Suppression of Buckthorn in the Long-term Management of Woodlands

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Terrestrial Invasive Plant Species Conference
Sault Ste. Marie Ontario
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Generalized distribution of in North America based on herbarium specimens and floras. Solid circles represent individual or local occurrences.
Buckthorn is successful because ...

- opportunistic colonizer of disturbed forests (Moffatt 2004)
- direct competition with later colonists by early germination and occupancy of suitable niches (Gill 1991)
- utilization of low light conditions of the understorey (Harrington 1989b)
- more rapid relative height growth rate, aboveground biomass allocation, and leaf area (Sanford 2003)
- early leaf-on (emergence) and late leaf-off (senescence) → 56 more growing days than native Cornus species (Harrington 1989a)
- young age (6 y) at reproduction (Grubb 1999)
- prolific and long-term viable fruit production (Cavers 2007)
- spread rate of > 6 m per year (Frappier 2003)
- avoidance by grazers or resilience to browsing (Grubb 1999, Alados 2003)
- displaces native vegetation by formation of a dense canopy (Cavers 2007)
2002 Street Tree Inventory
1,887 buckthorn plants

2004 Environmental Review Lands Study
58 of 140 vegetation patches have buckthorn present

2008 UFORE Study
44 of 207 plots have buckthorn present
Hypothetical Cost of Do-Nothing

IAS Management Cost vs Loss of Biodiversity

Costs Increase and Biodiversity Declines

Act Sooner

Too expensive

? Lost cause ?
Ecosystem Decay

**E**

Intervene

Area of Type I error (i.e. False Negative)

Adjust Control Limits as % change from baseline or % change year to year

**D**

Increase Monitoring Frequency

Area of Type II error (i.e. False Positive)

**C**

Maintain Monitoring

**B**

Monitoring Interval Extended

**A**

Monitoring interval

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1. Adapted from Morrison “The Use of Control Charts to Interpret Environmental Monitoring Data” Natural Areas Journal (vol missing): 66-73.
## Management Needs Index based on Ecological Integrity + Buckthorn Abundance + Trails

### Park Management Need

**Buckthorn Control Chart** (20 parks)

<table>
<thead>
<tr>
<th>NAME</th>
<th>Park ID</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monitor 1x per 2 year</td>
<td></td>
</tr>
<tr>
<td>IVEY PARK</td>
<td>P-081</td>
</tr>
<tr>
<td>ELDON HOUSE</td>
<td>P-242</td>
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<tr>
<td>EUSTON PARK</td>
<td>P-119</td>
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<tr>
<td>FAIRMONT PARK</td>
<td>P-030</td>
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<tr>
<td>HARRIS PARK</td>
<td>P-034</td>
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<tr>
<td>RIVER FORKS PARK</td>
<td>P-205A</td>
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<tr>
<td>ROSS PARK</td>
<td>P-123</td>
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<tr>
<td>THAMES PARK</td>
<td>P-004</td>
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<tr>
<td>Action Threshold</td>
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<tr>
<td>BERKSHIRE PARK</td>
<td>P-056</td>
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<tr>
<td>Intervention Steps</td>
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<tr>
<td>BUTLER PARK</td>
<td>P-042</td>
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<tr>
<td>GIBBONS PARK</td>
<td>P-003</td>
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<tr>
<td>GREENWAY PARK</td>
<td>P-090</td>
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<tr>
<td>KIWANIS PARK</td>
<td>P-012B</td>
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<tr>
<td>MITCHES PARK</td>
<td>P-101</td>
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<tr>
<td>SPRINGBANK PARK</td>
<td>P-001</td>
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<tr>
<td>ST. STEPHEN'S PARK</td>
<td>P-061</td>
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<tr>
<td>WELLINGTON VALLEY</td>
<td>P-259</td>
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<tr>
<td>KIWANIS PARK - CENTRAL SOUTH</td>
<td>P-012C</td>
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<tr>
<td>Aggressive Management</td>
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<tr>
<td>RIVER ROAD PARK</td>
<td>P-155</td>
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</tbody>
</table>

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**Management Need Index**

- **Aggressive Management**
- **Intervention Steps**
- **Action Threshold**
Management units: determined by criteria of:
• ecological integrity of woodlands
• abundance of buckthorn
• proximity to trails for aesthetic enjoyment of parkland and the Thames River

Goal: to reduce buckthorn abundance to < 5% in the selected management units
Smaller plants and branches were processed on site as woodchips for the pathways.

Most plants were extracted using a WeedWrench®.

Larger plants were cut with a chain saw.

Samples randomly selected for diameter measurements and growth rings counted.

14 year old Common Buckthorn *Rhamnus cathartica*
Stumps were piled and then transported to landfill.
Briscoe Woods
2008 August

- 9 days with crew of 20
- 7 days with mini-excavator
- 7.9 metric tonnes of stumps
- 15 hour of branch chipping
Berkshire Park
2008 July

- 5 days with crew of 20
- 4 days with mini-excavator
- 2.9 metric tonnes of buckthorn stumps
- 18 hour of branch chipping
Kiwanis Park

• 2.5 days with crew of 20
• followed field notes from 2007
  - to find stumps to re-girdle
  - to assess replacement planting success
  - to expand area of control

Girdling: cut a continuous band around the stem and remove all bark and cambial tissue; monitor and trim re-growth in subsequent years until root reserves exhausted
Rhamnus Replacements

Replacement plantings is one of the tactics in the objective of ecological restoration of degraded habitats within the Thames River Corridor.

Screened by an expert panel of botanists and ecologists for:
• suitability for understorey in Thames River Corridor
• provision of wildlife value (food, habitat)
• element of natural succession for the given habitat (sun, soil, moisture, aspect)
• “pre-emptive niche occupancy”
Summary of Methods

Buckthorn (*Rhamnus cathartica, R. frangula*) successfully managed by mechanical techniques:

- WeedWrench®
- Shovels
- Loppers
- Pruning saw
- Muscle

within a three year program of declining effort:

**Year One** to remove all seed-bearing stems
**Year Two** to remove any buckthorn stem above the knee
**Year Three** to remove any buckthorn stem above the ankle.

In subsequent years, continue to monitor within designated management units; expand areas of control; initiate naturalization projects to replace buckthorn with understorey shrubs.
Thames River Enhancement by Invasive Species Management supported by Ontario Ministry of Community Services “Summer Job Service for Youth”

Ministry of Children and Youth Services

Funding from the City of London was leveraged 2.8 fold from Federal, Provincial and local government and non-governmental organizations.

The education and empowerment of youth and community volunteers was an eye-opening extra dividend to the buckthorn management program.
Annual monitoring provided Parks Planning with annotated maps showing areas of success plus locations within the park that require follow-up work, e.g.

<table>
<thead>
<tr>
<th>Code</th>
<th>TH</th>
<th>SN</th>
<th>Description</th>
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<tbody>
<tr>
<td>P-012C 11</td>
<td>TH</td>
<td>SN</td>
<td>Pre-emptive niche occupancy pod</td>
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<tr>
<td>P-012C 12</td>
<td>TJ</td>
<td>A</td>
<td>small number Rhc &lt; 0.5 m, east side of trail</td>
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<tr>
<td>P-012C 13</td>
<td>TJ</td>
<td>A</td>
<td>small number Rhc &lt; 0.5 m, top of the hill</td>
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</table>
Monitoring in 2011 summarized areas under buckthorn management and provided Parks Planning with anticipated costs for next 6 years for 18 City parks.

**Rhamnus Management at 18 City of London Parks**

### Management Needs 2011-2012

<table>
<thead>
<tr>
<th>PID</th>
<th>Park</th>
<th>PENO</th>
<th>&lt; 1 yr</th>
<th>nC</th>
<th>nD</th>
<th>nE</th>
<th>HT</th>
<th>Hrs</th>
<th>n Crew</th>
<th>Labour</th>
<th>1-3 yrs</th>
<th>3-6 yrs</th>
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<td>P-247</td>
<td>Briscoe Street Woods</td>
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<td>Eldon House</td>
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<td>P-012C</td>
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<td>P-205A</td>
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</tbody>
</table>

**Expand area of management / reduce containment zone**

<table>
<thead>
<tr>
<th>PID</th>
<th>Park</th>
<th>PENO</th>
<th>&lt; 1 yr</th>
<th>nC</th>
<th>nD</th>
<th>nE</th>
<th>HT</th>
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<th>Labour</th>
<th>1-3 yrs</th>
<th>3-6 yrs</th>
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<tbody>
<tr>
<td>P-056</td>
<td>Berkshire -- New Mgt Zone</td>
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<td>P-119</td>
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<td>X</td>
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<td>51</td>
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<td>36</td>
<td>10</td>
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<td>P-106</td>
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<td>3</td>
<td>60</td>
<td>10</td>
<td>600</td>
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### Notes
- **PENO** = Pre-emptive Niche Occupancy Planting Pod
- nC, nD, nE = number of stems based on size and maturity (seed bearing)
- **HT** = Herbicide Treatment because access to plant is difficult (embedded in gabion basket, other)
• 28 parks along Thames River or parks with woodlands
• 89 hectares of buckthorn control
  many 000s of stems pulled
  > 100 metric tonnes chipped
  > 1 000 replacement plants in naturalization projects
• 5 to 90% Buckthorn abundance initial
• < 5% Buckthorn abundance
  post-management
• Funds leveraged 2.8x
• Techniques tested, tweaked
  now established protocol
City parks and residential backyards are being taken over by the Buckthorn plant and we need your help to remove it!

**We’ll be Buckthorn Busting in a park near you:**

<table>
<thead>
<tr>
<th>Location</th>
<th>Date</th>
<th>Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Argyle</td>
<td>June 26</td>
<td>6 - 9 pm</td>
</tr>
<tr>
<td>Masonville</td>
<td>July 18</td>
<td>5 - 8 pm</td>
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<tr>
<td>Westmount</td>
<td>July 24</td>
<td>5 - 8 pm</td>
</tr>
<tr>
<td>Oakridge</td>
<td>Aug 21</td>
<td>5 - 8 pm</td>
</tr>
</tbody>
</table>

Learn how to identify this stubborn plant, and the tactics for how to remove it permanently from your yard!

**MORE INFO**

Vanessa Kinsley  
Community Projects Coordinator  
519-661-2500

OR go to:  
www.london.ca  
search for “buckthorn”

**Buckthorn Busters 2012-2013**
Contact info:

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