South Sandy Creek: Aquatic Restoration Initiative Phase III

Aquatic and Riparian Invasive Species Monitoring, Management, and Habitat Restoration

2022 Final Report

December 2022

Cardno®

Table of Contents

Appendices

1 Initial Work Plan

In accordance with the plans and requirements outlined in the Scope of Services received on January 25, 2022, Cardno submitted a site specific work plan to SLELO PRISM on April 14th. On May 9th, a request was made by SLELO PRISM for some minor revisions to the plan. A revised copy with these revisions was submitted on May 13th. This work plant can be found in Appendix A.

2 June 11 Public Site Experience Event

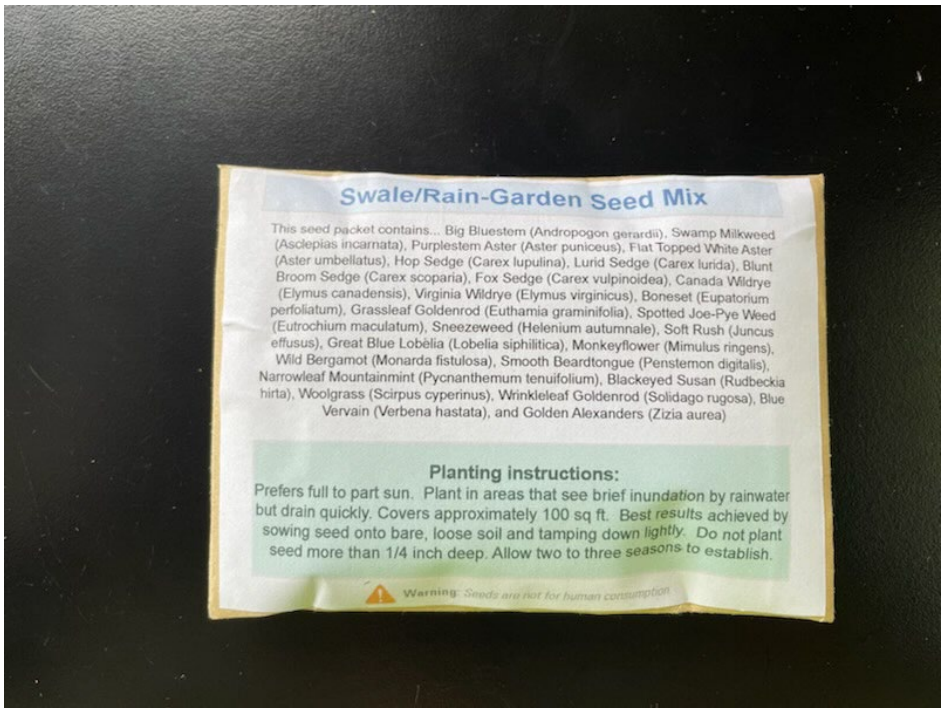
In addition to the work to be performed on-site, Cardno sent one representative to the June 11th site experience event hosted by SLELO PRISM. The staff member gave a 15-minute demonstration on various restoration techniques, including stem injection, planting plugs and seed installation. Cardno also provided 100 seed packets containing species native to the area that could be used to create a small raingarden or backyard swale. On one side, the seed packets will have a list of the species included in the packet, as well as brief instructions on how to install the seed and establish the plants. The front side included the logos of all the participating organizations. Final species composition and packet design was submitted to SLELO PRISM for approval prior to the event.

Examples of the packet design can be found below, as well as the composition of the packets can be found below.

Mix Composition	Species
22.00%	Elymus virginicus
12.00%	Elymus canadensis
15.00%	Andropogon gerardii
11.00%	Carex vulpinoidea
5.00%	Carex lurida
6.00%	Carex scoparia
4.00%	Verbena hastata
3.00%	Carex lupulina
3.00%	Rudbeckia hirta
5.00%	Asclepias incarnata
2.00%	Juncus effusus
2.50%	Zizia aurea
4.00%	Penstemon digitalis
1.00%	Solidago rugosa
0.70%	Eutrochium maculatum
0.40%	Lobelia siphilitica
0.50%	Monarda fistulosa
0.50%	Pycnanthemum tenuifolium
0.30%	Helenium autumnale
0.40%	Mimulus ringens
0.50%	Scirpus cyperinus
0.40%	Eupatorium perfoliatum
0.20%	Euthamia graminifolia
0.50%	Aster puniceus
0.10%	Aster umbellatus
100.0%	

Table 2.1: Species used in the seed packets

Front and back side of the June 11 seed packets



3 Management and Restoration Summary

3.1 Mechanical Removal of Plant Material

3.1.1 Spring

On-site activities began with the removal of the dormant *Phragmites* stand near the parking lot at the South Sandy Creek boat launch on May 17th. With the use of a brush saws, the crew cut the dead stems and hand collected as much of the debris as possible. Approximately 30 cubic yards of this material was removed from the treatment plot. All cut and collected material was placed in a roll-off dumpster and shipped to a local municipal waste landfill.

Once that area was cleared, the crew moved to the *Phragmites* patch located downstream and south of the bird observation tower. Again, the dead stems were cut as close to the ground as possible. However, it was determined that the process of removing debris and transporting it to the parking lot area for disposal would cause potential spread of seed throughout the entire site, as well as cause significant damage to the trail due to the wet site conditions at that time and the multiple trips needed to move that material. In consultation with SLELO PRISM's representative, it was decided that the debris would be collected and piled in two locations on the edge of the *Phragmites* patch away from the creek and in discrete areas. The piles were then covered with large, neutral colored tarps that were secured with stakes and logs to contain the debris and potentially damage any seed with the high temperatures that would be experienced under the tarp during the summer. The tarps would be removed at the end of the season.

Crew members removing dead Phragmites stems

Finally, the crew began removal of the dead Japanese knotweed debris that was cut from the treatment plots along the north bank of South Sandy Creek in the fall of 2021. Unfortunately, high water levels in the creek over the winter had flooded the areas and moved several of the debris piles from the plots or added random material to the piles created last year. The crew did their best to locate all the knotweed material and load it into the large tote bags for transport back to the dumpster located at parking lot. Bags were emptied into the dumpster and reused to continue bringing material from the treatment plots. When complete, the crew had brought approximately 20 cubic yards of this material to the dumpster for removal.

These activities were completed on May 20th.

3.1.2 Fall

To wrap up on-site activities for this season, Cardno returned to the site on November 30th to cut and remove the dead *Phragmites* stems in the plot located northeast of the boat launch parking lot. Crewmembers again cut the stems near the ground with the use of brush saws. It was observed there was considerably less material and growth within the plot as compared with what was seen in the spring. Once the stems were cut, they were collected by hand and disposed of in a roll-off dumpster that was again rented for this work. Approximately 12 cubic yards of material was collected.

Phragmites treatment plot after dead stem removal

During this visit, the crew also removed the tarps that were covering the *Phragmites* debris piles located in the far downstream treatment plot. The tarps and any loose fragments were collected, bagged, and taken off-site for disposal.

Phragmites pile with the tarp removed

3.2 Site Visits - Site Visits – Native Riparian Seed Installation

3.2.1 Spring

During the May visit, as crews were removing the Japanese knotweed debris from the treatment plots, they also began installing a native riparian seed mix. Focusing on areas that appeared to be mostly un-vegetated, crews roughed up the soil with the use of hand rakes and spread seed throughout at a rate of approximately 20 lbs per acre. The list of species can be seen below. No cover crop was applied as most traditional cover species are not permitted for use in restoration by the NYSDEC. Table 3.1 on the following page lists the species used.

Scientific Name	Common Name
Calamagrostis canadensis	Bluejoint grass
Carex vulpinoidea	Brown fox sedge
Elymus virginicus	Virginia wild rye
Eutrochium maculatum	Spotted Joe Pye weed
Glyceria striata	Fowl mannagrass
Helenium autumnale	Common sneezeweed
Persicaria pennsylvanica	Pensylvania smartweed

Table 3.1: Species used in the spring seed mix

3.2.2 Fall

Prior to Cardno sourcing seed material for installation during the fall, a discussion took place between Cardno and SLELO PRISM regarding the timing, type of restoration material to be used, and the increasing presence of goutweed (*Aegopodium podagraria*) across the site. It was decided that the remaining budget for this line item would be used to pre-order and pay for native plugs stock from a vendor specializing in the production of native species from the eastern US, Pinelands Nursery. Material would be delivered during the growing season in 2023 and installed under a new contract. The confirmed sales order for this material can be found in Appendix F.

3.3 Site Visits – Invasive Species Re-treatments

Cardno visited the site 4 times during the 2022 growing season to perform invasive species re-treatments. All herbicide was applied with the use of back-pack sprayers and a blue marking dye was added to the mixture to aid in tracking were the herbicide had been sprayed.

- May 23rd through 25th… The target of these treatments was the Japanese knotweed patches located along the creek corridor using a 2% concentration of Triclopyr4Ester (chemical label can be found in Appendix B). The crew applied 21 fl oz in the treatment plots found in the downstream half of the northern bank on the first day. The southern bank was treated the following day using 83 fl oz. On the final day, treatments of the remaining plots along the northern bank were performed with an additional 18 fl oz.
- July 19th and 20th… Again, the target species was Japanese knotweed using the same chemical and concentration as the previous visit. On the first day, crew focused on the northern bank and applied 30.72 fl oz of herbicide. The crew returned the next day to complete treating the remainder of the plots on the northern bank and all those found on the southern bank. An

additional 44.8 fl oz was applied on the northern bank, while 25.6 fl oz was used on the treatment plots along the southern bank.

- August 3rd… Cardno was able to complete an initial herbicide treatment on the *Phragmites* stand located near the parking lot and on the re-sprouts at the treatment plot located at the far downstream end of the work area. Cardno was unable to utilize the originally proposed herbicide of Vastlan due to multiple issues, including sourcing and timing as the application was associated with the work at North Sandy Pond. As the plants had grown too tall to fall within the label specifications for Vastlan, Cardno proposed using the chemical Clearcast (label can be found in Appendix B) at a 2% concentration. Approved for use in and around aquatic areas, Clearcast is an alternative to glyphosate that has been approved for *Phragmites* treatments when the plants are at a mature height. A total of 51.2 fl oz of the herbicide was applied over the two areas.
- September 29th and 30th… During this final visit, both Japanese knotweed and *Phragmites* were targeted. The first day, the crew treated Japanese knotweed re-sprouts in all treatment plots located on the north side of the creek, as well as a portion of the southern bank. The following day, the crew completed treating the plots located on the south side of the creek, and then they then moved onto retreating the *Phragmites* patch located near the parking lot. While this plot did show signs of distress from the previous treatment in August, it was decided a second treatment might yield additional mortality. As with the previous visits, a 2% concentration of Triclopyr4Ester was applied to Japanese knotweed with a total of 84.48 fl oz being used. The *Phragmites* were again treated with a 2% mixture of Clearcast with 30.72 fl oz used.

A map of the South Sandy Creek treatment areas can be found in Appendix C. The plots have been numbered and a chart with quantities of herbicide applied per plot can be found in Appendix D.

3.4 Site Visits - Invasive Species and Habitat Restoration Monitoring

Prior to the first invasive species monitoring visit, Cardno chose 40 random points across the site to place the invasive species monitoring plots. 4 of these plots were located outside mapped treatment plots to survey growth and species composition outside of areas that had been treated for invasive species. Another 4 were placed inside the two *Phragmites* treatment plots. The remainder were to be located within plots that have been treated for Japanese knotweed. Additionally, they had to be placed in a treatment plot and position that would allow a 9 m^2 sampling area to be established. Unfortunately, only 24 plots were identified that could hold such a sampling area due to the relative size and shape of the treatment polygons. Consequently, another 8 treatment plots were identified that could contain a "half plot" measuring 4.5 m^2 in area. This allowed Cardno to survey the total area that was proposed in the original work plan. Potential sampling locations were submitted to SLELO PRISM's representative prior to the first monitoring visit. These mapped points can be found in Appendix C.

This baseline monitoring visit was conducted over May 19th and 20th. 1.5" PVC pipes were installed at the location of the approved sampling points to mark the northwest corner of each plot. Slight adjustments in the location of these corner posts were occasionally needed based on field conditions, however every effort was made to keep the corner in the mapped spot to maintain the random distribution of the plots. Each marker-pipe has the sampling plot number on it written on it, as well as the number identifying the treatment plot it is located in. These pipes will remain in place after the end of the current contract in order to assist SLELO PRISM with future monitoring efforts and data comparison. Once the crewmember had established to location of the plot, they proceeded to locate the plot boundaries using a tape measure and pin flags then begin the survey. Botanical monitoring data collected during this initial survey included total vegetative cover, invasive species encountered and their respective coverage, and native species cover. Native species encountered and cover of any significant populations were also recorded, as well as other general observations. A photograph was also taken standing at the PVC post, looking across the sampling plot. An example of these photographs can be found on the next page. When the survey was complete, any temporary stakes or flagging were removed and the staff member moved to the next plot.

The second of these visits occurred on August 9th. Again, sampling plots were laid out and corners marked with pin flags. Data regarding total vegetative cover, invasive species and their coverage, and

native species coverage was recorded. It should be noted that two rounds of herbicide treatment on the Japanese knotweed occurred between the first and second monitoring visits.

The final visit was split between September 23rd and 29th. On the 23rd, staff surveyed 15 of the plots located on the northern bank of South Sandy Creek. The remaining plots site wide were completed on the 29th. The same process was carried out as before with similar data recorded.

Copies of the field notes can be found in Appendix E.

Photograph taken of SP #29 in TP #15

4 Observations and Recommendations for Future Activities

4.1 Observations

A table summarizing the data collected during the monitoring visits can be found in Appendix E. This data shows that in the areas treated in 2021, there was a significant decrease in the vegetative cover of both Japanese knotweed and common reed. While Cardno did not collect any data in 2021, invasive species cover was nearly 100% within these treatment plots. The table below shows the average cover of both Japanese knotweed and native vegetation during the three monitoring visits.

Date of Monitoring Visit	Average % cover Japanese knotweed	Average % cover native vegetation
May 19th – 20th	22%	20%
August 9th	18%	24%
September 23rd and 29th	22%	40%

When evaluating this data, it should be noted there were two herbicide treatments performed between the spring and summer sampling dates. The third herbicide treatment occurred immediately after the fall sampling. The slight dip and return to a similar cover percentage could be the result of re-sprouting before the final treatment. Over the course of the growing season, 14 sampling plots showed a decrease in the vegetative cover of Japanese knotweed. Plots showing no change or an increase in cover numbered 9 each. Japanese knotweed was not observed at any point during 2022 either in the 4 control plots or 4 *Phragmites* treatment plots. In 12 of the treatment plots, Japanese knotweed was observed with a cover of 5% or less during the final monitoring event.

The increase in native cover could also be related to the quick recovery and growth of the native species after the Japanese knotweed was treated mid-summer. Between May and September, 33 of the 40 treatment plots exhibited an increase in total native cover. Only 7 plots showed no change or a decrease in native species cover.

In the *Phragmites* treatment plot that received herbicide in 2021, total cover of the *Phragmites* hovered at or below 5% during the growing season in the two sampling plots located in that area. However, native vegetative cover increased dramatically from an average of 18% in the spring to 70% in September.

Several other introduced and potentially invasive species were observed throughout the sampling plots. The most widespread of these was goutweed (*Aegopodium podagraria*). It was observed in nearly every plot outside of the *Phragmites* treatment plots. Average cover of this species was observed at 39% during the spring and only decreased slightly over the summer into the fall. Another species of concern that seemed to increase in cover during the season was mugwort (*Artemisia vulgaris*), seen in 15 plots. Other non-native invasive species of note recorded included garlic mustard *(Alliaria petiolata*) seen in 17 plots, reed canary grass *(Phalaris arundinacea*) recorded in 5 plots, Canada thistle *(Cirsium arvense*) observed in 2 plots, and amur honeysuckle (*Lonicera maackii*) seen in 1 plot on the south bank of the creek. Purple loosestrife (*Lythrum salicaria*) was observed within 2 plots, however it appeared that the plants had been host to a number of purple loosestrife beetles and were distressed.

A list of the species observed can be found in Appendix E. While this list is not a complete inventory of the site, it is representative of the common species found throughout the project area.

4.2 Recommendations for Future Activities

The South Sandy Creek site shows potential for supporting a wide variety of native communities, from open wetlands to wooded riparian areas. However, large numbers of nuisance and invasive plants can be found in the park as well. Even with control of these species within the boundaries of the current project area, large populations of Japanese knotweed, common reed, and reed canary grass can be found on adjacent parcels that will continue to provide a source for invasive seed. These adjacent seed sources, and seed that will be transported onto the site from upstream properties, will likely continue to put pressure on the habitat within the project area. A continuous program of adaptive vegetation management will likely be needed over the next 3 to 5 years in order to help ensure that the project area continues to develop with high-quality native vegetation.

Going forward, SLELO PRISM should consider the following action items:

- Continue with invasive species vegetative monitoring to observe trends in growth of the nonnative species, as well as effectiveness of control methods. Also, performing a more focused FQA-based survey of the site and sampling plots may be useful in determining the diversity of the area and guide additional habitat restoration activities.
- Develop a plan to control the large infestation of goutweed. This rhizomatously spreading plant is tolerant of a wide variety of habitats and will quickly outcompete many species, especially in shaded areas, by forming dense colonies. Multiple treatments of a glyphosate-based herbicide may be able to eradicate the plant and open areas up for native restoration efforts.
- Continue with the chemical treatment of both Japanese knotweed and *Phragmites*. While significant reductions have been achieved, it will be important to continue keep up with any re-sprouting to maintain control.
- Once significant invasive species reduction has been achieved, installation of native plants via seed or plugs. Application of quick germinating seed may be ideal for those areas that have been treated but not deemed completely clear, as seed installation is more economical in both material and installation. Additionally, early restoration efforts can focus on monocot species that can withstand exposure to broadleaf specific herbicides. Once control has been achieved, additional plantings of a more diverse range of species can occur.
- Slowly look to expand the footprint of invasive species control beyond the current project area to eliminate seed and vegetative sources for reintroduction of these problem species.

South Sandy Creek:
Year End Project
Report

APPENDIX A

INITIAL WORK PLAN

South Sandy Creek:
Year End Project
Report

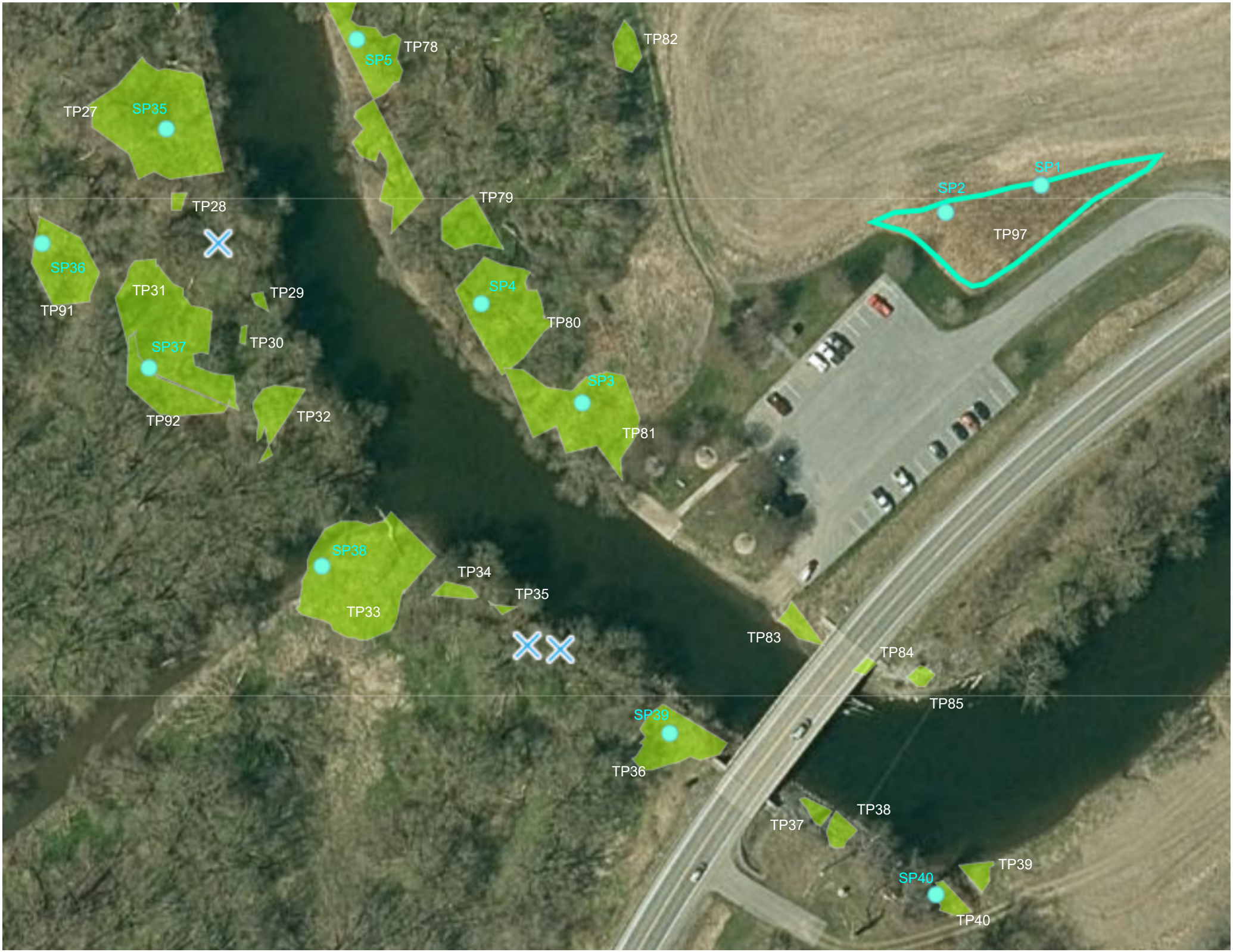
APPENDIX B

HERBICIDE LABELS

South Sandy Creek:
Year End Project
Report

APPENDIX C

TREATMENT AND SAMPLE PLOT MAPS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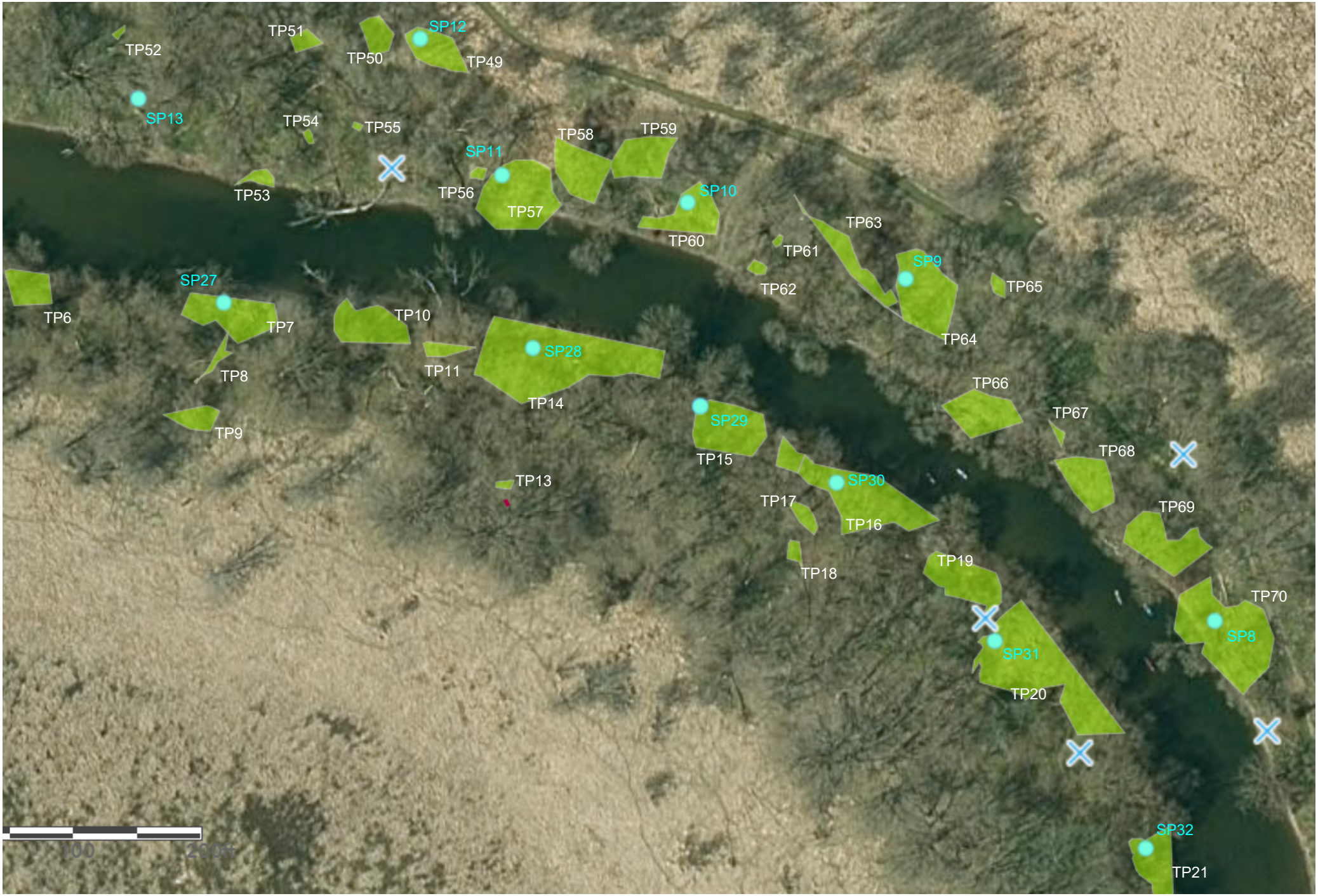
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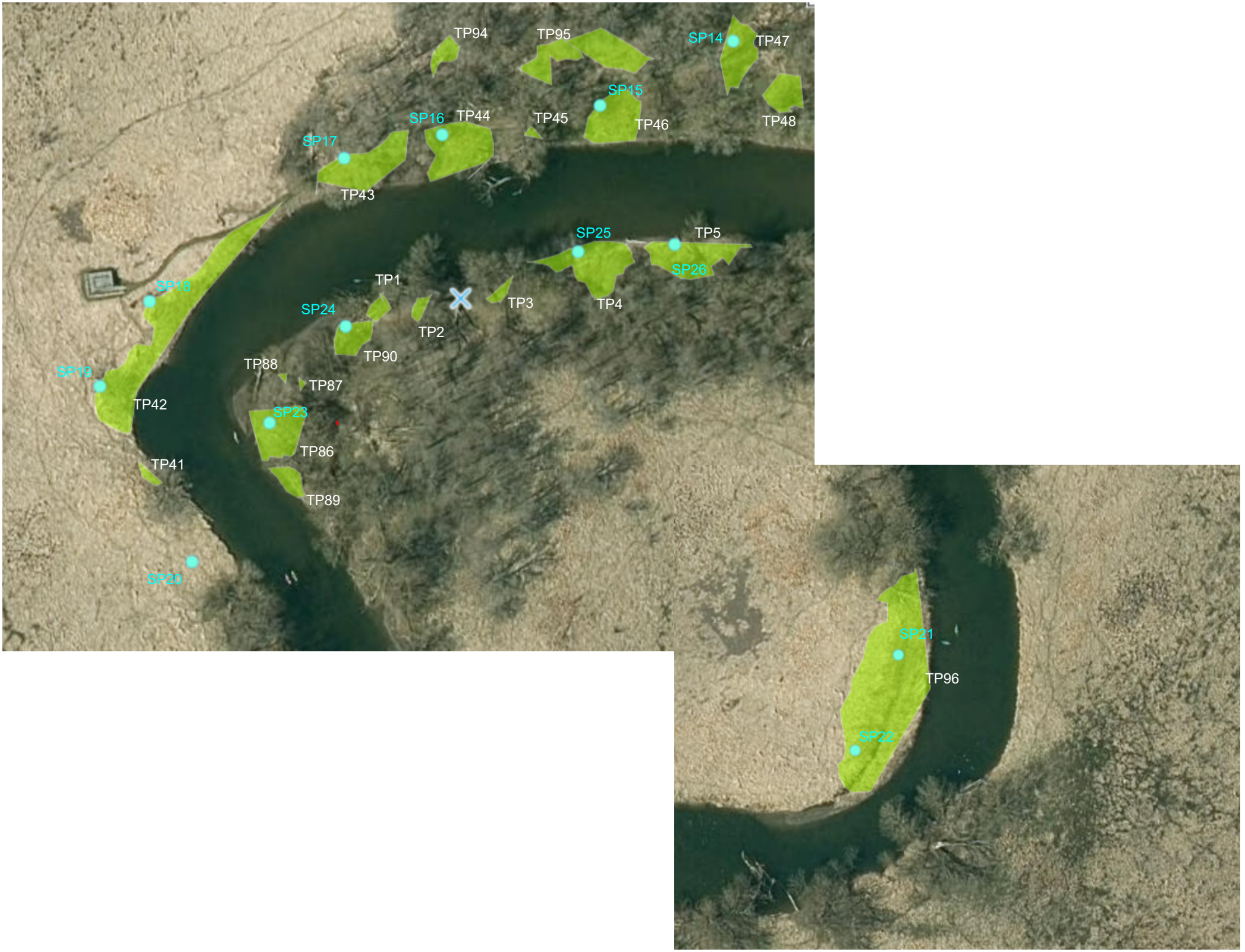
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SP22

South Sandy Creek:
Year End Project
Report

APPENDIX D

TREATMENT PLOT APPLIED HERBICIDE QUANTITIES

South Sandy Creek:
Year End Project
Report

APPENDIX

E

INVASIVE SPECIES MONITORING SUMMARY AND FIELD NOTES

2022 South Sandy Creek Monitoring Plot Summary

	Sampling Plot #	1					2				
	Treatment Plot #	97					97				
	Cover %	Total Vegetative	*Reynoutria japonica*	*Aegopodium podagraria*	*Phragmites australis*	Native Species	Total Vegetative	*Reynoutria japonica*	*Aegopodium podagraria*	*Phragmites australis*	Native Species
Date of Sampling	Spring (5/19 and 5/20)	25%	0%	0%	5%	25%	5%	0%	0%	5%	5%
	Summer (8/9)	95%	0%	0%	95%	60%	100%	0%	0%	100%	0%
	Fall (9/23 and 9/29)	80%	0%	0%	80%	10%	95%	0%	0%	95%	1%

	Sampling Plot #	3					4			
	Treatment Plot #	81					80			
	Cover %	Total Vegetative	*Reynoutria japonica*	*Aegopodium podagraria*	*Alliaria petiolata*	Native Species	Total Vegetative	*Reynoutria japonica*	*Aegopodium podagraria*	Native Species
Date of Sampling	Spring (5/19 and 5/20)	40%	5%	30%	1%	5%	80%	10%	70%	10%
	Summer (8/9)	10%	1%	1%	< 1%	0%	60%	2%	50%	10%
	Fall (9/23 and 9/29)	60%	5%	15%	< 1%	45%	55%	5%	45%	15%

	Sampling Plot #	5					6			
	Treatment Plot #	78					76			
	Cover %	Total Vegetative	*Reynoutria japonica*	*Aegopodium podagraria*	*Alliaria petiolata*	Native Species	Total Vegetative	*Reynoutria japonica*	*Aegopodium podagraria*	Native Species
Date of Sampling	Spring (5/19 and 5/20)	70%	0%	55%	1%	45%	60%	5%	45%	45%
	Summer (8/9)	95%	1%	50%	30%	20%	90%	2%	75%	20%
	Fall (9/23 and 9/29)	95%	1%	25%	10%	70%	80%	5%	45%	50%

2022 South Sandy Creek Monitoring Plot Summary

	Sampling Plot #	7					8				
	Treatment Plot #	untreated area					70				
	Cover %	Total Vegetative	*Reynoutria japonica*	*Aegopodium podagraria*	*Alliaria petiolata*	Native Species	Total Vegetative	*Reynoutria japonica*	*Aegopodium podagraria*	*Artemisia vulgaris*	Native Species
Date of Sampling	Spring (5/19 and 5/20)	95%	0%	60%	5%	85%	50%	15%	10%	0%	35%
	Summer (8/9)	100%	0%	5%	0%	100%	95%	20%	40%	0%	40%
	Fall (9/23 and 9/29)	95%	0%	30%	1%	90%	85%	35%	60%	3%	55%

	Sampling Plot #	9						10 (4.5 m^2)			
	Treatment Plot #	64						60			
	Cover %	Total Vegetative	*Reynoutria japonica*	*Aegopodium podagraria*	*Alliaria petiolata*	*Artemisia vulgaris*	Native Species	Total Vegetative	*Reynoutria japonica*	*Aegopodium podagraria*	Native Species
Date of Sampling	Spring (5/19 and 5/20)	55%	30%	45%	1%	0%	5%	85%	10%	80%	5%
	Summer (8/9)	15%	5%	10%	0%	0%	0%	90%	10%	80%	5%
	Fall (9/23 and 9/29)	75%	30%	20%	0%	< 1%	35%	85%	10%	40%	60%

	Sampling Plot #	11					12 (4.5 m^2)			
	Treatment Plot #	57					49			
	Cover %	Total Vegetative	*Reynoutria japonica*	*Aegopodium podagraria*	*Artemisia vulgaris*	Native Species	Total Vegetative	*Reynoutria japonica*	*Aegopodium podagraria*	Native Species
Date of Sampling	Spring (5/19 and 5/20)	65%	15%	15%	0%	35%	70%	35%	40%	5%
	Summer (8/9)	30%	30%	5%	0%	< 1%	30%	5%	20%	5%
	Fall (9/23 and 9/29)	75%	45%	15%	5%	40%	85%	25%	35%	35%

2022 South Sandy Creek Monitoring Plot Summary

	Sampling Plot #	13					14 (4.5 m^2)			
	Treatment Plot #	untreated area					47			
	Cover %	Total Vegetative	*Reynoutria japonica*	*Aegopodium podagraria*	*Phalaris arundinacea*	Native Species	Total Vegetative	*Reynoutria japonica*	*Aegopodium podagraria*	Native Species
Date of Sampling	Spring (5/19 and 5/20)	100%	0%	75%	1%	35%	55%	40%	10%	5%
	Summer (8/9)	100%	0%	60%	< 1%	50%	20%	10%	5%	5%
	Fall (9/23 and 9/29)	100%	0%	40%	0%	75%	55%	45%	0%	10%

	Sampling Plot #	15				
	Treatment Plot #	46				
	Cover %	Total Vegetative	*Reynoutria japonica*	*Aegopodium podagraria*	*Artemisia vulgaris*	Native Species
Date of Sampling	Spring (5/19 and 5/20)	70%	25%	30%	0%	15%
	Summer (8/9)	60%	30%	30%	< 1%	10%
	Fall (9/23 and 9/29)	85%	20%	25%	5%	60%

	Sampling Plot #	16						
	Treatment Plot #	44						
	Cover %	Total Vegetative	*Reynoutria japonica*	*Aegopodium podagraria*	*Alliaria petiolata*	*Artemisia vulgaris*	*Lythrum salicaria*	Native Species
Date of Sampling	Spring (5/19 and 5/20)	45%	15%	15%	1%	0%	1%	15%
	Summer (8/9)	95%	15%	35%	0%	2%	0%	30%
	Fall (9/23 and 9/29)	95%	35%	15%	0%	0%	0%	70%

2022 South Sandy Creek Monitoring Plot Summary

	Sampling Plot #	17							
	Treatment Plot #	43							
	Cover %	Total Vegetative	*Reynoutria japonica*	*Aegopodium podagraria*	*Alliaria petiolata*	*Artemisia vulgaris*	*Lythrum salicaria*	*Phalaris arundinacea*	Native Species
Date of Sampling	Spring (5/19 and 5/20)	80%	10%	35%	1%	1%	1%	1%	30%
	Summer (8/9)	50%	5%	35%	0%	0%	0%	0%	5%
	Fall (9/23 and 9/29)	80%	5%	20%	0%	10%	0%	0%	60%

	Sampling Plot #	18							
	Treatment Plot #	42							
	Cover %	Total Vegetative	*Reynoutria japonica*	*Aegopodium podagraria*	*Alliaria petiolata*	*Artemisia vulgaris*	*Cirsium arvensis*	*Phalaris arundinacea*	Native Species
Date of Sampling	Spring (5/19 and 5/20)	40%	20%	10%	1%	0%	0%	1%	15%
	Summer (8/9)	95%	5%	0%	0%	1%	0%	5%	60%
	Fall (9/23 and 9/29)	80%	25%	10%	0%	10%	1%	25%	65%

	Sampling Plot #	19						
	Treatment Plot #	42						
	Cover %	Total Vegetative	*Reynoutria japonica*	*Aegopodium podagraria*	*Alliaria petiolata*	*Artemisia vulgaris*	*Phalaris arundinacea*	Native Species
Date of Sampling	Spring (5/19 and 5/20)	40%	5%	5%	5%	0%	1%	15%
	Summer (8/9)	90%	1%	0%	0%	0%	0%	50%
	Fall (9/23 and 9/29)	60%	10%	5%	1%	10%	25%	60%

2022 South Sandy Creek Monitoring Plot Summary

	Sampling Plot #	20						
	Treatment Plot #	untreated area						
	Cover %	Total Vegetative	*Reynoutria japonica*	*Aegopodium podagraria*	*Alliaria petiolata*	*Cirsium arvense*	*Phalaris arundinacea*	Native Species
Date of Sampling	Spring (5/19 and 5/20)	80%	0%	3%	1%	5%	55%	25%
	Summer (8/9)	100%	0%	0%	0%	0%	50%	30%
	Fall (9/23 and 9/29)	95%	0%	5%	< 1%	20%	45%	70%

	Sampling Plot #	21				
	Treatment Plot #	96				
	Cover %	Total Vegetative	*Reynoutria japonica*	*Aegopodium podagraria*	*Phragmites australis*	Native Species
Date of Sampling	Spring (5/19 and 5/20)	10%	0%	0%	5%	10%
	Summer (8/9)	40%	0%	0%	5%	35%
	Fall (9/23 and 9/29)	65%	0%	0%	3%	60%

	Sampling Plot #	22					
	Treatment Plot #	96					
	Cover %	Total Vegetative	*Reynoutria japonica*	*Aegopodium podagraria*	*Lythrum salicaria*	*Phragmites australis*	Native Species
Date of Sampling	Spring (5/19 and 5/20)	25%	0%	0%	1%	5%	25%
	Summer (8/9)	95%	0%	0%	0%	5%	95%
	Fall (9/23 and 9/29)	85%	0%	0%	5%	5%	80%

2022 South Sandy Creek Monitoring Plot Summary

	Sampling Plot #	23 *dense tree cover in this plot					24 (4.5 m2)				
	Treatment Plot #	86					90				
	Cover %	Total Vegetative	*Reynoutria japonica*	*Aegopodium podagraria*	*Alliaria petiolata*	Native Species	Total Vegetative	*Reynoutria japonica*	*Aegopodium podagraria*	*Alliaria petiolata*	Native Species
Date of Sampling	Spring (5/19 and 5/20)	90%	30%	5%	10%	45%	70%	50%	10%	0%	10%
	Summer (8/9)	10%	10%	0%	< 1%	< 1%	40%	20%	0%	< 1%	15%
	Fall (9/23 and 9/29)	30%	30%	25%	3%	5%	50%	50%	0%	0%	0%

	Sampling Plot #	25					
	Treatment Plot #	4					
	Cover %	Total Vegetative	*Reynoutria japonica*	*Aegopodium podagraria*	*Artemisia vulgaris*	*Lonicera maackii*	Native Species
Date of Sampling	Spring (5/19 and 5/20)	65%	25%	30%	0%	1%	25%
	Summer (8/9)	100%	5%	10%	1%	1%	40%
	Fall (9/23 and 9/29)	80%	30%	30%	10%	10%	55%

	Sampling Plot #	26						27 (4.5 m2)			
	Treatment Plot #	5						7			
	Cover %	Total Vegetative	*Reynoutria japonica*	*Aegopodium podagraria*	*Alliaria petiolata*	*Artemisia vulgaris*	Native Species	Total Vegetative	*Reynoutria japonica*	*Aegopodium podagraria*	Native Species
Date of Sampling	Spring (5/19 and 5/20)	70%	5%	55%	0%	1%	15%	75%	0%	70%	10%
	Summer (8/9)	100%	0%	30%	2%	0%	50%	100%	< 1%	30%	50%
	Fall (9/23 and 9/29)	95%	15%	30%	0%	5%	65%	90%	0%	75%	35%

2022 South Sandy Creek Monitoring Plot Summary

	Sampling Plot #	28					
	Treatment Plot #	14					
	Cover %	Total Vegetative	*Reynoutria japonica*	*Aegopodium podagraria*	*Alliaria petiolata*	*Artemisia vulgaris*	Native Species
Date of Sampling	Spring (5/19 and 5/20)	80%	45%	35%	1%	0%	30%
	Summer (8/9)	60%	50%	10%	0%	0%	0%
	Fall (9/23 and 9/29)	85%	45%	25%	5%	1%	35%

	Sampling Plot #	29 (4.5 m2)					30				
	Treatment Plot #	15					16				
	Cover %	Total Vegetative	*Reynoutria japonica*	*Aegopodium podagraria*	*Alliaria petiolata*	Native Species	Total Vegetative	*Reynoutria japonica*	*Aegopodium podagraria*	*Artemisia vulgaris*	Native Species
Date of Sampling	Spring (5/19 and 5/20)	65%	25%	1%	35%	5%	85%	10%	70%	0%	10%
	Summer (8/9)	25%	3%	0%	10%	0%	100%	1%	95%	0%	5%
	Fall (9/23 and 9/29)	60%	10%	5%	30%	15%	75%	5%	60%	1%	30%

	Sampling Plot #	31					32 (4.5 m2)				
	Treatment Plot #	20					21				
	Cover %	Total Vegetative	*Reynoutria japonica*	*Aegopodium podagraria*	*Alliaria petiolata*	Native Species	Total Vegetative	*Reynoutria japonica*	*Aegopodium podagraria*	*Artemisia vulgaris*	Native Species
Date of Sampling	Spring (5/19 and 5/20)	75%	20%	50%	1%	5%	65%	10%	50%	0%	10%
	Summer (8/9)	100%	1%	100%	0%	10%	100%	0%	100%	0%	< 1%
	Fall (9/23 and 9/29)	95%	5%	70%	0%	25%	95%	< 1%	90%	1%	5%

2022 South Sandy Creek Monitoring Plot Summary

	Sampling Plot #	33				34				
	Treatment Plot #	untreated area				25				
	Cover %	Total Vegetative	*Reynoutria japonica*	*Aegopodium podagraria*	Native Species	Total Vegetative	*Reynoutria japonica*	*Aegopodium podagraria*	*Alliaria petiolata*	Native Species
Date of Sampling	Spring (5/19 and 5/20)	100%	0%	80%	25%	95%	30%	45%	1%	20%
	Summer (8/9)	100%	0%	100%	20%	100%	90%	30%	0%	0%
	Fall (9/23 and 9/29)	95%	0%	75%	30%	95%	10%	80%	0%	30%

	Sampling Plot #	35				36			
	Treatment Plot #	27				91			
	Cover %	Total Vegetative	*Reynoutria japonica*	*Aegopodium podagraria*	Native Species	Total Vegetative	*Reynoutria japonica*	*Aegopodium podagraria*	Native Species
Date of Sampling	Spring (5/19 and 5/20)	95%	65%	40%	30%	95%	35%	45%	20%
	Summer (8/9)	95%	90%	70%	2%	100%	80%	20%	20%
	Fall (9/23 and 9/29)	85%	60%	40%	30%	95%	45%	70%	40%

	Sampling Plot #	37				38					
	Treatment Plot #	31				33					
	Cover %	Total Vegetative	*Reynoutria japonica*	*Aegopodium podagraria*	Native Species	Total Vegetative	*Reynoutria japonica*	*Aegopodium podagraria*	*Alliaria petiolata*	*Artemisia vulgaris*	Native Species
Date of Sampling	Spring (5/19 and 5/20)	90%	35%	50%	10%	90%	50%	30%	5%	0%	10%
	Summer (8/9)	50%	40%	0%	5%	40%	25%	0%	0%	0%	5%
	Fall (9/23 and 9/29)	85%	35%	50%	10%	85%	25%	50%	0%	3%	15%

2022 South Sandy Creek Monitoring Plot Summary

	Sampling Plot #	39					40 (4.5 m^2)			
	Treatment Plot #	36					40			
	Cover %	Total Vegetative	*Reynoutria japonica*	*Aegopodium podagraria*	*Artemisia vulgaris*	Native Species	Total Vegetative	*Reynoutria japonica*	*Aegopodium podagraria*	Native Species
Date of Sampling	Spring (5/19 and 5/20)	50%	10%	40%	0%	5%	80%	10%	50%	25%
	Summer (8/9)	80%	1%	40%	0%	0%	100%	1%	50%	50%
	Fall (9/23 and 9/29)	85%	5%	40%	1%	30%	100%	< 1%	75%	45%

WEEKLY FIELD REPORT

Common reed stem removal near the parking lot

Cleared downstream common reed patch and covered debris pile

DAILY FIELD REPORT

DAILY FIELD REPORT

DAILY FIELD REPORT

DAILY FIELD REPORT

DAILY FIELD REPORT

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WEEKLY FIELD REPORT

ACTIVITY	HRS./ STAFF	# STAFF	TOTAL HRS.	**NOTES** (density, species, etc.)
Common reed stem removal	8	3	24	
Tarp removal	2	1	2	
TOTAL				

Cardno crewmember a using brush cutter to mow Phragmites stems

WEEKLY FIELD REPORT

South Sandy Creek Phragmites patch post mowing

North Sandy Pond dense Phragmites patch post mowing

Please Respect the Environment

About Cardno

Cardno is an ASX-200 professional infrastructure and environmental services company, with expertise in the development and improvement of physical and social infrastructure for communities around the world. Cardno's team includes leading professionals who plan, design, manage, and deliver sustainable projects and community programs. Cardno is an international company listed on the Australian Securities Exchange [ASX:CDD].

Cardno Zero Harm

Cardno ZERO HARM EVERY JOB. EVERY DAY.

At Cardno, our primary concern is to develop and maintain safe and healthy conditions for anyone involved at our project worksites. We require full compliance with our Health and Safety Policy Manual and established work procedures and expect the same protocol from our subcontractors. We are committed to achieving our Zero Harm goal by continually improving our safety systems, education, and vigilance at the workplace and in the field. Safety is a Cardno core value and through strong leadership and active employee participation, we seek to implement and reinforce these leading actions on every job, every day.

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