

# Final Summary Report

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Post Treatment Monitoring of *Phragmites australis* Sites in Adirondack Park

**Raymond P. Curran**

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**(Adirondack\_Information\_Group \_ADK invasive plant monitoring \_6\_27\_13)**

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## Background

The purpose of this long-term study is to monitor impacts from herbicide treatment of plant communities that have been invaded by the target invasive plants. Five communities were monitored in 2013 after they were treated with herbicides (beginning in 2010) to try to control the plant invaders. All sites were once host to *Phragmites australis*.

The goal of the monitoring is to assess the effectiveness of the management techniques. Ideally two outcomes should result from management.

First, the population of invading plant should be reduced sufficiently to prevent it from spreading beyond the site and ideally will be permanently eliminated from the site (long term control).

Second, the plant community of the site would recover to "natural" conditions, so the site is occupied by native or otherwise non-invasive vegetation. This will help to prevent future infestations of plant invaders and restore ecosystem functions and values.

The monitoring and measurements are meant to assess success in both of those outcomes. Five sites were measured this year, representing the 6 year of annual post-treatment monitoring at some sites. A pale yellow iris site at Barton Mines that otherwise would have been visited was inaccessible because of high water conditions. Interestingly, high water conditions existed at the Peavine Swamp site, but monitoring was conducted from a canoe.

## Methodology

At each location, where a plant community has been invaded and treatment of the "target species" has occurred, sampling proceeds as described. A portion of the site that has not been treated and is similar to the treated site is chosen as a reference community (also termed "control" or untreated community elsewhere in this report). The treated area is also identified and the limits of the infestation by the target plant are tracked using a GPS device. Photos are collected and measurements are made in each situation (treated versus reference) at each location.

Here is a summary of the measurement activities at each site.

- 1) Identify plant community to be sampled and lay out a grid.
  - a) Establish (pins and rebar) N/S baseline through the center
  - b) Stretch tapes N/S; E/W, Central
  - c) Establish 4 ends (pins and rebar) with approximately 2 meter buffer
  - d) GPS edge of stand (UTM)
- 2) Randomly generate quadrats to be sampled (1/2 m by 1/2 m plots) and Identify on map.
  - a) One of two techniques is employed: a. using a random number generator in Excel to generate plot coordinates (x, y) or b. establishing quadrats at regular intervals along a transect through the center of the community.
- 3) Locate first quadrat or plot (1/2 m by 1/2 m) being carefully not to trample other sampling plots.
  - a) Mark first corner

- b) Establish quadrat edge using plastic pipes
- c) Measure and Record:
  - i) Presence of all species,
  - ii) Percent cover of all species, ground cover (and in over story if bi-level) and other cover categories (e.g. leaf litter, bare soils, surface water),
  - iii) Height target at maximum (the invasive plant) ,
  - iv) Number of stems of target plant.
- 4) Go to Next Quadrat

## Monitoring Sites

Following is a table showing measurements of key parameters made in the five plant communities to help track impacts from use of herbicides to control invasive plant species.

Percent cover was estimated for each plant and recorded as a numeral representing 1 of 6 categories . A sample data form is displayed in the Appendix. For example the surface area coverage by dead leaf litter was estimated as was the coverage of each plant species, such as the targeted invasive plant *Phragmites*.

The data collected enabled the determination of relative cover by plant species or other physical parameter. This was calculated by adding together the 10 reports from each quadrat. If cover in each quadrat was 6, then the sum would be "60," a theoretical maximum. If a plant was very minor, with but one occurrence, for example, the minimum sum would be "1."

In the table that follows the relative amount of total coverage by all plants that were alive (including *Phragmites*) is reported. This is a measure of the amount of "green" cover at the site. The detailed data is found in the body of this report, but the summary is presented here. The total coverage of living plants (green cover) is a simple way to measure recovery of a site. The treated area is compared to the green cover in the adjacent reference part of the community.

In addition, for each site, the relative cover of the target plant (*Phragmites*) is reported. The management goal is to reduce the cover and eventually maintain it at "Zero." Since in some cases we have multiple years of data to report, as this study continues, the chronology will become more powerful.

## Summary Results and Conclusions

### Reduction in Target Plant

The relative cover of *Phragmites* in all five sites has been dramatically reduced. Two sites had no *Phragmites* detected in the monitoring plots and in one of those sites *Phragmites* was not observed in the treated community (the Wanakena Ranger School site). See Table 1 for summary results.

**Table 1. Relative Cover of Target Plant (*Phragmites*)**

Summary	Total <i>Phragmites</i> Relative Cover Each Year			
Site	Code	2011	2012	2013
Upper Cherry Patch	UC	4	2	4
Lower Cherry Patch	LC	2	3	2
Ray Brook	RB	16	7	15
Peavine	Pea	n/a	1	0
Wanakena	Wana	n/a	3	0

### Recovery of Site Vegetation

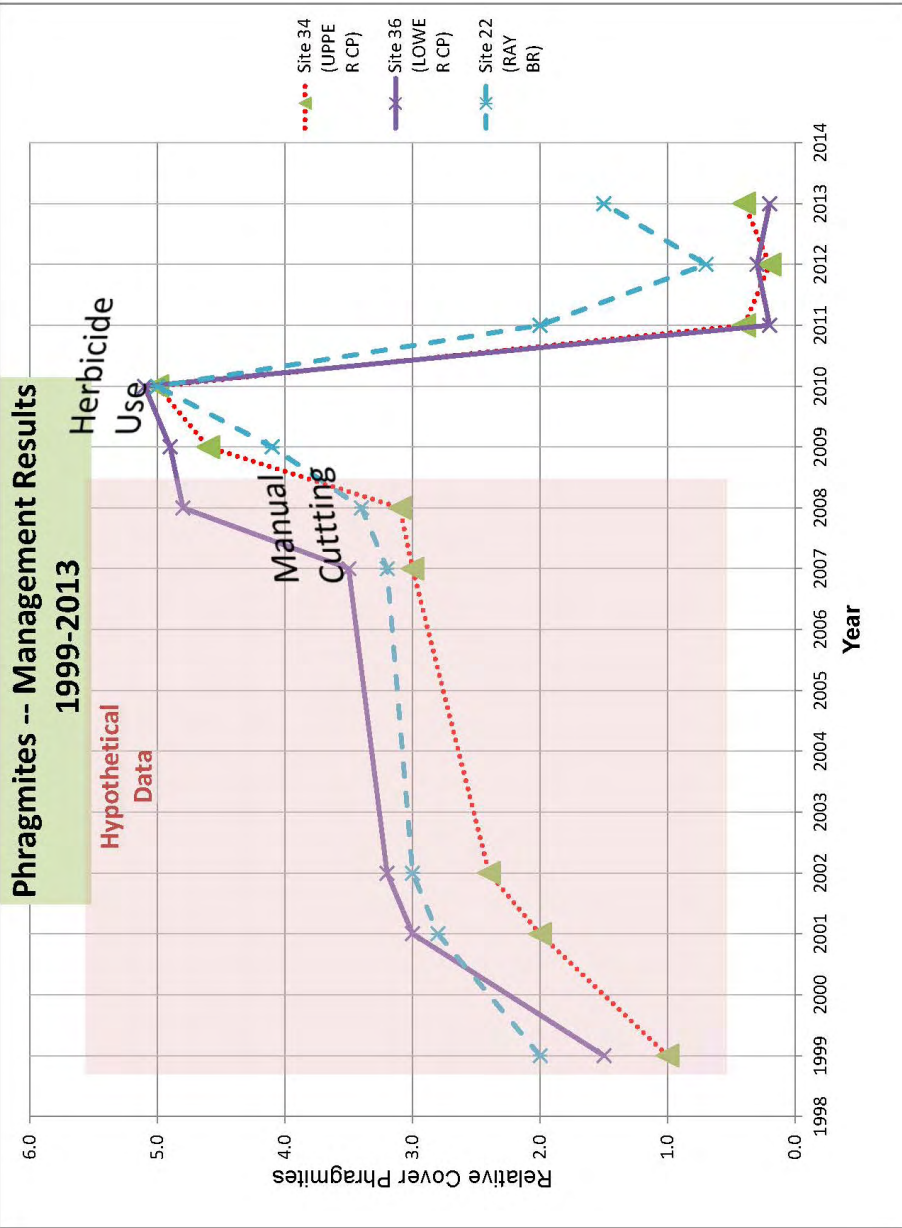
As the treated site recovers from removal of the invading plant, the site should eventually become re-colonized by plants other than the "target" invasive species. Because, in these cases, the sites had dense and extensive stands of *Phragmites*, as this plant is killed, the site is covered by dead and decaying vegetation. Other plants (whether native or non-native) have also largely been displaced from the sites by years of aggressive growth of *Phragmites*.

Even though every effort is made to avoid treatment of the non-target vegetation, some remain mixed in with the invasive plant. There is some mortality of this vegetation from the herbicides used, but in any event following treatment the site is mostly "brown." The brown condition is reflected in very low relative amounts of cover of "green" plants, or live vegetative cover. The sites are mostly covered with dead vegetation (part of the litter).

As new plants come in and re-colonize the site, the plant cover should approach that of the reference sites nearby. Table 2 shows the green cover (relative amounts) in several sites (some multiple years) where good performance (that is abundant vegetative cover approaching or comparable to the reference sites) has been observed.

The next table and figure "Relative Cover by Year" shows the development of *Phragmites* on three sites and the decrease in 2011 of relative cover following the use of herbicides in 2010.

Relative Cover by Year												
	1999	2001	2002	2007	2008	2009	2010	2011	2012	2013		
Site 1 (CHAPEL)	6.0	2.0	2.4	0.0	1.7	0.0	0.2	0.0	0.0			
Site 2 (SPLIT ROCK)	1.2	1.8	2.2	0.3	0.1	0.0	0.0	0.0	0.0			
Site 34 (UPPER CP)	1.0	2.0	2.4	3.0	3.1	4.6	5.0	0.4	0.2	0.4		
Site 36 (LOWER CP)	1.5	3.0	3.2	3.5	4.8	4.9	5.1	0.2	0.3	0.2		
Site 22 (RAY BR)	2.0	2.8	3.0	3.2	3.4	4.1	5.0	2.0	0.7	1.5		
	Hypothetical Data					Measured Data						
Relative Cover Measures: 6 = 96%-100%; 5= 76%-95%; 4 = 51%-75%; 3 = 26%-50%; 2=6%-25%; 1= 0%-5%												



**Table 2. Comparison of Relative Cover in Treatments**

<b>Good Performance</b>		
<b>Site Name and Year</b>	<b>Live Vegetative Cover -- Treatment</b>	<b>Live Vegetative Cover -- Reference</b>
	The units are "relative cover" and are computed as the sum of the cover categories (a range from 1 to 6 for each plot) as observed in each quadrat of the 10 quadrats measured. See Methods for more description of how cover was determined in each plot.	
Upper Cherry Patch 2013	102	91
Lower Cherry Patch 2013	63	82
Wanakena 2013	54	71
Ray Brook 2013	37	93
Peavine 2013	4	23
Upper Cherry Patch 2012	97	82
Wanakena 2012	61	79



These figures plot the position of each community using the total relative cover of green material -- in the treated versus the reference area. For example, points to the left side of the x-axis are low in relative cover (that is brown) and points to the right are high in relative cover (green). A line has been added in Figure 2 that shows the axis where green cover is equivalent in the treated versus the reference area. Above this line the reference area is greener and below this line the treated area is greener.

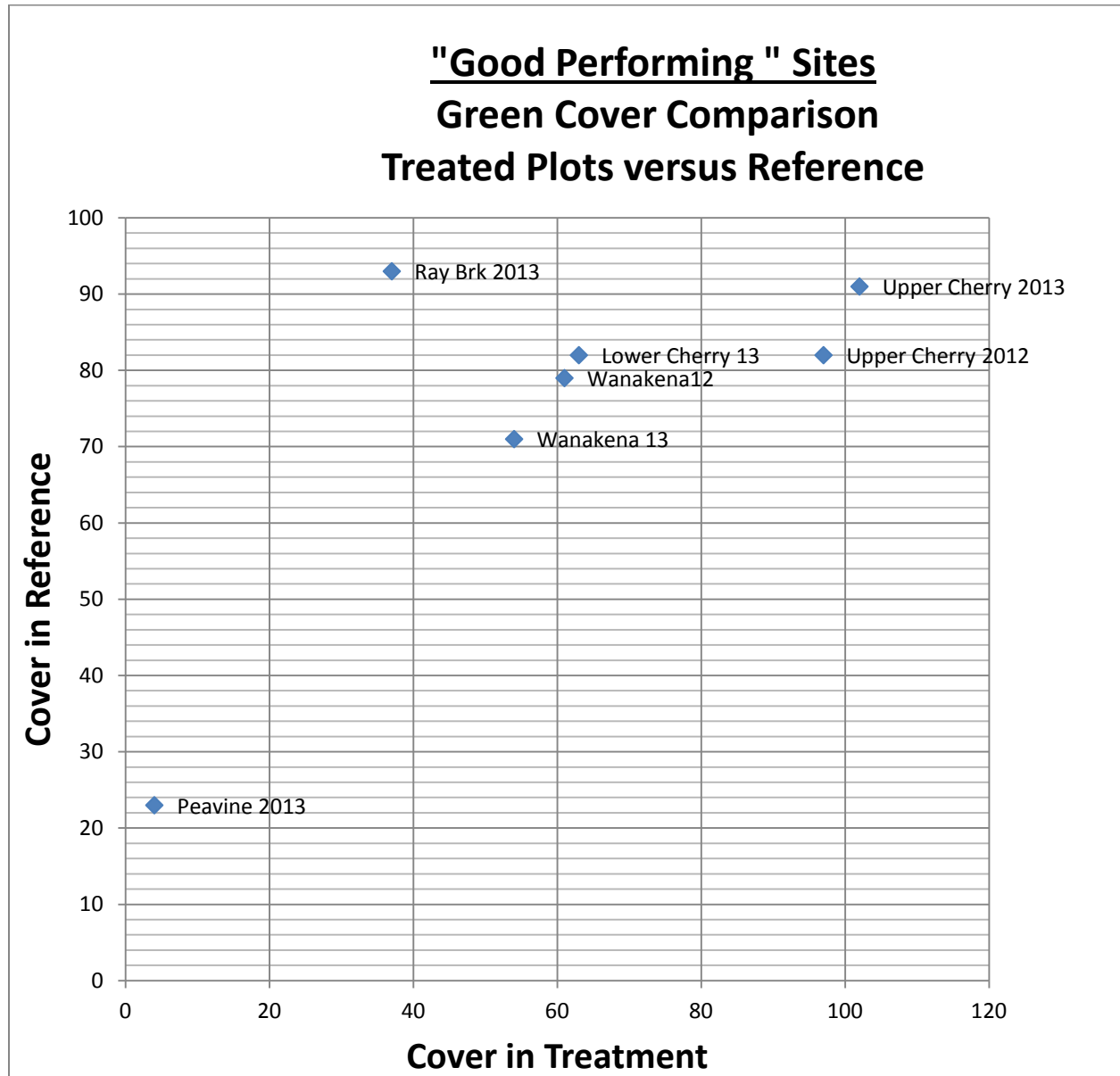
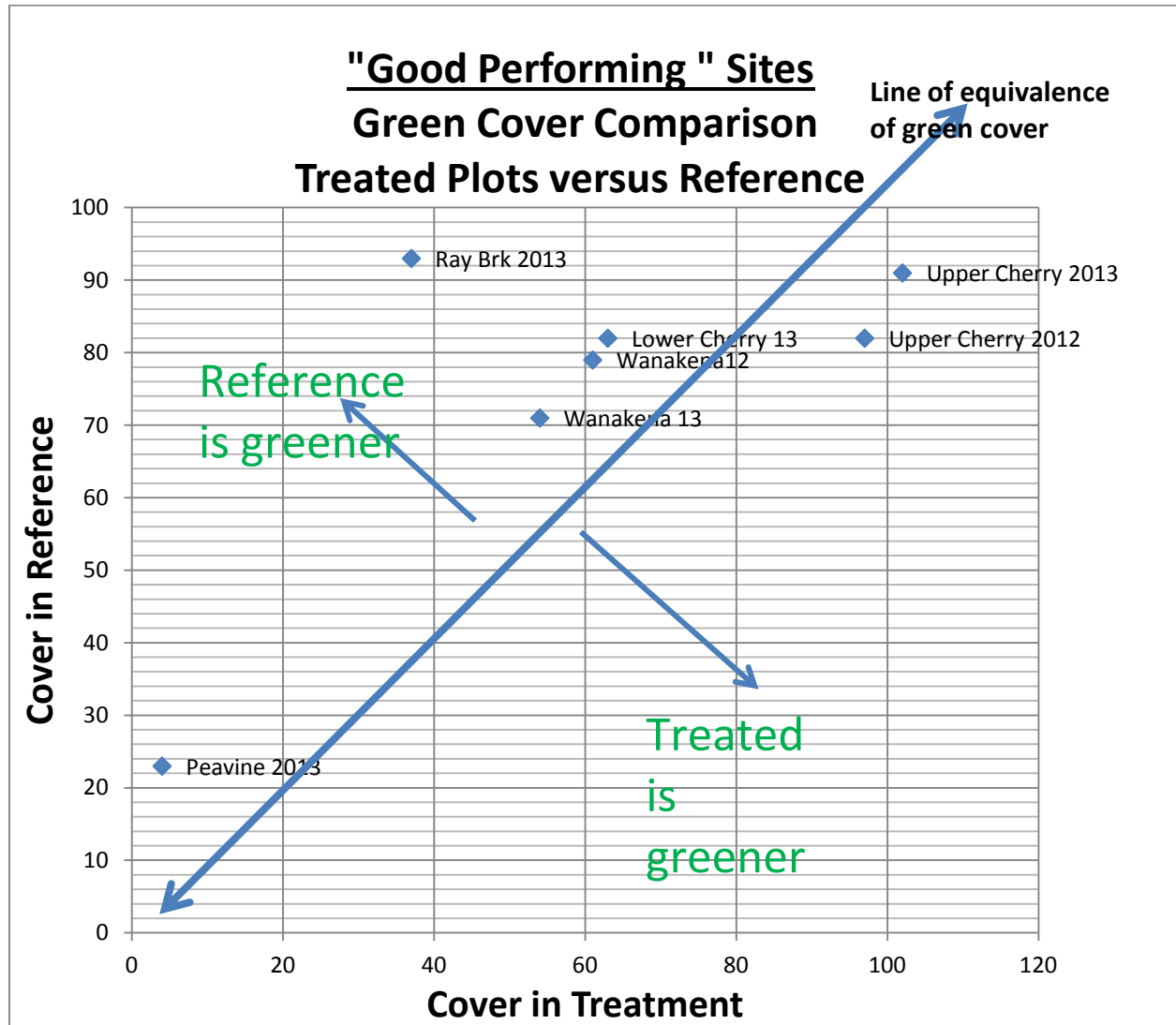


Figure 1. Comparison of Amount of Green Cover

In this figure, most sites pictured fall above the line of equivalence; that is, most have a greener untreated (control) area. As treated sites recover to be more similar to the control sites, the points should be found more closely to the line of equivalence. Peavine has very low cover in both areas, enhanced by flooding conditions. There is natural variation in the observed data, so the reference area at Upper Cherry Patch had less green cover observed than the treated area. This could be normal variance.



**Figure 2. Comparison of Amount of Green Cover**

## **Site Reports for 2013**

# Preliminary Analysis 2013 Upper Cherry Patch Pond Phragmites site

## Timeline

2010

- Treatment was conducted from September 10<sup>th</sup>, 2010 through September 14<sup>th</sup> 2010.
- Approximately 28 ounces of Accord Concentrate was applied at 3-5 quarts/acre.
- Accord concentrate was applied via foliar spray in a 1.5% solution. Cide Kick II was used as a surfactant.

2011

- Follow-up monitoring to measure plots was conducted on August 9, 2011 by Raymond P. Curran.
- Treatment was conducted on August 11th.
- Approximately 0.5 ounces of Accord Concentrate was applied at 3-5 quarts/acre.
- Approximately 0.25 ounces of Aquamaster was applied at 3-5 quarts/ acre.
- Accord concentrate was applied via foliar spray in a 1.5% solution. Cide Kick II was used as a surfactant.
- Aquamaster was applied via stem injection in a 50% solution.

2012

- Follow-up monitoring was conducted on August 22, 2012 by Raymond P. Curran.
- Treatment was conducted on September 6<sup>th</sup>.
- Approximately 4.3 ounces of Aquamaster was applied at 3-5 quarts/acre.
- Aquamaster was applied via foliar spray in a 1.5% solution. Cide-Kick II was used as a surfactant

2013

- Follow-up monitoring to measure plots was conducted on August 12, 2013 by Raymond P. Curran and Brendan Quirion.
- Treatment was conducted on August 26th.
- Approximately 7.7 ounces of Aquamaster was applied at 3-5 quarts/acre.
- Aquamaster was applied via foliar spray in a 1.5% solution. Activator 90 was used as a surfactant .

## Background

Prior to treatment the area was a dense stand (measured to be between 75% and 95% cover in plots) of head height (measured to average 1.7 meters in height) *Phragmites*, although not nearly as extensive and dense as the site at Lower Cherry Patch. It is an emergent / shrub wetland, with seasonal pockets of

standing water; there is evidence of past occupation by trees - dead standing snags 20 - 30 feet in height and logs of woody material that are embedded in the peat substrate. Based on personal knowledge the *Phragmites* stand is more than 10 years old.

I measured 10 randomly located 1/2 by 1/2 meter plots in the treated area and for comparison 10 randomly located 1/2 by 1/2 meter plots in the un-treated area.

### **Treated Area Results**

The area still has abundant litter from dead *Phragmites* plants and has not completely re-vegetated , although the proportion of green vegetation to dead litter is increasing.

The predominant vegetation in the treated area is *Abies balsamea* (balsam fir) - (shrubby), *Rubus hispidus* (dewberry), Sphagnum moss, and *Picea rubens* (red spruce). The green cover in the treated area is closer to that of the adjacent reference area this year as compared to past years.

There are still some *Phragmites* plants at low levels that have survived treatment, consistent with results from last year. They show signs of herbicide induced stress (especially reduced maximum height).

### **Adjacent Reference Area Results**

The reference area is a shrub/ emergent wetland with seasonal pockets of standing water with deep unstable muck or peat deposits that is susceptible to disturbance from foot traffic.

The predominant vegetation is *Phalaris arundinacea* (reed canarygrass) and *Typha latifolia* (common cat-tail). We consider reed canary grass to be a non-native and invasive plant since native and introduced reed canary grass are virtually indistinguishable, but it is not being managed by the APIP Program. The native plant assemblage is diverse although slightly less than the number of species found in the treated area.

The amount of cover by native green vegetation is slightly less than in the treated area, although comparable.

### **Other Observations:**

The site was very wet this year, consistent with record amounts of rainfall in June and early July. A summary of the data is located in the Appendix.

## Preliminary Analysis 2013 Lower Cherry Patch Pond *Phragmites* site

### Timeline

2010 – Treatment was conducted from September 20<sup>th</sup> through September 27<sup>th</sup>

- Approximately 68 ounces of Accord Concentrate was applied at 3-5 quarts/acre.
- Accord concentrate was applied via foliar spray in a 1.5% solution. Cide Kick II was used as a surfactant.

2011 Follow-up measurement of plots was conducted on July 29, 2011 by Raymond P. Curran

2011 – Treatment was conducted on August 11<sup>th</sup>

- Approximately 4.25 ounces of Accord Concentrate was applied at 3-5 quarts/acre.
- Approximately 28 ounces of Aquamaster was applied at 3-5 quarts/ acre.
- Accord concentrate was applied via foliar spray in a 1.5% solution. Cide Kick II was used as a surfactant.
- Aquamaster was applied via stem injection in a 50% solution.

2012 Follow-up monitoring was conducted on August 22, 2012 by Raymond P. Curran.

2012 - Treatment was conducted on September 5<sup>th</sup>

- Approximately 19.9 ounces of Aquamaster was applied at 3-5 quarts/acre.
- 13.9 ounces of Aquamaster was applied via foliar spray in a 1.5% solution. Cide-Kick II was used as a surfactant.
- 6 ounces of Aquamaster was applied via stem injection in a 25% solution.

2013 Follow-up monitoring was conducted on August 12, 2013 by Raymond P. Curran.

2013 - Treatment was conducted on August 26<sup>th</sup>

- Approximately 13.5 ounces of Aquamaster was applied at 3-5 quarts/acre.
- 11.5 ounces of Aquamaster was applied via foliar spray in a 1.5% solution. Activator 90 was used as a surfactant 2 ounces of Aquamaster was applied via stem injection in a 25% solution.

### Background

Prior to treatment the area was a dense stand (measured to be between 75% and 95% cover in plots) of head height or taller *Phragmites*. Prior to invasion it was an emergent / shrub wetland, with seasonal pockets of standing water; there is evidence of past occupation by trees - dead standing snags 20 - 30 feet in height and logs of woody material that are embedded in the peat substrate. The *Phragmites* stand is older than 10 years but the exact age is uncertain. It is estimated that the stand may be closer to 15 to 20 years old..

I measured 10 randomly located 1/2 by 1/2 meter plots in the treated area and for comparison 10 randomly located 1/2 by 1/2 meter plots in the un-treated (control) area.

### **Treated Area Results**

The area is still dominated by litter from dead *Phragmites* plants and has not been completely re-vegetated, although the proportion of green vegetation to dead litter is increasing.

The predominant vegetation in the treated area is *Calamagrostis canadensis* (blue-joint grass), *Typha latifolia* (cat-tail) and *Osmunda cinnamoniodes* (cinnamon fern). The green cover in the treated area is closer to that of the adjacent reference area this year as compared to past years.

There are still some *Phragmites* plants at low levels that have survived treatment, but they are stunted and deformed from repeated herbicide exposure. They show signs of herbicide induced stress (especially reduced maximum height). The other plants show some slight increase in relative cover this year.

### **Adjacent Reference Area Results**

The reference area is a shrub/ emergent wetland with seasonal pockets of standing water with deep unstable muck or peat deposits that is susceptible to disturbance from foot traffic.

I measured 10 randomly located 1/2 by 1/2 meter plots in the control area.

The predominant vegetation is *Calamagrostis canadensis* (blue-joint grass), *Typha latifolia* (cat-tail) and *Osmunda cinnamoniodes* (cinnamon fern). The native plant assemblage diversity is about equal to the treated area (16 versus 19 species in the treated area).

Here the site is almost completely covered by native green vegetation, giving it more relative cover than in the treated area.

### **Other Observations:**

The site was very wet this year, consistent with record amounts of rainfall in June and early July. In the control area, pools of water at the surface alternate with dense stands of cat-tails. In one of the plots in the control area a stem of live *Phragmites* was found far from the nearest treated area. This stem escaped treatment in previous years. On the other hand, nearby a dead stem of *Phragmites* was found suggesting that it was killed by translocation of the pesticide from treated plants many 10's of meters away.

A summary of the data is located in the Appendix.

# Preliminary Analysis 2013 Ray Brook Tracks Phragmites Site

## Timeline

2010 – Treatment was conducted from September 2<sup>nd</sup> through September 10<sup>th</sup>

- Approximately 48 ounces of Accord Concentrate was applied at 3-5 quarts/acre.
- Accord concentrate was applied via foliar spray in a 1.5% solution. Cide Kick II was used as a surfactant.

2011 -- Follow-up measurement by plots was conducted on August 12 by Raymond P. Curran (with Brendan Quirion)

2011 – Treatment was conducted August 16<sup>th</sup> and 22<sup>nd</sup>

- Approximately 19.1 ounces of Accord Concentrate was applied at 3-5 quarts/acre.
- Approximately 51 ounces of Aquamaster was applied at 3-5 quarts/ acre.
- Accord concentrate was applied via foliar spray in a 1.5% solution. Cide Kick II was used as a surfactant.
- Aquamaster was applied via stem injection in a 50% solution.

2012 Follow-up monitoring was conducted on August 22, 2012 by Raymond P. Curran.

2012 - Treatment was conducted on September 6<sup>th</sup>

- Approximately 23.4 ounces of Aquamaster was applied at 3-5 quarts/acre.
- 15.4 ounces of Aquamaster was applied via foliar spray in a 1.5% solution. Cide-Kick II was used as a surfactant.
- 8 ounces of Aquamster was applied via stem injection in a 25% solution.

2013 Follow-up monitoring was conducted on August 12, 2013 by Raymond P. Curran (with Brendan Quirion)

2013 - Treatment was conducted on August 15<sup>th</sup>

- Approximately 11 ounces of Aquamaster was applied at 3-5 quarts/acre.
- Aquamaster was applied via foliar spray in a 1.5% solution. Activator 90 was used as a surfactant.

## Treated Area

Prior to treatment the area was a dense stand (measured to be between 75% and 95% cover in plots) of head height or taller *Phragmites* (measured to average 3.4 meters in plots). Prior to invasion it was once an emergent / shrub wetland, with seasonal pockets of standing water; there is evidence of past occupation by trees - dead standing snags 20 - 30 feet in height and abundant coarse woody debris on



the soil's surface. The soils are more stable than cherry patch fen, possibly indicating more mineral content. The *Phragmites* stand is more than 10 years old although the exact age is unknown.

I measured 10 randomly located 1/2 by 1/2 meter plots in the treated area.

The predominant remnant vegetation is *Phragmites*. Green vegetation, including *Phragmites*, is sparse. The green cover in the treated area is 1/2 that of the adjacent reference area. Litter, primarily dead stems of *Phragmites*, has 2 times the relative cover of all green plants.

It appears that there are more plants recolonizing the site, as the species count has nearly doubled since the inception of this monitoring, even though the soil surface is covered by dead *Phragmites* leaves and stems.

Prior to treatment, the target plant was robust on the site; it was very dense, well represented, and occurred in each of the plots.

### Adjacent Reference Area

The reference area is an emergent wetland with seasonal pockets of standing water.

I measured 10 randomly located 1/2 by 1/2 meter plots in the reference area.

The predominant vegetation is composed of two graminoid species – *Calamagrostis canadensis* (blue-joint grass) and *Typha latifolia* (cattail).

This community has lower plant diversity than others, like the Cherry Patch wetlands, and the species count in both the treated area and control is low. Only 6 species (all natives) occur in the control plots, fewer than the treated area (where there were 12 species).

### Other observations:

Dead vegetation is thick, with matted dead leaves on the ground and standing cut stems, in the treated area.

There are much fewer sprouts of *Phragmites* this year, but control from the first year was far less effective than in the Cherry Patch wetlands. This is most likely because of the timing of the treatment relative to weather events or phenology of the plants.

### Data Report

A summary of the data is located in the Appendix.

## Analysis 2013 Peavine Swamp Phragmites Site

### Timeline

2011 – Treatment was conducted on July 29<sup>th</sup>

- Approximately 28.8 ounces of Aquamaster was applied at 3-5 quarts/acre.
- Aquamaster was applied via foliar spray in a 1.5% solution. Cide-Kick II was used as a surfactant.

2012 – Treatment was conducted on August 6<sup>th</sup>

- Approximately 2.4 ounces of Aquamaster was applied at 3-5 quarts/acre.
- 1.4 ounces of Aquamaster was applied via foliar spray in a 1.5% solution. Cide-Kick II was used as a surfactant.
- 1 ounce of Aquamaster was applied via stem injection in a 25% solution.

2012 Follow-up measurement of plots was conducted on August 23, 2012 by Raymond P. Curran.

2013 – Treatment was not conducted during the 2013 field season because the area was flooded by water impounded behind a newly constructed beaver dam. However, two small *Phragmites* sprouts that emerged above the water surface were manually pulled from the site while conducting follow-up monitoring on August 19<sup>th</sup>.

2013 Follow-up measurement of plots was conducted on August 19, 2013 by Raymond P. Curran and Brendan Quirion.

### Treated Area

Prior to treatment the area was a dense stand of *Phragmites* (unfortunately we do not have pre-treatment measurements). Prior to invasion it was an emergent wetland, with saturated soils.

I measured 10 randomly located 1/2 by 1/2 meter plots in the treated area.

The predominant remnant vegetation is *Calamagrostis canadensis* (blue-joint grass) .

There are still some *Phragmites* plants that have survived treatment, but only a few. There were no *Phragmites* shoots observed in the plots.

### Adjacent Reference Area

The reference area is an emergent wetland with saturated peaty soils.

I measured 10 randomly located 1/2 by 1/2 meter plots in the control area. The predominant vegetation is *Calamagrostis canadensis* (blue-joint grass) .

Green cover is much greater in the reference area than in treated area; and there was substantially more vegetation emerging through the water.

### **Other observations:**

The area was flooded by water impounded behind a newly constructed beaver dam. Sampling was accomplished from a canoe. Flooding changed the basic appearance of the site from vegetated to open water, so observations in plots reflected the low amount of vegetation now present on the site.

### **Data Report:**

A summary of the data is located in the Appendix.

## Analysis 2013 Wanakena Phragmites Site

### Timeline

2012 – Treatment was conducted on August 2nd .

- Approximately 1.4 ounces of Aquamaster was applied at 3-5 quarts/acre.
- Aquamaster was applied via foliar spray in a 1.5% solution. Cide-Kick II was used as a surfactant.

2012 Follow-up measurement of plots was conducted on August 23, 2012 by Raymond P. Curran.

2013 – Treatment was conducted on July 16th.

- Approximately .1 ounces of Aquamaster was applied at 3-5 quarts/acre.
- Aquamaster was applied via foliar spray in a 1.5% solution. Activator 90 was used as a surfactant.

2013 Follow-up measurement of plots was conducted on August 19, 2013 by Raymond P. Curran and Brendan Quirion.

### Treated Area

Prior to treatment the area was a moderate dense stand of *Phragmites* (*unfortunately we do not have pre-treatment measurements*). Prior to invasion it was an emergent / shrub wetland, with seasonal pockets of standing water; there is evidence of past occupation by trees – as there are fallen tree trunks scattered around the site.

I measured 10 randomly located 1/2 by 1/2 meter plots in the treated area.

The predominant remnant vegetation is *Juncus canadensis* (Canada rush). Non-target green vegetation is low. There is still abundant litter from dead *Phragmites* plants on the ground.

There were few if any *Phragmites* plants that survived treatment; no *Phragmites* plants were observed on August 19, but a very few were present earlier, on July 16 during treatment.

### Adjacent Reference Area

The reference area is a shrub/ emergent wetland with seasonal pockets of standing water with deep unstable muck or peat deposits that is susceptible to disturbance from foot traffic. I measured 10 randomly located 1/2 by 1/2 meter plots in the reference area.

The predominant vegetation is *Calamagrostis canadensis* (blue-joint grass) . The native plant assemblage diversity is greater than the treated area (5 species versus 4 species in the treated area).

Green cover is slightly higher in the reference area than in the treated area.

### **Data Report:**

A summary of the data is located in the Appendix.

## **Appendices: Summary - Site Data Reports**

Terminology note: "control area" and "untreated area" are synonymous with "adjacent reference area"

# Upper Cherry Patch Fen Phragmites Site

2013 Treated Area Plots		
Code	Name	Relative Cover
1	balsam fir	23
26	litter	12
107	dewberry	12
85	Sphagnum moss	8
194	red spruce	8
16	dead Phragmites	6
9	paper birch	5
37	water	5
184	Equisetum plaustrae	5
11	blue-joint grass	4
44	Phragmites	4
104	star flower	4
175	cat-tail	4
47	blue grass	3
71	moss	3
91	flat-top goldenrod	3
176	red-stem moss	3
2	red maple	2
94	bunch berry	2
184	marsh horsetail	2
6	sarsaparilla	1
36	sensitive fern	1
68	grass	1
161	gooseberry	1
165	Canada goldenrod	1
190	snowberry	1
203	white cedar	1

# Relative Cover of Species August 2013

Vegetation	
Name	Relative Cover
balsam fir	23
dewberry	12
Sphagnum moss	8
red spruce	8
paper birch	5
marsh horsetail	5
blue-joint grass	4
Phragmites	4
star flower	4
cat-tail	4
blue grass	3
moss	3
flat-top goldenrod	3
red-stem moss	3
red maple	2
bunch berry	2
marsh horsetail	2
sarsaparilla	1
sensitive fern	1
grass	1
gooseberry	1
Canada goldenrod	1
snowberry	1
white cedar	1
<b>Total</b>	<b>102</b>

Notes
An emergent shrub wetland peat muck soils, lots of down woody material
Measured on August 12, 2013

## Treated

Significant but much reduced presence of Phragmites in plots and in site  
Presence of Phragmites similar to last year (2 vs. 4)  
leaf litter from dead Phragmites not significant  
site has abundant natural vegetation from alternate species  
site has diverse flora  
site has not been cleared, but great progress has been made.

## Untreated

just as last year, reed canary grass is the dominant plant  
graminoids dominate although shrubs are abundant  
amount of green cover is high, as it is in treated.

2013 Untreated Plots		
Code	Species Name	Sum Cover
43	reed canary grass	25
175	cat-tail	16
26	litter	12
1	balsam fir	9
107	dewberry	7
5	speckled alder	6
36	sensitive fern	6
37	water	5
85	sphagnum moss	5
68	grass	3
191	lady fern	3
38	cinnamon fern	2
47	bluegrass	2
65	wild raisin	2
94	bunchberry	2
21	marsh sty	1
91	flat-top goldenrod	1
186	liverwort	1

Vegetation	
Species Name	Sum Cover
reed canary grass	25
cat-tail	16
balsam fir	9
dewberry	7
speckled alder	6
sensitive fern	6
sphagnum moss	5
grass	3
lady fern	3
cinnamon fern	2
bluegrass	2
wild raisin	2
bunchberry	2
marsh St Johnswort	1
flat-top goldenrod	1
liverwort	1
<b>Total</b>	<b>91</b>

## 2012 Treated Notes:

more species this year  
22 native and 1 non native species  
low amount of dead phrag  
less total cover  
increase in green cover  
Total cover = 118 (151)  
dead cover = 21 (80)  
green total = 97 (71)  
**Control Notes:**  
15 native and 0 non native species (20 and 0)  
5(2 )single occurrence species  
all natives  
graminoids most abundant greenery  
Total cover = 100(134)  
dead cover = 18(22)  
green total = 82(112)



# Lower Cherry Patch Fen Phragmites Site

## Relative Cover of Species August 2013

2013 Treated Area Plots		
Species Code	Species Name	Sum Cover
26	litter	34
16	dead Phrag	32
11	blue-joint grass	17
175	cat-tail	6
38	cinnammon fern	5
37	water	4
91	flat-top goldenrod	4
107	dewberry	4
156	flat-top white aster	4
1	balsam fir	3
71	moss	3
22	mountain holly	2
44	Phragmites	2
47	blue grass	2
59	meadow sweet	2
68	grass	2
104	starflower	2
9	paper birch	1
46	white pine	1
93	shadbush	1
95	false lily of the valley	1
195	rough stem goldenrod	1

Vegetation	
Name	Relative Cover
blue-joint grass	17
cat-tail	6
cinnammon fern	5
flat-top goldenrod	4
dewberry	4
flat-top white aster	4
balsam fir	3
moss	3
mountain holly	2
Phragmites	2
blue grass	2
meadow sweet	2
grass	2
starflower	2
paper birch	1
white pine	1
shadbush	1
false lily of the valley	1
rough stem goldenrod	1
<b>Total</b>	<b>63</b>

Notes
An emergent shrub wetland with peat muck soils, lots of downed woody material.
Measured on August 12, 2013

### Treated Plots

Phragmites still present at low levels in plots and in site  
litter predominates  
some remnant plants are recovering  
some evidence of new volunteer vegetation  
19 native species present, comparable to last year

### Untreated Plots

Phragmites has crept into these plots undetected  
One dead stem found (translocation killed it)  
One live stem found  
site is very wet this year  
in community, pools alternate with dense cat-tails

2013 Untreated Plots		
Species Code	Species Name	Sum
175	cat-tail	20
26	litter	17
11	blue-joint grass	10
38	cinnamon fern	10
37	water	7
91	flat-top goldenrod	6
107	dewberry	6
156	flat-top white aster	6
68	grass	4
185	tussock sedge	4
188	common rush	4
36	sensitive fern	3
73	water	3
47	blue grass	2
55	raspberry	2
165	Canada goldenrod	2
16	dead phrag	1
29	horehound	1
44	Phragmites	1
159	forb	1

Vegetation	
Species Name	Sum Cover
cat-tail	20
blue-joint grass	10
cinnamon fern	10
flat-top goldenrod	6
dewberry	6
flat-top white aster	6
grass	4
tussock sedge	4
common rush	4
sensitive fern	3
blue grass	2
raspberry	2
Canada goldenrod	2
horehound	1
Phragmites	1
forb	1
<b>Total</b>	<b>82</b>

### 2012 Treated Notes:

still dominated by dead phrag or litter  
18 native and 2 non native species

6 single occurrence species  
cinnamon fern most abundant green again  
dramatic decrease in phrag cover this year  
Total Cover = 180  
Dead Cover = 115  
Green Cover = 65



# Ray Brook Phragmites Site

## Relative Cover of Species August 2013

2013 Treated Area Plots		
Code	Name	Relative Cover
26	litter	43
16	dead Phragmites	35
44	Phragmites	15
175	cat-tail	7
91	flat-top goldenrod	6
69	sedge	3
7	ragweed	2
36	sensitive fern	2
37	water	2
38	cinnamon fern	1
185	silky willow	1

Vegetation	
Name	Relative Cover
Phragmites	15
cat-tail	7
flat-top goldenrod	6
sedge	3
ragweed	2
sensitive fern	2
cinnamon fern	1
silky willow	1
<b>Total</b>	<b>37</b>

Notes
An emergent shrub wetland peat muck soils, lots of down woody material
Measured on August 12, 2013

### Treated

still largely unvegetated  
Phragmites still present and common  
bluejoint grass not present in treated area  
litter and dead material is still ubiquitous  
litter is composed mostly of Phragmites stems  
sensitive fern observed to be arriving by seed

### Untreated

plant diversity of un-treated area is much higher  
all native plants  
relative cover of plants is much higher

2013 Untreated Plots		
Code	Name	Relative Cover
175	cat-tail	23
11	bluejoint grass	21
26	litter	14
29	horehound	13
37	water	13
91	flat-top goldenrod	7
59	meadowsweet	6
185	silky willow	5
2	red maple	2
36	sensitive fern	2
47	Poa	2
68	grass	2
71	moss	2
55	raspberry	1
60	starwort	1
69	sedge	1
74	lichen	1
78	aspen	1
85	Sphagnum moss	1
107	dewberry	1
159	forb	1

Vegetation	
Name	Relative Cover
cat-tail	23
bluejoint grass	21
horehound	13
flat-top goldenrod	7
meadowsweet	6
silky willow	5
red maple	2
sensitive fern	2
Poa	2
grass	2
moss	2
raspberry	1
starwort	1
sedge	1
lichen	1
aspen	1
Sphagnum moss	1
dewberry	1
forb	1
<b>Total</b>	<b>93</b>

### 2012 Notes:

#### Treated Notes

6 single occurrence species  
more species this year  
12 native and 1 non native species (versus 7 native and 2 non native)  
still large amount of dead phrag; half of plots have Phrag  
less total cover  
increase in green cover

Total cover = 118 (153)

dead cover = 84 (132)

green total = 34 (41)

#### Un-Treated Notes

dominated by 2 graminoid species: bluejoint grass and cattails  
low diversity  
same species as last year  
remaining species = 10 percent  
Total cover = 89(95)  
dead cover = 37(30)  
green total = 52 (65)

### Relative Cover of Species August 2013

Notes
An emergent peatland with saturated soils, site was flooded to a depth of 2 - 3 feet.
Measured on August 19, 2013

plant diversity of un-treated area is higher

green cover = 62

<b>Vegetation</b>	
<b>Name</b>	<b>Relative Cover</b>
bluejoint grass	14
cat-tail	5
tussock sedge	3
meadowsweet	1
<b>Total</b>	<b>23</b>

# Wanakena Ranger School Phragmites Site

## Relative Cover of Species August 2013

2013 Treated Area Plots		
Code	Name	Relative Cover
187	rush	25
37	water	22
91	flat-top goldenrod	20
26	litter	17
16	dead Phragmites	8
11	bluejoint grass	7
69	tussock sedge	2
73	bare ground	2
44	Phragmites	0

Vegetation	
Name	Relative Cover
rush	25
flat-top goldenrod	20
bluejoint grass	7
tussock sedge	2
<b>Total</b>	<b>54</b>

Notes
An emergent wetland peat muck soils, lots of down woody material
Measured on August 19, 2013
<b>Treated Plots</b>

Phragmites not present in plots nor on site  
 leaf litter from dead Phragmites still significant  
 bare ground is still common  
 site has not been revegetated by alternate species  
 site has not recovered

### Untreated Plots

plant diversity of un-treated area is higher

2013 Untreated Plots		
Code	Name	Relative Cover
11	bluejoint grass	48
91	flat-top goldenrod	14
37	water	8
59	meadowsweet	4
187	rush	4
179	fern	1

Vegetation	
Name	Relative Cover
bluejoint grass	48
flat-top goldenrod	14
meadowsweet	4
rush	4
fern	1
<b>Total</b>	<b>71</b>

### 2012 Notes:

#### Treated Plots

4 single species obs  
 10 native and 1 non native species  
 low amount of dead phrag  
 moderate total cover

Total cover = 104  
 dead cover = 43  
 green total = 61

#### Control Plots

3 single obs  
 7 native one non native  
 Total cover = 83  
 dead cover = 4  
 green total = 79

filename = PlotData2013 Wanakena Ranger School

## **Appendix: Sample - Site Field Data Report for Ray Brook Treatment Plots**

**Quadrat Data:**

Cover Classes: S = solitary; 1 = 0 - 5 %; 2 = 6 - 25 %; 3 = 26 - 50 %; 4 = 51 - 75 %; 5 = 76 - 95 %; 6 = 96 - 100%

Date: 8/12

Observers:
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Plot Name: (species):

Plot coordinates (origin or SE corner)

permanent no. typha 25+ phrag

## Photos





DSCN0229

Lower Cherry Patch Phragmites Site



DSCN0250

Upper Cherry Patch Phragmites Monitoring Site . stretched tape and some Phrag.





DSCN0270

Ray Brook Phragmites Monitoring Site; clumps of Phrag and dead Phrag.



DSCN0345

Wanakena Ranger School Phragmites Monitoring Site





DSCN0364

Peavine Swamp Phragmites Monitoring Site