



DILLON
CONSULTING

CITY OF LONDON

Invasive Species Control Program Results

Medway Valley Heritage Forest ESA



December 2015 – 14-9389

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A False Rue-anemone Monitoring Record

Executive Summary

In cooperation with the City of London (the City) and Upper Thames River Conservation Authority (UTRCA), the City retained Dillon Consulting Limited (Dillon) to prepare an Invasive Species Management Plan for the Medway Valley Heritage Forest (MVHF) Environmentally Significant Area (ESA). The Invasive Species Management Plan and Program in the MVHF ESA is fully funded by the City of London to protect and restore the City's Natural Heritage System. This management plan was in response to observations of invasive species competing with sensitive vegetation during the 2013 Natural Heritage Inventory and Evaluation (NHIE) completed by Dillon for the City in the MVHF South ESA.

Highly invasive flora, such as Goutweed and Japanese Knotweed were threatening to out-compete local native vegetation within the MVHF ESA and in particular, Species at Risk and Species of Conservation that are found in close proximity to severe infestations. This was a concern to several stakeholders, including the City of London and Upper Thames River Conservation Authority, who implemented efforts to control the encroachment of those invasive species within the ESA in 2014 and 2015.

The Invasive Species Management Plan was drafted in early 2014 to review and compile background literature and make recommendations for invasive species control. This report provides an overview of the methods used by the UTRCA to control Japanese Knotweed and Goutweed in 2014 and 2015 and outlines the effectiveness of those methods as documented during on-going monitoring of control efforts.

Although those control efforts have proven to be effective in reducing the density of invasive flora, the long-term management recommended in the Invasive Species Management Plan should still be implemented once the short-term management is complete to ensure managed invasive flora do not re-establish and that other invasive flora do not invade the controlled areas. This may include on-going monitoring of the control areas in identifying if follow-up effort may be required and/or if further threats to these sensitive flora species are present.

Introduction

In cooperation with the City of London (the City) and the Upper Thames River Conservation Authority (UTRCA), the City retained Dillon Consulting Limited (Dillon) to prepare an Invasive Species Management Plan for the Medway Valley Heritage Forest (MVHF) Environmentally Significant Area (ESA). The Invasive Species Management Plan and Program in the MVHF ESA is fully funded by the City of London to protect and restore the City's Natural Heritage System. This management plan was in response to observations of invasive species competing with sensitive vegetation during the 2013 Natural Heritage Inventory and Evaluation (NHIE) completed by Dillon for the City in the MVHF South ESA. Two highly invasive flora, Japanese Knotweed (*Fallopia japonica*) and Goutweed (*Aegopodium podagraria*), were identified in the NHIE as high priority species to control and manage as those species pose a direct threat to significant populations of Species at Risk (SAR) and/or Species of Conservation Concern (SCC). Populations of sensitive flora that are threatened by encroachment of Japanese Knotweed and Goutweed in the MVHF ESA include Striped Cream Violet (*Viola striata*), Green Dragon (*Arisaema dracontium*) and False Rue-anemone (*Enemion biternatum*).

The Invasive Species Management Plan was compiled in early 2014 to summarize methods reported to be effective in the control of target invasive species. Based on the environment in each of the areas of the MVHF ESA targeted for invasive species control, decisions were made as to the most-effective and least impactful method prior to control efforts carried out by UTRCA starting in July 2014 and into 2015. This report provides an overview of the methods used by the UTRCA to control Japanese Knotweed and Goutweed in 2014 and 2015 and outlines the effectiveness of those methods as documented during on-going monitoring of control efforts.

2.0 Overview of Control Methods Applied

2.1 Goutweed Control

High priority populations of Goutweed identified for control were those located in the bottomlands of the MVHF South ESA and in proximity to significant populations of False Rue-anemone and Striped Cream Violet. Site reconnaissance was completed by Dillon and the UTRCA on May 20, 2014 to assess whether chemical control methods would be feasible based on the proximity of the infestation to Medway Creek and locations of the sensitive species. The City retained the UTRCA to implement and supervise control efforts. Dillon was retained by the City to monitor and report on the control efforts.

It was determined that with the appropriate mitigation measures in place (i.e. covered spray wands and spray barriers); chemical control would be applied to the densest patches of Goutweed. Where the density of Goutweed was lower and sensitive native species present, Goutweed was scheduled to be controlled through manual methods (e.g. hand pulling).

2.1.1 Chemical Control

Where there was limited risk for chemicals to enter Medway Creek and/or damage adjacent populations of SAR/SCC through spray drift, chemical control was used. Potential risks were minimized by using spot treatments, including covers on spray wands to reduce spray drift and spraying during optimal conditions (e.g. winds <10 km/h). Barriers consisting of polyethylene sheets were installed around sensitive species in addition to spraying outside of the flowering period for those species. The chemical sprayed used was Glyphosate (Roundup) and/or Garlon XRT.

2.1.2 Manual Control

Where application of herbicide was determined not to be feasible, especially in close proximity to Medway Creek and within the barricaded areas containing sensitive species, alternative methods were undertaken to minimize impacts. This included hand-pulling of Goutweed as well as cutting of Goutweed and manually applying herbicide to the cut stems in the fall as plants are entering dormancy. An outline of the management timeline for Goutweed is presented below in **Table 1**.

TABLE 1: OUTLINE OF MANAGEMENT COMPLETED TO DATE FOR GOUTWEED

Activity Component	Timing	Objective of Activity Component
Identification of SAR/ SCC Population Limits	<p>May 20, 2014 Completed in early spring when ephemeral species were flowering and more visible to promote identification.</p>	To stake the limits of sensitive species populations and identify which areas of Goutweed infestation are suitable for chemical methods or whether manual efforts are required. Identification training of sensitive species for UTRCA also occurred concurrently.
Barrier Installation	<p>July 10, 2014 Temporary barriers consisting of polyethylene and wooden stakes were installed prior to herbicide application</p> <p>May 12, 2015 Repairs to existing barriers and installation of additional barriers prior to 2015 activities.</p>	Barriers were installed around smaller patches of sensitive species to minimize impacts during herbicide application.
Herbicide Application	<p>Initial spraying of Glyphosate (Roundup) and/or Garlon XRT took place on the following dates:</p> <ul style="list-style-type: none"> ▪ July 10, 2014 ▪ July 16, 2014 ▪ August 7, 2014 ▪ August 13, 2014 ▪ August 27, 2014 ▪ October 23, 2014 <p>Follow-up spraying took place on the following dates:</p> <ul style="list-style-type: none"> ▪ June 2, 2015 ▪ June 11, 2015 ▪ July 15, 2015 ▪ July 24, 2015 	Spot treatment of Goutweed with an herbicide application. Application of herbicide was completed outside of the flowering season for the False Rue-anemone and Striped Cream Violet.
Hand Pulling/ Manual application of herbicide to cut stems	<p>Initial hand pulling of Goutweed in the barricaded areas took place on the following dates:</p> <ul style="list-style-type: none"> ▪ July 8, 2014 ▪ July 10, 2014 <p>Application of herbicide to cut goutweed stems with a foam wicking brush was carried out in mid- to late September 2015.</p>	<p>Goutweed mixed in with sensitive species was attempted to be manually removed through the use of hand-pulling in early 2014.</p> <p>Goutweed within barricaded areas was manually cut and a herbicide applied with a foam wicking brush onto stems in the fall of 2015.</p>

Activity Component	Timing	Objective of Activity Component
Wildflower plug plantings and seeding	Shade tolerant wildflower seed mixes and wildflower plugs were ordered and planted/seeded in mid to late fall of 2015. Wildflower plug quantities included: <ul style="list-style-type: none"> ▪ 72 - Canada Anemone (<i>Anemone canadensis</i>) ▪ 72 - Zigzag Goldenrod (<i>Solidago flexicaulis</i>) ▪ 72- Blue Vervain (<i>Verbena hastate</i>) ▪ 72 - Wild Columbine (<i>Aquilegia canadensis</i>) ▪ 40 (1 gallon pots) - Wild Ginger (<i>Asarum canadense</i>) 	Targeted planting and seeding of native wildflowers was in an effort to prevent Goutweed re-establishment and/ or other invasive flora from invading the area.

2.2

Japanese Knotweed Control

Three infestations of Japanese Knotweed were identified in the MVHF, all in association with the Elsie Perrin Williams Estate. The suspected initial parent colony is located along the edge of the estate driveway and is considered a small infestation (0.1 to 0.5 ha) of low density (<10% cover) according to the Best Management Practices in Ontario for Japanese Knotweed (Anderson, 2012). Due to the presence of a Species at Risk (Green Dragon, listed of *Special Concern*) within 10 m and Medway Creek in close proximity to the infested area, the stem injection method was used for the smaller parent colony and a combination of cutting/foiar spray and stem injection used for the offshoot colonies. Injecting the parent colony was deemed a feasible task since the population has a lower density (<200 stems). The two offshoot colonies are much denser so stems were cut in the fall of 2014 and then foliar sprayed with follow-up visits in the fall of 2015 to inject any new stems. The City retained the UTRCA to implement and supervise control efforts. Dillon was retained by the City to monitor and report on the control efforts. An outline of the management timeline for Japanese Knotweed is presented below in **Table 2**.

TABLE 2: OUTLINE OF MANAGEMENT COMPLETED TO DATE FOR JAPANESE KNOTWEED

Activity Component	Timing	Objective of Activity Component
Cutting back of stems	The two larger colonies requiring foliar spraying were cut on September 10, 2014 . Follow-up cutting of the colonies took place on the following dates: <ul style="list-style-type: none"> ▪ May 21, 2015 ▪ June 3, 2015 	The two off-shoot colonies were cut back in anticipation of foliar spraying later in the fall of 2014
Foliar Spray	The two large colonies were sprayed on the following dates: <ul style="list-style-type: none"> ▪ May 20, 2015 ▪ June 3, 2015 ▪ June 24, 2015 ▪ July 24, 2015 	Larger colonies were sprayed with Garlon XRT
Stem Injection	September 11, 2014 The parent colony was injected. Follow-up injections took place on the following dates: <ul style="list-style-type: none"> ▪ May 21, 2015 ▪ June 3, 2015 	Injection of Japanese Knotweed stems with a concentrate of Glyphosate herbicide (5:1). The parent colony was injected first and then any remaining or new stems in the off-shoot colonies after foliar spraying efforts

3.0 Effectiveness of Control Methods

Efforts to control Goutweed and Japanese Knotweed began in July 2014 with on-going monitoring and documentation of the control method effectiveness during these efforts. Overall, control efforts have appeared to be successful with reductions of Goutweed and Japanese Knotweed densities in the control areas. Mitigation measures put in place to minimize potential adverse impacts to sensitive species also appear to be successful based on observations of those species at similar densities in 2015 compared to pre-control densities.

3.1 Goutweed Control

Control of Goutweed included a combination of chemical and manual efforts to reduce the densities of this invasive groundcover and minimize future encroachment into populations of sensitive species. To date, chemical control efforts, which included application of herbicide (Glyphosate and Garlon XRT) in 2014, has proven very effective. Limited manual removal (i.e. hand-pulling) was completed in 2014. Cutting of goutweed and manually applying herbicide to stems also occurred in September 2015. Monitoring post-control will not be completed until the spring of 2016 to assess effectiveness.

Goutweed that was sprayed in early summer of 2014 was observed to wilt, turn brown and dieback generally within 7-10 days of herbicide application. Application of Glyphosate resulted in the same effects as Garlon XRT but generally took a few days longer to show the full effects.

3.1.1 2014 Monitoring

Initial spraying in 2014 resulted in the wilting and browning of Goutweed in the controlled areas. Observations of the controlled areas in the fall of 2014 showed large patches of bare soil with limited Goutweed presence. Goutweed that was visible was wilted and brown. **Table 3** provides photographic documentation of the control efforts.

TABLE 3: PHOTO DOCUMENTATION OF 2014 GOUTWEED CONTROL EFFORTS

<p>May 20, 2014</p> <p>Pre-control</p>	
<p>July 16, 2014</p> <p>Spray barriers in place prior to herbicide application</p>	



July 16, 2014

Herbicide application
(Glyphosate)



August 7, 2014

Twelve days after herbicide application (Glyphosate)



August 14, 2014

Nineteen days after herbicide application (Glyphosate)



3.1.2 2015 Monitoring

Control areas that were sprayed in 2014 were monitored in early spring of 2015 to assess the effects of herbicide application and whether there were any visible adverse effects to sensitive species. Areas of dense Goutweed that were sprayed in 2014 appeared to be free of Goutweed growth when observed on May 10, 2015. Sprayed areas were clearly defined due to the absence of Goutweed when compared to adjacent areas, in particular the areas within barricaded sensitive species. Although appearing to lack Goutweed growth, sprayed areas were observed not to be completely bare. Early season flora such as trout lily (*Erythronium* sp.), wild leek (*Allium tricoccum*), wild ginger (*Asarum canadense*), toothwort (*Dentaria* sp.), jack-in-the-pulpit (*Arisaema triphyllum*) were present in the sprayed area, possibly re-establishing from the seed bank. **Table 4** provides photographic documentation of the control efforts.

TABLE 4: PHOTO DOCUMENTATION OF 2015 GOUTWEED POST-CONTROL RESULTS

<p>May 10, 2015</p> <p>Post-control – clear distinction between control and non-control areas.</p> <p>Uncontrolled areas were observed to have thick growth of Goutweed in early spring vs. the control areas.</p>	
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May 10, 2015

Post-control –
clear distinction
between control
and non-control
areas



May 10, 2015

Post-control –
sprayed area
abundant trout
lily but no
Goutweed
observed



May 10, 2015

Post-control –
Goutweed lush
and healthy
within barricaded
area (mixed
presence with
False Rue-
anemone) but
absent in sprayed
area



May 10, 2015

Post-control –
few Goutweed
stems poking out
under the barrier



3.2 Japanese Knotweed Control

Control of Japanese Knotweed included a combination of chemical and manual efforts to reduce the densities of this invasive species and minimize future encroachment into populations of sensitive species. To date, chemical control efforts, which included stem injection of herbicide (Glyphosate) in 2014, has proven to be very effective in reducing the density of stems in the parent colony. The off-shoot colonies were cut back in the early fall of 2014 with anticipation of foliar spraying in the fall or spring of 2015. Monitoring of the foliar spray effectiveness has yet to be completed.

3.2.1 Parent Colony

One-hundred and thirty one (131) stems in the parent colony of Japanese Knotweed were injected in September 2014 with Glyphosate. These stems were observed to dieback quickly after the initial injections. The 2014 growth was cut back and removed to allow for inspection of the colony in 2015 and assess the density of new growth prior to follow-up injections. The colony was monitored on May 10, 2015 and found to have approx. 50-60 new stems which were spread out in the original footprint of the colony. Follow-up injections were to be completed in the fall of 2015 when the plants are beginning to enter dormancy and drawing nutrients to the rhizomes. **Table 5** provides photographic documentation of the control efforts.

TABLE 5: PHOTO DOCUMENTATION OF JAPANESE KNOTWEED PARENT COLONY CONTROL EFFORTS

<p>July 16, 2014 Pre-control</p>	
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September 11,
2014

Stem injection



September 11,
2014

Stem injection



May 10, 2015

Post-control –
colony cut back,
very few new
stems (in
comparison with
2014 density)



May 10, 2015

Post-control –
few new stems



3.2.2 Off-shoot Colonies

The two off-shoot colonies located downslope of the parent colony of Japanese Knotweed were observe to be much denser and therefore not feasible candidates for stem injection as a primary control. The two off-shoot colonies were cut back in the fall of 2014 with anticipation of foliar spraying when re-growth emerges. Re-growth of stems was limited in the fall of 2014 so spraying was postponed until the spring of 2015 with follow-up spraying throughout the summer months. Stem injection of remaining stems was planned for the fall of 2015.

TABLE 6: PHOTO DOCUMENTATION OF OFF-SHOOT COLONY CONTROL EFFORTS

<p>July 16, 2014</p> <p>Pre-control off-shoot colony at base of slope</p>	
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September 11,
2014

Cut back off-shoot
colony located on
the side of the
slope



June 18, 2015

Colony at the
base of slope
after two initial
spraying events.
Density greatly
reduced when
compared with
pre-control
conditions.



4.0

Conclusion

Highly invasive flora, such as Goutweed and Japanese Knotweed were threatening to out-compete local native vegetation within the MVHF ESA and in particular, Species at Risk and Species of Conservation that are found in close proximity to severe infestations. This was a concern to several stakeholders, including the City of London who retained the Upper Thames River Conservation Authority to undertake efforts to control the encroachment of those invasive species within the ESA in 2014. Although those control efforts have proven to be effective in reducing the density of invasive flora, the long-term management recommended in the Invasive Species Management Plan should still be implemented once the short-term management is complete to ensure managed invasive flora do not re-establish and that other invasive flora do not invade the controlled areas. This may include on-going monitoring of the areas where control efforts have been undertaken to identify if follow-up effort may be required and/or if further threats to these sensitive flora species are present.

Appendix A

False Rue-anemone Monitoring Record



1.0

Introduction

In cooperation with the City of London (the City) and the Upper Thames River Conservation Authority (UTRCA), the City retained Dillon Consulting Limited (Dillon) to prepare an Invasive Species Management Plan for the Medway Valley Heritage Forest (MVHF) Environmentally Significant Area (ESA). The Invasive Species Management Plan and Program in the MVHF ESA is fully funded by the City of London to protect and restore the City's Natural Heritage System. The Invasive Species Management Plan was created to review and compile background literature and make recommendations for invasive species control.

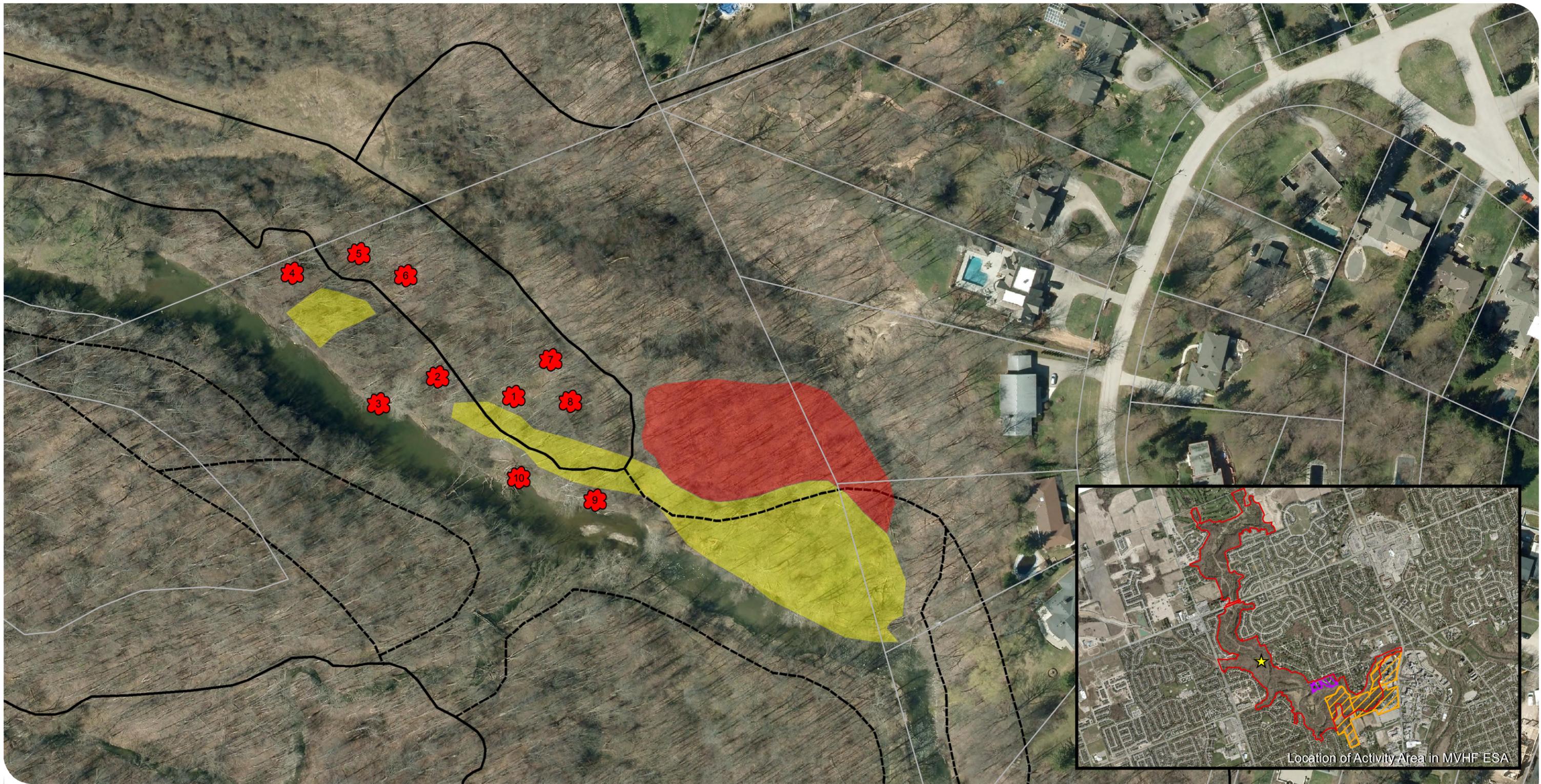
As part of that plan, Goutweed (*Aegopodium podagraria*) was identified as a high priority species to control and manage as it poses a threat to a significant population of False Rue-anemone (*Enemion biternatum*), a species listed as *Threatened* on the Species at Risk in Ontario list (see **Figure 1**). Goutweed has also been identified in the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) *Assessment and Update Status Report on False Rue-anemone Enemion biternatum in Canada* (2005) as a direct threat to the decline of the species through encroachment.

Control efforts for Goutweed were in proximity to, and in some cases within, patches of False Rue-anemone. Therefore, management activities were registered on the Ministry of Natural Resources and Forestry (MNRF) Registry provided under Section 23.17 (Species Protection or Recovery Activities) of Ontario Regulation 242/08 of the *Endangered Species Act, 2007*. Confirmation of the activity registration was received from the MNRF on June 19, 2014 (Confirmation ID # X-102-0000000251). A mitigation plan was also drafted in support of the management activities (Dillon Consulting Limited, July 7, 2014) and in accordance with subsections (7) and (8).

As part of the requirements for the registration (see paragraph 7 of subsection (6) under Section 23.17), a record was created to outline the following while carrying out the control efforts:

- i. the effects of the activity on each species that is the object of the activity
- ii. the steps that are taken by the person carrying out the activity to minimize the adverse effects of the activity on each species that is the object of the activity, including the locations where the steps are taken, and an assessment of the effectiveness of those steps
- iii. the names of each individual with expertise who was responsible for carrying out or supervising the activity

The purpose of this monitoring record is to provide this record.



CITY OF LONDON
 Medway Valley Heritage Forest ESA
 False Rue-anemone Monitoring Record

MVHF SOUTH ESA
UTRCA GOUTWEED CONTROL AREA & FALSE RUE-ANEMONE COLONY LOCATIONS
 FIGURE 1

- Closed Trail
- Managed Trail (UTRCA, 2013)
- Informal Trail (Unmanaged Trail)
- Property Line
- Elsie Perrin Williams Estate (City Owned Land)
- UWO & Huron College Property
- ✿ False Rue Anemone Sub-colony (#1 to 10)
- False Rue-anemone Main Colony
- Goutweed (*Aegopodium podagraria*)



MAP DRAWING INFORMATION:
 DATA PROVIDED BY MNR & CITY OF LONDON
 MAP CREATED BY: JWH
 MAP CHECKED BY: JP
 MAP PROJECTION: NAD 1983 UTM Zone 17N

1:1,500

0 12.5 25 50 m

N

PROJECT: 14-9389 STATUS: DRAFT DATE: 7/27/2015

2.0 Contacts for the Activity

The UTRCA was the primary organization responsible for carrying out the physical control efforts such as application of herbicide, hand-pulling and barrier installation. Dillon was retained to develop and oversee the management efforts and reporting on behalf of the City and provide the required expertise.

2.1 City of London

The contact at the City of London who is responsible for the overseeing the overall activity is:

Linda McDougall, MES, OALA, RPP

Ecologist

Environmental & Parks Planning – Planning Services

Tel: 519-661-2500 ext. 6494

Email: lmcdouga@london.ca

2.2 Upper Thames River Conservation Authority

The contacts at UTRCA responsible for carrying out and/or supervising the control efforts, including herbicide application, are:

Brandon Williamson

Land Management Technician

Tel: 519-451-2800 ext. 296

Email: williamsonb@thamesriver.on.ca

Dan Jones

Land Management Supervisor

Tel: 519-451-2800 ext. 281

Email: jonesd@thamesriver.on.ca

2.3 Dillon Consulting Limited

The contacts at Dillon responsible for overseeing the management efforts and reporting on behalf of the City are:

Jonathan Harris, Adv. Dip.

Biologist

Tel: 416-229-4647 ext. 2389

Email: Jharris@dillon.ca

Jennifer Petruniak, M.Sc.

Lead Biologist

Tel: 416-229-2627 ext. 2432

Email: jpetruniak@dillon.ca

3.0

Mitigation of Potential Adverse Effects

The infestation of Goutweed located in the bottomland of the MVHF South ESA and within proximity to a significant population of False Rue-anemone received initial control efforts in 2014. Several steps were taken to mitigate adverse effects to the False Rue-anemone as a result of chemical and manual control methods. The steps are listed in the below chart and detailed in **Table 1** along with the dates of implementation.

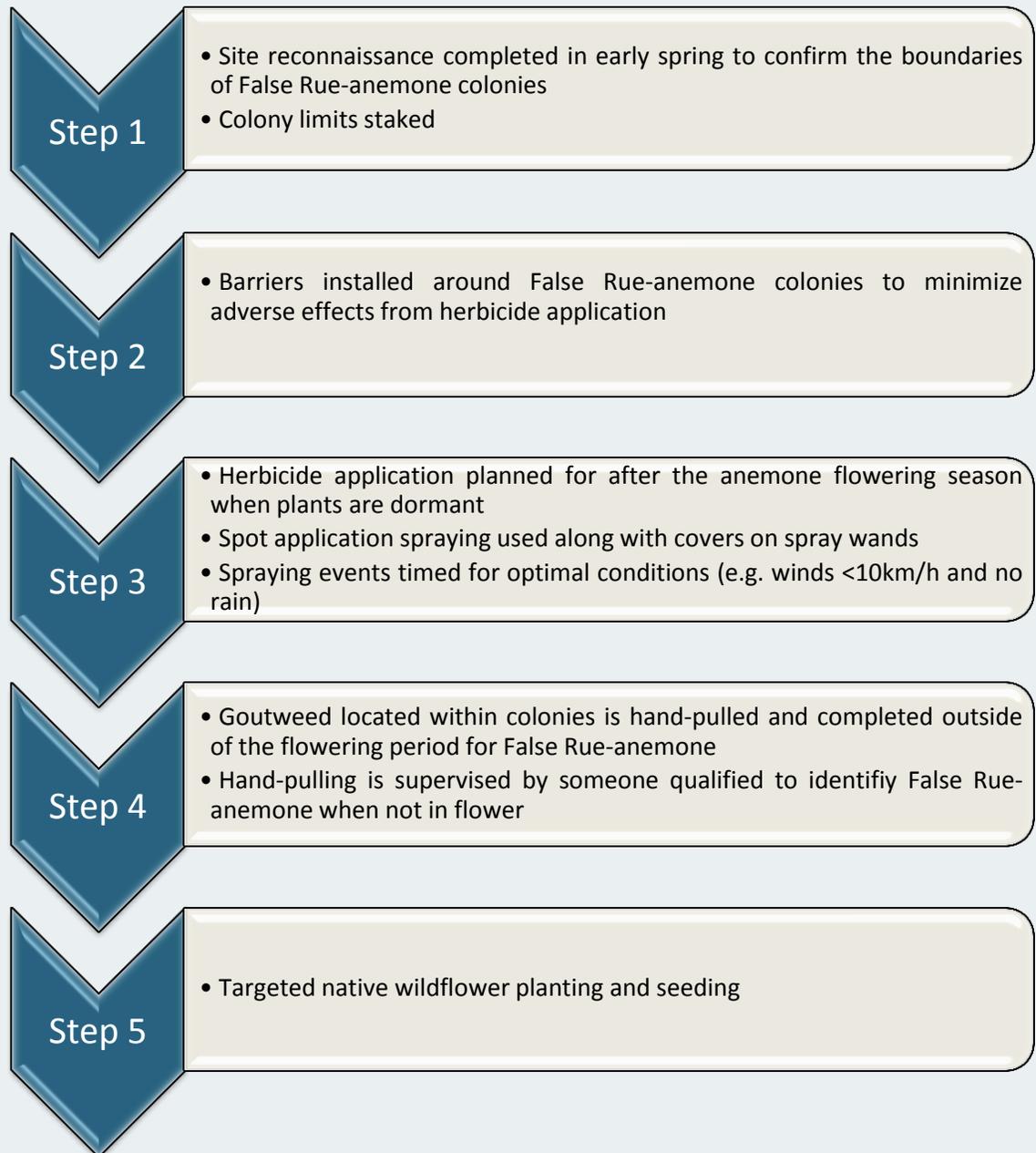


TABLE 1: OUTLINE OF MANAGEMENT COMPLETED TO DATE FOR GOUTWEED

Activity Component	Timing	Objective of Activity Component
Step 1 Identification of Colony Limits	May 20, 2014 Completed in early spring when ephemeral species were flowering and more visible to promote identification.	To stake the limits of sensitive species populations and identify which areas of Goutweed infestation are suitable for chemical methods or whether manual efforts are required. Identification training of sensitive species for UTRCA also occurred concurrently.
Step 2 Barrier Installation	July 10, 2014 Temporary barriers consisting of polyethylene and wooden stakes were installed prior to herbicide application May 12, 2015 Repairs to existing barriers and installation of additional barriers prior to 2015 activities.	Barriers were installed around smaller patches of sensitive species to minimize impacts during herbicide application
Step 3 Herbicide Application	Initial spraying of Glyphosate (Roundup) and/or Garlon XRT took place on the following dates: <ul style="list-style-type: none"> ▪ July 10, 2014 ▪ July 16, 2014 ▪ August 7, 2014 ▪ August 13, 2014 ▪ August 27, 2014 ▪ October 23, 2014 Follow-up spraying took place on the following dates: <ul style="list-style-type: none"> ▪ June 2, 2015 ▪ June 11, 2015 ▪ July 15, 2015 ▪ July 24, 2015 	Spot treatment of Goutweed with an herbicide application. Application of herbicide was completed outside of the flowering season for the False Rue-anemone and Striped Cream Violet.
Step 4 Hand Pulling/ Manual application of herbicide to cut stems	Initial hand pulling of Goutweed in the barricaded areas took place on the following dates: <ul style="list-style-type: none"> ▪ July 8, 2014 ▪ July 10, 2014 Fall of 2015, herbicide was applied to cut goutweed stems with a foam wicking brush.	Any Goutweed mixed in with False Rue-anemone was attempted to be manually removed through the use of hand-pulling in early 2014. Goutweed within barricaded areas was manually cut and a herbicide applied with a foam wicking brush onto stems in the fall of 2015.

Activity Component	Timing	Objective of Activity Component
<p>Step 5 Wildflower plug plantings and seeding</p>	<p>Shade tolerant wildflower seed mixes and wildflower plugs were ordered and planted/seeded in mid to late fall of 2015. Wildflower plug quantities included:</p> <ul style="list-style-type: none"> ▪ 72 - Canada Anemone (<i>Anemone canadensis</i>) ▪ 72 - Zigzag Goldenrod (<i>Solidago flexicaulis</i>) ▪ 72 Blue Vervain (<i>Verbena hastata</i>) ▪ 72 - Wild Columbine (<i>Aquilegia canadensis</i>) ▪ 40 (1 gallon pots) - Wild Ginger (<i>Asarum canadense</i>) 	<p>Targeted planting and seeding of native wildflowers was in an effort to prevent Goutweed re-establishment and/or other invasive flora from invading the area.</p>

4.0

Effectiveness of Mitigation

Control efforts for Goutweed were implemented following the False Rue-anemone flowering period. Therefore, monitoring the effectiveness of the mitigation measures implemented prior to herbicide application occurred in 2015. Mitigation measures included installation of spray barriers, use of covers on spray wands and timing herbicide application outside of the flowering period. These measures appeared to be effective in preserving the colonies of False Rue-anemone. The density of flowers observed on May 10, 2015 was similar to those observed on May 20, 2014 (see **Table 2**). Additional monitoring of mitigation is recommended for the spring of 2016 to assess the effectiveness of manual methods (i.e. hand-pulling, application of herbicide to cut goutweed) used to control Goutweed present within colonies of False Rue-anemone in the fall of 2015.

TABLE 2: COMPARISON OF PRE & POST-CONTROL CONDITIONS

<p>Goutweed Pre-Control – barrier around False-rue Anemone colony #1, Goutweed right up to barrier both inside and outside - July 16, 2014</p>	
<p>Goutweed Post-Control – barrier around False-rue Anemone colony #1, Goutweed restricted to inside the barrier – May 10, 2015. White flowers present in the photo are False Rue-anemone (~65 plants – similar to that observed in 2014 (between 50 & 70)</p>	

5.0

Conclusion

Goutweed, a highly invasive flora species was threatening to out-compete local native vegetation within the MVHF ESA and in particular False Rue-anemone, a Species at Risk that was observed in proximity to a severe infestation. This was a concern to several stakeholders, including the City of London who retained the Upper Thames River Conservation Authority to undertake efforts to control the encroachment of Goutweed within the ESA in 2014.

Although those control efforts have proven to be effective in reducing the density of Goutweed while maintaining the integrity of False Rue-anemone colonies, long-term management is recommended to be implemented once the short-term management is complete in an effort to prevent Goutweed from re-establishing and/or other invasive flora from invading the area. This may include targeted planting and/or seeding of native vegetation and on-going monitoring of the False Rue-anemone population to identify if follow-up control effort(s) are required to preserve the species in the MVHF ESA.



FIGURE 1. FALSE RUE OBSERVED ON MAY 2, 2015.

It is recommended that this monitoring record be updated in 2016 following re-emergence of the False Rue-anemone population to document the control efforts undertaken in the fall of 2015. This monitoring record is to be submitted in its entirety to the Natural Heritage Information Centre within 180 days of the completion of the activity. The record should include a detailed assessment of the extent to which the overall activity achieved its purpose.

6.0

References

Dillon Consulting Limited. July 7, 2014. False Rue-Anemone Mitigation Plan. City of London. 16 pp.