

Summary:

**Phase 1 Japanese Knotweed Injection Experiment Photomonitoring Series**  
**Plot # 07 - 3mL**



Photo 1, 17 July 2003 *Before treatment*  
Total Stems: 132



Photo 2, 12 August 2003 *After treatment (3mL)*  
Total Injected Stems: 86      Foliar: No  
Treatment Score: 3.02/4

Photo 3,

Photo 4,

Summary:

**Phase 1 Japanese Knotweed Injection Experiment Photomonitoring Series**  
**Plot # 08 - 1.5mL**



Photo 1, 17 July 2003      *Before treatment*  
Total Stems: 71



Photo 2, 12 August 2003      *After treatment (1.5mL)*  
Total Injected Stems: 70      Foliar: No  
Treatment Score: 3.90/4

Photo 3,

Photo 4,

Summary:

**Phase 1 Japanese Knotweed Injection Experiment Photomonitoring Series**  
**Plot # 09 - 0mL**



Photo 1, 17 July 2003 *Before treatment*  
Total Stems: 45



Photo 2, 12 August 2003 *After treatment (0mL)*  
Total Injected Stems: 0  
Foliar: No  
Treatment Score: 0.00/4

Photo 3,

Photo 4,

Summary:

**Phase 1 Japanese Knotweed Injection Experiment Photomonitoring Series**  
**Plot # 10 - 5mL**



Photo 1, 17 July 2003  
Total Stems: 38

*Before treatment*



Photo 2, 12 August 2003  
Total Injected Stems: 39  
Treatment Score: 3.79/4

*After treatment (5mL)*  
Foliar: No

Photo 3,

Photo 4,

Summary:

**Phase 1 Japanese Knotweed Injection Experiment Photomonitoring Series**  
**Plot # 11 - 0mL**



Photo 1, 17 July 2003 *Before treatment*  
Total Stems: 58

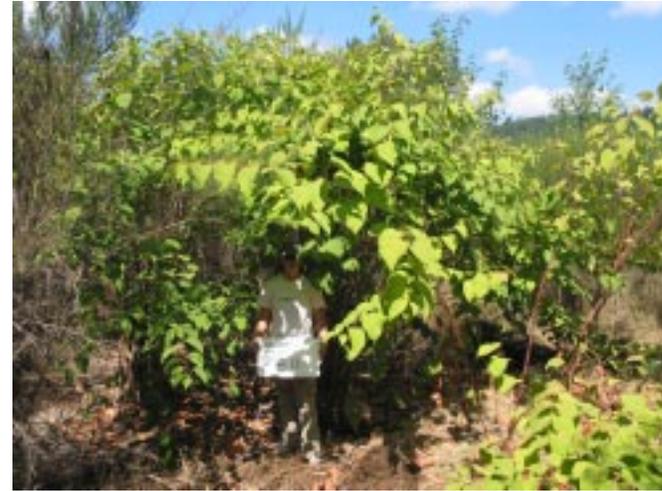


Photo 2, 12 August 2003 *After treatment (0mL)*  
Total Injected Stems: 0  
Foliar: No  
Treatment Score: 0.17/4

Photo 3,

Photo 4,

Summary:

**Phase 1 Japanese Knotweed Injection Experiment Photomonitoring Series**  
**Plot # 12 - 3mL**



Photo 1, 17 July 2003 *Before treatment*  
Total Stems: 44



Photo 2, 12 August 2003 *After treatment (3mL)*  
Total Injected Stems: 32  
Foliar: No  
Treatment Score: 2.66/4

Photo 3,

Photo 4,

Summary:

**Phase 1 Japanese Knotweed Injection Experiment Photomonitoring Series**  
**Plot # 13 - 0mL**



Photo 1, 17 July 2003 *Before treatment*  
Total Stems: 32



Photo 2, 12 August 2003 *After treatment (0mL)*  
Total Injected Stems: 0  
Foliar: No  
Treatment Score: 0.00/4

Photo 3,

Photo 4,

Summary:

**Phase 1 Japanese Knotweed Injection Experiment Photomonitoring Series**  
**Plot # 14 - 5mL**



Photo 1, 17 July 2003 *Before treatment*  
Total Stems: 101



Photo 2, 12 August 2003 *After treatment (5mL)*  
Total Injected Stems: 36  
Foliar: No  
Treatment Score: 1.50/4

Photo 3,

Photo 4,

Summary:

**Phase 1 Japanese Knotweed Injection Experiment Photomonitoring Series**  
**Plot # 15 - 3mL**



Photo 1, 17 July 2003      *Before treatment*  
Total Stems: 225



Photo 2, 12 August 2003      *After treatment (3mL)*  
Total Injected Stems: 126      Foliar: No  
Treatment Score: 1.85/4

Photo 3,

Photo 4,

Summary:

**Phase 1 Japanese Knotweed Injection Experiment Photomonitoring Series**  
**Plot # 16 - 5mL + Foliar**



Photo 1, 17 July 2003      *Before treatment*  
Total Stems: 123



Photo 2, 12 August 2003      *After treatment (5mL)*  
Total Injected Stems: 71      Foliar: Yes  
Treatment Score: 1.97/4

Photo 3,

Photo 4,

Summary:

**Phase 1 Japanese Knotweed Injection Experiment Photomonitoring Series**  
**Plot # 17 - 5mL + Foliar**



Photo 1, 17 July 2003 *Before treatment*  
Total Stems: 33



Photo 2, 12 August 2003 *After treatment (5mL)*  
Total Injected Stems: 19  
Foliar: Yes  
Treatment Score: 3.76/4

Photo 3,

Photo 4,

Summary:

**Phase 1 Japanese Knotweed Injection Experiment Photomonitoring Series**  
**Plot # 18 - 1.5mL**



Photo 1, 17 July 2003 *Before treatment*  
Total Stems: 34



Photo 2, 12 August 2003 *After treatment (1.5mL)*  
Total Injected Stems: 28      Foliar: No  
Treatment Score: 3.32/4

Photo 3,

Photo 4,

Summary:

**Phase 1 Japanese Knotweed Injection Experiment Photomonitoring Series**  
**Plot # 19 - 0mL**



Photo 1, 17 July 2003 *Before treatment*  
Total Stems: 37



Photo 2, 12 August 2003 *After treatment (0mL)*  
Total Injected Stems: 0      Foliar: No  
Treatment Score: 0.22/4

Photo 3,

Photo 4,

Summary:

**Phase 1 Japanese Knotweed Injection Experiment Photomonitoring Series**  
**Plot # 20 - 1.5mL**



Photo 1, 17 July 2003      *Before treatment*  
Total Stems: 24



Photo 2, 11 August 2003      *After treatment (1.5mL)*  
Total Injected Stems: 17      Foliar: No  
Treatment Score: 2.92/4

Photo 3,

Photo 4,

Summary:

**Phase 1 Japanese Knotweed Injection Experiment Photomonitoring Series**  
**Plot # 21 - 3mL**



Photo 1, 17 July 2003 *Before treatment*  
Total Stems: 30



Photo 2, 11 August 2003 *After treatment (3mL)*  
Total Injected Stems: 12  
Foliar: No  
Treatment Score: 2.00/4

Photo 3,

Photo 4,

Summary:

**Phase 1 Japanese Knotweed Injection Experiment Photomonitoring Series**  
**Plot # 22 - 5mL + Foliar**



Photo 1, 17 July 2003      *Before treatment*  
Total Stems: 52



Photo 2, 11 August 2003      *After treatment (5mL)*  
Total Injected Stems: 14      Foliar: Yes  
Treatment Score: 2.15/4

Photo 3,

Photo 4,

Summary:

**Phase 1 Japanese Knotweed Injection Experiment Photomonitoring Series**  
**Plot # 23 - 5mL + Foliar**



Photo 1, 17 July 2003 *Before treatment*  
Total Stems: 23



Photo 2, 11 August 2003 *After treatment (5mL)*  
Total Injected Stems: 14  
Foliar: Yes  
Treatment Score: 2.78/4

Photo 3,

Photo 4,

Summary:

**Phase 1 Japanese Knotweed Injection Experiment Photomonitoring Series**  
**Plot # 24 - 1.5mL**



Photo 1, 17 July 2003 *Before treatment*  
Total Stems: 78



Photo 2, 11 August 2003 *After treatment (1.5mL)*  
Total Injected Stems: 39      Foliar: No  
Treatment Score: 1.82/4

Photo 3,

Photo 4,

Summary:

**Phase 1 Japanese Knotweed Injection Experiment Photomonitoring Series**  
**Plot # 25 - 1.5mL**



Photo 1, 17 July 2003      *Before treatment*  
Total Stems: 44



Photo 2, 11 August 2003      *After treatment (1.5mL)*  
Total Injected Stems: 31      Foliar: No  
Treatment Score: 3.09/4

Photo 3,

Photo 4,

Summary:

**Phase 1 Japanese Knotweed Injection Experiment Photomonitoring Series**  
**Plot # 26 - 5mL**



Photo 1, 17 July 2003 *Before treatment*  
Total Stems: 56



Photo 2, 11 August 2003 *After treatment (5mL)*  
Total Injected Stems: 39  
Foliar: No  
Treatment Score: 2.68/4

Photo 3,

Photo 4,

Summary:

**Phase 1 Japanese Knotweed Injection Experiment Photomonitoring Series**  
**Plot # 27 - 5mL + Foliar**



Photo 1, 17 July 2003 *Before treatment*  
Total Stems: 30



Photo 2, 11 August 2003 *After treatment (5mL)*  
Total Injected Stems: 20      Foliar: Yes  
Treatment Score: 3.77/4

Photo 3,

Photo 4,

Summary:

**Phase 1 Japanese Knotweed Injection Experiment Photomonitoring Series**  
**Plot # 28 - 0mL**



Photo 1, 17 July 2003      *Before treatment*  
Total Stems: 105



Photo 2, 11 August 2003      *After treatment (0mL)*  
Total Injected Stems: 0      Foliar: No  
Treatment Score: 0.00/4

Photo 3,

Photo 4,

Summary:

**Phase 1 Japanese Knotweed Injection Experiment Photomonitoring Series**  
**Plot # 29 - 3mL**



Photo 1, 8 July 2003 *Before treatment*  
Total Stems: 31



Photo 2, 11 August 2003 *After treatment (3mL)*  
Total Injected Stems: 16      Foliar: No  
Treatment Score: 2.26/4

Photo 3,

Photo 4,

Summary:

**Phase 1 Japanese Knotweed Injection Experiment Photomonitoring Series**  
**Plot # 30 -5mL + Foliar**



Photo 1, 8 July 2003      *Before treatment*  
Total Stems: 25



Photo 2, 11 August 2003      *After treatment (5mL)*  
Total Injected Stems: 22      Foliar: Yes  
Treatment Score: 3.52/4

Photo 3,

Photo 4,

Summary:

## **Appendix 2**

### **Phase 3 Japanese Knotweed Injection Experiment Photo Series**

Plots 1-30

**Phase 3 Japanese Knotweed Injection Experiment Photomonitoring Series**  
**Plot # 01 - 5mL + Foliar**



Photo 1, 17 September 2003 *Before treatment*  
Total Stems: 100



Photo 2, 6 October 2003 *After treatment (5mL)*  
Total Injected Stems: 84      Foliar: Yes  
Treatment Score: 3.22/4

Photo 3,

Photo 4,

Summary:

**Phase 3 Japanese Knotweed Injection Experiment Photomonitoring Series**  
**Plot # 02 - 1.5mL**



Photo 1, 16 September 2003 *Before treatment*  
Total Stems: 36



Photo 2, 6 October 2003 *After treatment (1.5mL)*  
Total Injected Stems: 37      Foliar: No  
Treatment Score: 1.90/4

Photo 3,

Photo 4,

Summary:

**Phase 3 Japanese Knotweed Injection Experiment Photomonitoring Series**  
**Plot # 03 - 0mL**



Photo 1, 16 September 2003 *Before treatment*  
Total Stems: 31



Photo 2, 6 October 2003 *After treatment (0mL)*  
Total Injected Stems: 0      Foliar: No  
Treatment Score: 0.13/4

Photo 3,

Photo 4,

Summary:

**Phase 3 Japanese Knotweed Injection Experiment Photomonitoring Series**  
**Plot # 04 - 0mL**



Photo 1, 16 September 2003 *Before treatment*  
Total Stems: 96



Photo 2, 6 October 2003 *After treatment (0mL)*  
Total Injected Stems: 0  
Foliar: No  
Treatment Score: 0.02/4

Photo 3,

Photo 4,

Summary:

## Phase 3 Japanese Knotweed Injection Experiment Photomonitoring Series

Plot # 05 - 1.5mL



Photo 1, 16 September 2003  
Total Stems: 67

*Before treatment*



Photo 2, 6 October 2003  
Total Injected Stems: 68  
Treatment Score: 2.76/4

*After treatment (1.5mL)*  
Foliar: No

Photo 3,

Summary:

Photo 4,

**Phase 3 Japanese Knotweed Injection Experiment Photomonitoring Series**  
**Plot # 06 - 0mL**



Photo 1, 16 September 2003 *Before treatment*  
Total Stems: 103



Photo 2, 6 October 2003 *After treatment (0mL)*  
Total Injected Stems: 76      Foliar: No  
Treatment Score: 0.08/4

Photo 3,

Summary:

Photo 4,

**Phase 3 Japanese Knotweed Injection Experiment Photomonitoring Series**  
**Plot # 07 - 5mL+Foliar**



Photo 1, 16 September 2003 *Before treatment*  
Total Stems: 72



Photo 2, 6 October 2003 *After treatment (5mL)*  
Total Injected Stems: 69      Foliar: Yes  
Treatment Score: 2.99/4

Photo 3,

Photo 4,

Summary:

**Phase 3 Japanese Knotweed Injection Experiment Photomonitoring Series**  
**Plot # 08 - 1.5mL**



Photo 1, 16 September 2003 *Before treatment*  
Total Stems: 91



Photo 2, 6 October 2003 *After treatment (1.5mL)*  
Total Injected Stems: 84      Foliar: No  
Treatment Score: 3.08/4

Photo 3,

Photo 4,

Summary:

**Phase 3 Japanese Knotweed Injection Experiment Photomonitoring Series**  
**Plot # 09 - 3mL**



Photo 1, 16 September 2003 *Before treatment*  
Total Stems: 84



Photo 2, 6 October 2003 *After treatment (3mL)*  
Total Injected Stems: 70      Foliar: No  
Treatment Score: 2.60/4

Photo 3,

Photo 4,

Summary:

**Phase 3 Japanese Knotweed Injection Experiment Photomonitoring Series**  
**Plot # 10 - 5mL**



Photo 1, 16 September 2003 *Before treatment*  
Total Stems: 36



Photo 2, 6 October 2003 *After treatment (5mL)*  
Total Injected Stems: 28      Foliar: No  
Treatment Score: 3.72/4

Photo 3,

Photo 4,

Summary:

**Phase 3 Japanese Knotweed Injection Experiment Photomonitoring Series**  
**Plot # 11 - 0mL**



Photo 1, 16 September 2003 *Before treatment*  
Total Stems: 55



Photo 2, 6 October 2003 *After treatment (0mL)*  
Total Injected Stems: 0  
Foliar: No  
Treatment Score: 0.36/4

Photo 3,

Photo 4,

Summary:

**Phase 3 Japanese Knotweed Injection Experiment Photomonitoring Series**  
**Plot # 12 - 3mL**

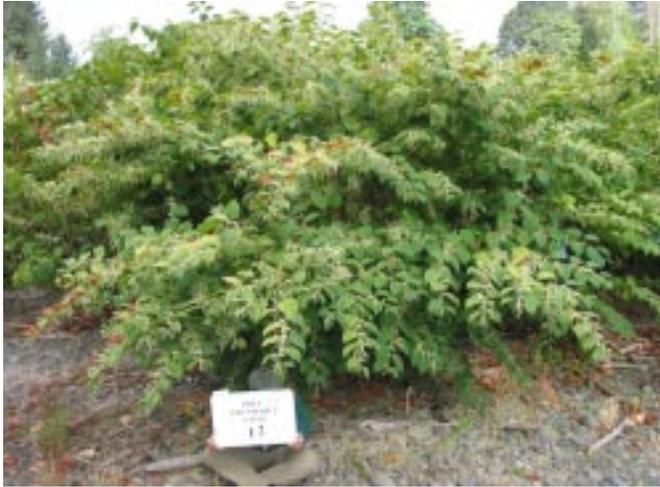


Photo 1, 16 September 2003 *Before treatment*  
Total Stems: 41



Photo 2, 6 October 2003 *After treatment (3mL)*  
Total Injected Stems: 42      Foliar: No  
Treatment Score: 1.95/4

Photo 3,

Photo 4,

Summary:

**Phase 3 Japanese Knotweed Injection Experiment Photomonitoring Series**  
**Plot # 13 - 5mL**



Photo 1, 15 September 2003 *Before treatment*  
Total Stems: 19



Photo 2, 6 October 2003 *After treatment (5mL)*  
Total Injected Stems: 22      Foliar: No  
Treatment Score: 3.09/4

Photo 3,

Photo 4,

Summary:

**Phase 3 Japanese Knotweed Injection Experiment Photomonitoring Series**  
**Plot # 14 - 1.5mL**



Photo 1, 16 September 2003 *Before treatment*  
Total Stems: 44



Photo 2, 6 October 2003 *After treatment (1.5mL)*  
Total Injected Stems: 38      Foliar: No  
Treatment Score: 3.36/4

Photo 3,

Photo 4,

Summary:

**Phase 3 Japanese Knotweed Injection Experiment Photomonitoring Series**  
**Plot # 15 - 0mL**



Photo 1, 16 September 2003 *Before treatment*  
Total Stems: 22



Photo 2, 6 October 2003 *After treatment (0mL)*  
Total Injected Stems: 0      Foliar: No  
Treatment Score: 0.04/4

Photo 3,

Photo 4,

Summary:

**Phase 3 Japanese Knotweed Injection Experiment Photomonitoring Series**  
**Plot # 16 - 5mL + Foliar**



Photo 1, 17 September 2003 *Before treatment*  
Total Stems: 34



Photo 2, 6 October 2003 *After treatment (5mL)*  
Total Injected Stems: 31      Foliar: Yes  
Treatment Score: 3.86/4

Photo 3,

Photo 4,

Summary:

**Phase 3 Japanese Knotweed Injection Experiment Photomonitoring Series**  
**Plot # 17 - 5mL + Foliar**



Photo 1, 17 September 2003 *Before treatment*  
Total Stems: 34



Photo 2, 6 October 2003 *After treatment (5mL)*  
Total Injected Stems: 31      Foliar: Yes  
Treatment Score: 3.15/4

Photo 3,

Photo 4,

Summary:

**Phase 3 Japanese Knotweed Injection Experiment Photomonitoring Series**  
**Plot # 18 - 5mL**



Photo 1, 16 September 2003 *Before treatment*  
Total Stems: 114



Photo 2, 6 October 2003 *After treatment (5mL)*  
Total Injected Stems: 29      Foliar: No  
Treatment Score: 1.77/4

Photo 3,

Photo 4,

Summary:

**Phase 3 Japanese Knotweed Injection Experiment Photomonitoring Series**  
**Plot # 19 - 0mL**



Photo 1, 16 September 2003 *Before treatment*  
Total Stems: 111



Photo 2, 6 October 2003 *After treatment (0mL)*  
Total Injected Stems: 0      Foliar: No  
Treatment Score: 0.32/4

Photo 3,

Photo 4,

Summary:

**Phase 3 Japanese Knotweed Injection Experiment Photomonitoring Series**  
**Plot # 20 - 5mL + Foliar**



Photo 1, 17 September 2003 *Before treatment*  
Total Stems: 73



Photo 2, 6 October 2003 *After treatment (5mL)*  
Total Injected Stems: 64      Foliar: Yes  
Treatment Score: 3.58/4

Photo 3,

Photo 4,

Summary:

**Phase 3 Japanese Knotweed Injection Experiment Photomonitoring Series**  
**Plot # 21 - 5mL + Foliar**



Photo 1, 17 September 2003 *Before treatment*  
Total Stems: 22



Photo 2, 6 October 2003 *After treatment (5mL)*  
Total Injected Stems: 21      Foliar: Yes  
Treatment Score: 3.91/4

Photo 3,

Photo 4,

Summary:

**Phase 3 Japanese Knotweed Injection Experiment Photomonitoring Series**  
**Plot # 22 - 1.5mL**



Photo 1, 16 September 2003 *Before treatment*  
Total Stems: 93



Photo 2, 6 October 2003 *After treatment (1.5mL)*  
Total Injected Stems: 95      Foliar: No  
Treatment Score: 2.53/4

Photo 3,

Photo 4,

Summary:

**Phase 3 Japanese Knotweed Injection Experiment Photomonitoring Series**  
**Plot # 23 - 5mL**



Photo 1, 16 October 2003 *Before treatment*  
Total Stems: 77



Photo 2, 6 October 2003 *After treatment (5mL)*  
Total Injected Stems: 74      Foliar: No  
Treatment Score: 3.42/4

Photo 3,

Photo 4,

Summary:

**Phase 3 Japanese Knotweed Injection Experiment Photomonitoring Series**  
**Plot # 24 - 3mL**



Photo 1, 16 September 2003 *Before treatment*  
Total Stems: 73



Photo 2, 6 October 2003 *After treatment (3mL)*  
Total Injected Stems: 68      Foliar: No  
Treatment Score: 3.84/4

Photo 3,

Photo 4,

Summary:

**Phase 3 Japanese Knotweed Injection Experiment Photomonitoring Series**  
**Plot # 25 - 5mL**



Photo 1, 16 September 2003 *Before treatment*  
Total Stems: 85



Photo 2, 6 October 2003 *After treatment (5mL)*  
Total Injected Stems: 77      Foliar: No  
Treatment Score: 3.56/4

Photo 3,

Photo 4,

Summary:

**Phase 3 Japanese Knotweed Injection Experiment Photomonitoring Series**  
**Plot # 26 - 5mL**



Photo 1, 16 September 2003 *Before treatment*  
Total Stems: 46



Photo 2, 6 October 2003 *After treatment (5mL)*  
Total Injected Stems: 42      Foliar: No  
Treatment Score: 3.89/4

Photo 3,

Photo 4,

Summary:

**Phase 3 Japanese Knotweed Injection Experiment Photomonitoring Series**  
**Plot # 27 - 3mL**



Photo 1, 16 September 2003 *Before treatment*  
Total Stems: 46



Photo 2, 6 October 2003 *After treatment (3mL)*  
Total Injected Stems: 43      Foliar: No  
Treatment Score: 3.83/4

Photo 3,

Photo 4,

Summary:

**Phase 3 Japanese Knotweed Injection Experiment Photomonitoring Series**  
**Plot # 28 - 3mL**



Photo 1, 16 September 2003 *Before treatment*  
Total Stems: 94



Photo 2, 6 October 2003 *After treatment (3mL)*  
Total Injected Stems: 84      Foliar: No  
Treatment Score: 2.83/4

Photo 3,

Photo 4,

Summary:

**Phase 3 Japanese Knotweed Injection Experiment Photomonitoring Series**  
**Plot # 29 - 1.5mL**



Photo 1, 16 September 2003 *Before treatment*  
Total Stems: 21



Photo 2, 6 October 2003 *After treatment (1.5mL)*  
Total Injected Stems: 21      Foliar: No  
Treatment Score: 3.33/4

Photo 3,

Photo 4,

Summary:

**Phase 3 Japanese Knotweed Injection Experiment Photomonitoring Series**  
**Plot # 30 - 3mL**



Photo 1, 16 September 2003 *Before treatment*  
Total Stems: 59



Photo 2, 6 October 2003 *After treatment (3mL)*  
Total Injected Stems: 48  
Treatment Score: 3.05/4  
Foliar: No

Photo 3,

Photo 4,

Summary: