



EMERALD ASH BORER

Survey Guidelines

AT A GLANCE

- Target urban areas and destinations where EAB may be introduced via firewood such as campgrounds, parks and rest stops, prioritizing areas with ash decline
- Green prism traps baited with (Z)-3-hexenol and lactone are placed high in the canopy of larger ash trees along forest edges and open areas
- Trap is secured at least 0.6 m from the bole on the south or southwest side of the tree, sticky side out
- Traps are placed by early June and collected in early September with one mid-season check
- Insects must be placed in 70% non-denatured ethanol for lab submission

1. Background

The emerald ash borer (EAB) is an invasive alien wood boring beetle native to the Russian Far East, China, Japan, North Korea, South Korea, Mongolia, and Taiwan. EAB has resulted in significant mortality of ash trees (*Fraxinus* spp.) within North America, where it is thought to have been introduced through the movement of infested wood packaging materials from China. EAB was first confirmed in Canada in July of 2002 in Windsor, Ontario and has since been found in Quebec, Manitoba, Nova Scotia, New Brunswick and in numerous locations throughout Ontario. Regulated areas have been established to prevent the movement of potentially infested materials outside of the known infested areas <https://www.inspection.gc.ca/plant-health/plant-pests-invasive-species/insects/emerald-ash-borer/areas-regulated/eng/1347625322705/1367860339942>.

2. Target Pests or Life Stages

Emerald ash borer adults, larvae, pupae and associated signs and symptoms are targeted in this survey. Emergence and flight periods of EAB are affected in part by latitude, altitude and weather. Within Canada, adults emerge between the end of May and late July through distinct D-shaped exit holes. After emergence, adults feed on the edges of ash leaves creating a notched appearance. Adults may be observed on or near host trees from early June into August. Eggs, approximately 0.6 by 1.0 mm are laid in bark crevices or under bark scales and are very difficult to detect in the field. Larvae hatch in a few weeks and burrow under the bark where they feed on the vascular tissue and form distinct S-shaped galleries. Some larvae may be present year-round; however the majority of the population will overwinter as prepupae in pupal chambers in the sapwood or bark. Pupation begins within the pupal chambers in the bark or sapwood in spring and pupae are present from late April until mid-June.

3. Target Hosts

All species of ash, *Fraxinus* spp.

4. Timing

4.1 Trapping Surveys

Baited traps are deployed in the field by June 1st and taken down by August 31st.

4.2 Visual Surveys

Ground surveys at trap sites should be conducted at the time of trap collection (late August) when the signs and symptoms of EAB are most evident.

5. Target Areas and Site Selection

Detection surveys for EAB focus on all areas where the pest could have been introduced through human activities. Target sites include but are not limited to:

- Areas with ash decline
- Urban centres
- Holiday destinations: provincial parks, seasonal campgrounds, etc.
- Rest stops along major transportation corridors
- New subdivisions with ash nursery stock
- Suspect areas identified by the public

6. Survey Methodology

6.1 Trapping Surveys

6.1.1 Traps

Green Prism Traps with Tanglefoot. See section 9 for purchasing information. Green prism traps in storage should be flipped every 3 months to prevent the glue from pooling at the bottom.

6.1.2 Lure Types

EAB traps are baited with two synergistic lure components:

- (Z)-3-hexenol, which is a host volatile.
- (3Z)-lactone, which is a female-produced pheromone.

See section 9 for purchasing information.

All traps must contain both lure components. The (Z)-3-hexenol pouch is attached to the bottom of the trap spreader with a twist tie while the rubber septa containing the (3Z)-lactone is attached to the pouch with the provided safety pin.

Please see Appendix 2 for instructions on trap and lure assembly.

6.1.3 Storage and Handling of Lures

Store lures in sealed packages at temperatures below 0°C, with any opened lure packages being placed in sealed containers after use. The date should be noted on the storage container for future reference. During transportation to the field, ensure that lures are kept cool (within a cooler) and out of direct sunlight.

Disposable gloves must be worn at all times when handling the lures.

6.1.4 Trap Placement and Density

- Traps may be deployed in urban centres using a triangular grid system.
- Traps will only be deployed in ash trees (*Fraxinus* spp.) 8” or greater in diameter, with preference given to larger ash trees.
- The host tree should be located along a forest edge, in an open area, or in an open stand of trees such as in parks.
- One trap should be placed per site, using a telescopic extension pole with a modified hook (Appendix 3).
- Traps will be placed as high as possible within the canopy, but no lower than 5 metres above the ground.
- Traps should be placed on the south or southwest side of the tree, in the middle of a branch stable enough to support the weight of the trap, where leaves are present.
- Contact must be made with the landowner prior to conducting survey activities.
- The longitude/latitude coordinates in decimal degrees (NAD 83 datum) are to be recorded at each trap location.
- Affix a trap sign to each tree containing a trap, indicating the purpose of the trap.

6.1.5 Trap Servicing:

Service traps by July 15th to collect specimens for laboratory submission and ensure that there is no brush or debris obstructing the traps. Lures will dispense chemicals for the entire duration of the trapping period and do not need to be replaced.

If the trap surfaces contain twigs, leaves or other debris, these should be removed from the trap surface. Use a putty knife to spread and renew the sticky surface of the glue and apply a coat of Tangle-Trap® Sticky Coating to the sticky surface of the trap.

Final sample collection should be completed by August 31st at which time the traps will be removed from the site and disposed. The trap spreaders and limb hooks can be stored for re-use.

6.2 Visual Surveys

Ground surveys are based on the visual detection of EAB life stages as well as the signs and symptoms associated with an infestation. Visual surveys should be conducted at all trapping locations at the time of trap collection.

- 20 ash trees within a 100 m radius of the trap location should be inspected for signs and symptoms of EAB.
- Emphasis should be placed on declining ash in the area.
- If EAB is not detected during a visual survey but the location is highly suspect, the site should be prioritized for trapping in subsequent years.

6.3 Branch Sampling

Branch sampling is an effective method of detecting EAB-infested trees and also provides information on the infestation status of individual trees. For details regarding this sampling technique, please refer to Ryall et al. 2011.

6.4 Biosurveillance

A novel monitoring tool for EAB involves the use of a native Crabonid wasp, *Cerceris fumipennis*. As this ground-nesting wasp provisions its nests exclusively with buprestid prey, locating and monitoring colonies can lead to new discoveries of EAB.

For more information contact Troy Kimoto (troy.kimoto@Canada.ca) or visit www.cerceris.info

7. Biosecurity Precautions

When visiting areas that are or could be infested with pests of significance, staff must take the necessary precautions to ensure that the risk of spread is mitigated, including inspecting the vehicle for hitchhikers prior to leaving the area.

8. Coordinating with the CFIA

8.1 Target Locations

To ensure that your efforts compliment the regulatory survey being conducted by the CFIA, it is highly recommended that you contact your Area Survey Biologist or local Regional Program Officer to obtain the current survey plan for your specific area. The CFIA conducts EAB surveys at both high risk sites and urban centres located outside of the regulated area, and therefore, a cooperative approach for enhancing surveillance capacity is ideal to ensure survey efforts are not redundant.

8.2 Collaborative Data Management

Survey activities conducted for a regulated pest in accordance with the established CFIA survey protocol should be captured so that all collaborative efforts can be reported. An Excel spreadsheet containing latitude and longitude coordinates and address for the site surveyed, organization details and coordinates for any suspect trees can be submitted to the CFIA cfia.surveilliance-surveillance.acia@canada.ca by no later than September 1st each year so that all efforts can be mapped and reported Nationally. Possible suspects should always be reported in real time.

8.3 Suspect Finds

All suspect findings in unregulated areas must be communicated to your local CFIA office as soon as possible (Appendix 4).

Suspect buprestid/metallic wood boring beetle trap captures in unregulated areas must be submitted to your local CFIA office with the *Survey Site Form* (Appendix 1) for official lab analysis.

- The *Emerald Ash Borer Survey Site Form* (Appendix 1) must be completed for all suspect locations, including address and GPS coordinates for all suspect trees, to facilitate follow-up inspection activities.
- Upon submission to your local CFIA office, relevant data will be entered into CFIA's Lab Sample Tracking System prior to shipment to the lab for official identification

8.3.1 Sample Preparation

1. Adult and pupal specimens collected live from ash trees can be placed in a vial with 70% non-denatured ethanol and a pencil written label. Larval specimens collected from ash trees should first be killed by placing them into near-boiling water. Heat about ½ cup of water (using a gas-burner, microwave or kettle) until the first signs of boiling. Add the larvae to this water and let sit for 30 seconds (or up to 3 minutes for large larvae). Remove from water and place into vials with 70% non-denatured ethanol, and place a paper label into the vial. The label must include the date, the submitter's name and the GPS coordinates for the suspect tree (written in pencil, not ink which will dissolve in ethanol).
2. Adult buprestids collected from a trap should be carefully removed from the trap, wrapped individually in a lint-free wipe (do not use toilet paper or tissue, which will adhere to the glue) and placed in a sealed, sturdy container or glass vial. Please be careful when removing the specimen from the trap so that you do not damage any structures needed for identification of the beetle. Place a paper label into the vial, including the date, the submitter's name and the GPS coordinates of the trap location.

9. Supplies

- Green EAB sticky prism traps from Synergy Semiochemical Corp. (product code 4005) or Solida (product code 40SY385) or BioForest/Sylvar Technologies Inc. (product code PL-SGR)
- (Z)-3-hexenol lure (8 g pouch) from Synergy Semiochemical Corp.(product code 3136) or Solida (product code 40SY136) or BioForest/Sylvar Technologies Inc. (product code PL-HEX)
- (3Z)-Lactone lures from Sylvar Technologies Inc. (product code PL-EAB) or Solida (product code 40SY001) or BioForest/Sylvar Technologies Inc.
- Tangle-Trap® Sticky Coating: 10 oz. Tangle-Trap aerosol cans from Solida (product code 3016584)
- Trap spreader assemblies and limb hooks from Midwest Wire Products LLC (product codes USDA-1 and USDA-2), Solida (product codes 40MW001 and 40MW002), or Synergy Semiochemical Corp. (product code 4007) or BioForest/Sylvar Technologies Inc. (product code PLHGR)
- Zip/Cable ties (minimum of 4 inch)
- Mr Long Arm© Heavy Duty 23' telescopic extension pole available at hardware stores
- Hook attachment for extension pole (Heavy duty paint roller available at any Home Depot, modified for hanging traps – Appendix 3)
- Personal health and safety equipment and supplies
- Waterless cleaning lotion such as Phoenix 5700
- Drawknife
- Knife and hatchet
- Pruning shears
- Forms (See Appendix 1)
- Pencils and markers
- Maps
- GPS unit
- Flagging Tape
- Rubber Gloves
- Hand lens
- Binoculars
- Putty knife
- Kimwipes
- Vials with 70% non-denatured ethanol
- Thermos of boiling water

- Labels for sample collection
- Diameter measuring tape
- Digital camera
- Tick Removal Kit (e.g., <https://canlyme.com/product/tick-removal-kit/>)

10. Supporting Documents and Additional Information

Emerald Ash Borer news, information and policy documents

<http://www.inspection.gc.ca/english/plaveg/pestrava/agrpla/agrplae.shtml>

Canadian Forest Service Publications

<http://cfs.nrcan.gc.ca/publications/search?query=emerald+ash+borer>

Detection of emerald ash borer in urban environments using branch sampling. 2011. Ryall, K.L.; Fidgen, J.G.; Turgeon, J.J. Natural Resources Canada, Canadian Forest Service, Great Lakes Forestry Centre, Sault Ste. Marie, Ontario. Frontline Technical Note 111.

Workshop Proceedings: Guiding Principles for Managing the Emerald Ash Borer in Urban Environments. 2010. Lyons, D.B.; Scarr, T.A., November 18, 2009, Royal Botanical Gardens, Burlington, Ontario. Natural Resources Canada, Canadian Forest Service, Great Lakes Forestry Centre, and Ontario Ministry of Natural Resources, Forest Health & Silviculture Section. Sault Ste Marie Ontario, Ontario. 44 p.

Survey guide for detection of emerald ash borer. 2007. Lyons, D.B.; Caister, C.; De Groot, P.; Hamilton, B.; Marchant, K.; Scarr, T.A.; Turgeon, J.J. Natural Resources Canada, Great Lakes Forestry Centre, Sault Ste. Marie, Ontario and Canadian Food Inspection Agency. 52 p.
<http://cfs.nrcan.gc.ca/pubwarehouse/pdfs/26858.pdf>

A visual guide to detecting emerald ash borer damage. 2006. De Groot, P.; Biggs, W.D.; Lyons, D.B.; Scarr, T.A.; Czerwinski, E.J.; Evans, H.J.; Ingram, W.A.; Marchant, K. Natural Resources Canada, Great Lakes Forestry Centre and Ontario Ministry of Natural Resources, Sault Ste. Marie, Ontario. 16 p
<http://cfs.nrcan.gc.ca/pubwarehouse/pdfs/26856.pdf>

***Cerceris fumipennis* – A Biosurveillance Tool for Emerald Ash Borer.** 2009. Careless, P.D.; Marshall, S.A.; Gill, B.D.; Appleton, E.; Favrin, R.; Kimoto, T. Canadian Food Inspection Agency. 16p.
http://publications.gc.ca/collections/collection_2014/acia-cfia/A104-36-1-2012-eng.pdf

Detection of Emerald Ash Borer in Urban Environments Using Branch Sampling, 2011. Ryall, K.L.; Fidgen, J.G.; Turgeon, J.J. Natural Resources Canada, Canadian Forest Service, Great Lakes Forestry Centre, Sault Ste. Marie, Ontario. Frontline Technical Note 111.

http://publications.gc.ca/collections/collection_2014/acia-cfia/A104-94-2012-eng.pdf

Field Guide to the Jewel Beetles (Coleoptera: Buprestidae) of Eastern North America. 2012. Paiero, S.M.; Jackson, M.D.; Jewiss-Gaines, A.; Kimoto, T.; Gill, B.D.; Marshall, S.A. Canadian Food Inspection Agency. 411 p.

Emerald Ash Borer Detection Card

http://publications.gc.ca/collections/collection_2014/acia-cfia/A104-36-1-2012-eng.pdf



Appendix 1: EAB Survey Site Form

EMERALD ASH BORER - SURVEY SITE FORM

1a. Trap set:		Y	Y	Y	Y	M	M	D	D	10. Survey crew:	
Trap check:		Y	Y	Y	Y	M	M	D	D		
Trap collection & Visual inspection:		Y	Y	Y	Y	M	M	D	D		
1b. Visual		Y	Y	Y	Y	M	M	D	D	11. Form completed by:	
2. Site ID:										12. Address:	
3. Datum:		N	A	D	8	3				13. City/Municipality i.e community:	
4. Latitude:					.					14. County/Regional municipality i.e. parent community:	
5. Longitude:		-			.					15. Province:	
6. Survey Type: <input type="checkbox"/> Visual : Motorized <input type="checkbox"/> Trap <input type="checkbox"/> Call Back <input type="checkbox"/> Visual : Pedestrian <input type="checkbox"/> Trap with Lactone <input type="checkbox"/> Delimitation										16. Postal code:	
										17. Contact name*:	
7. Site Type:										18. Business name*:	
8. Ash present: No.:				or				%		19. Phone*:	
9. Percentage of Ash Canopy Decline										20. Fax*:	
22. Notes:										21. Contacted landowner: <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Attempted	
23. Suspect tree found:		<input type="checkbox"/> Yes <input type="checkbox"/> No		24. Follow up required?		<input type="checkbox"/> Yes <input type="checkbox"/> No		25. Picture taken?		<input type="checkbox"/> Yes <input type="checkbox"/> No	
Suspect tree site:		26. Latitude:						27. Longitude:			
28. Type of sign:		<input type="checkbox"/> Woodpecker feeding		<input type="checkbox"/> Squirrel feeding		<input type="checkbox"/> Notched leaves		<input type="checkbox"/> D-Shaped exit holes			
		<input type="checkbox"/> Serpentine galleries		<input type="checkbox"/> Other _____							
29. Type of symptom:		<input type="checkbox"/> Crown dieback		<input type="checkbox"/> Chlorosis		<input type="checkbox"/> Epicormic shoots		<input type="checkbox"/> Bark deformities			
		<input type="checkbox"/> Other _____									
30. Specimen(s)collected?		<input type="checkbox"/> Yes <input type="checkbox"/> No		31. Number and life stage(s)				32. LSTS System ID#:			
						<p style="text-align: center;">Legend</p> <p style="text-align: center;">⊗ Ash Tree</p> <p style="text-align: center;">● Trap</p> <p style="text-align: center;">□ Building</p> <p style="text-align: center;">↔ Road</p> <p style="text-align: center;">△ House</p> <p style="text-align: center;">☆ Landmark</p> <p style="text-align: center;">~ River/Ditch</p>					
						34. Entered? LSTS System ID#: _____					
						Signature: _____					
						Date (e.g. 17-May-2012): _____					

Site type list: High risk (specify; campground, holiday destination, sawmill, new subdivision, rest stop etc.), urban centre grid, ash decline.

*Optional

Page ____ of ____

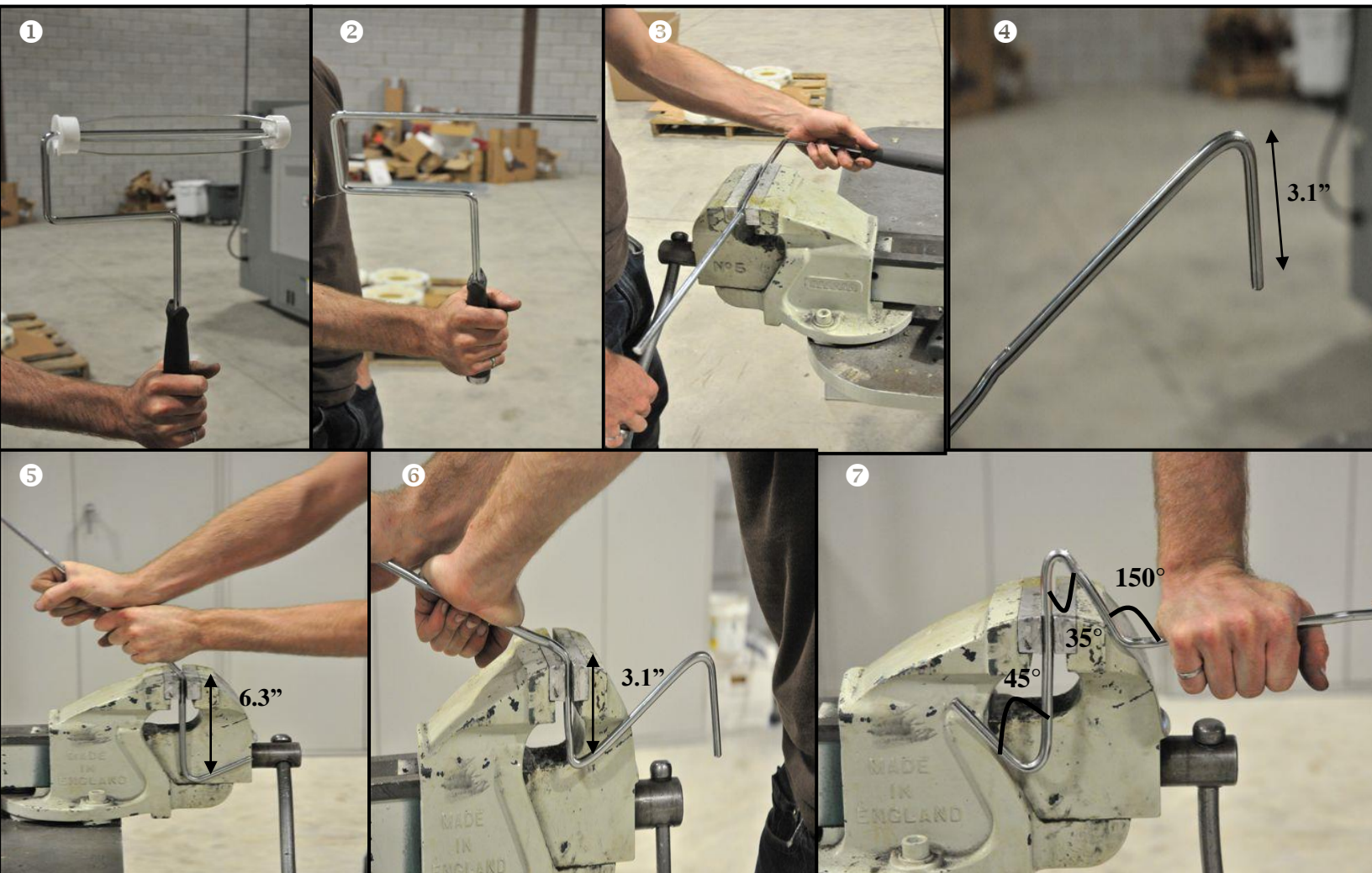
Revised : 27 February 2013

Appendix 2: EAB Trap and Lure Assembly Instructions

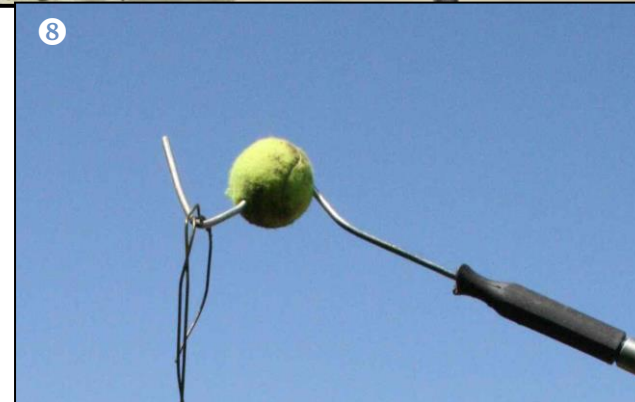


1. See Section 9.0 of the survey protocol for a complete listing of supplies needed.
2. Separate the paired traps by slowly peeling trap panels apart, being careful not to bend panels, and set aside the unused trap. Gloves must always be worn when handling the traps and lures.
3. Bend the trap along the scored sections to create a triangular prism. Note: the sticky side of the trap should be facing outward.
4. Feed the tabs at the edge of the trap inward through the perforated slots located on the opposite edge of the trap.
5. Thread a twist tie or zip tie through the perforated holes closest to the tab fold at both the top and bottom of the trap to secure the panel edges together.
6. Insert the 3 hooks on the trap spreader through the perforated holes at the top of the trap. The hooks should be placed downward, as indicated in the photo above.
7. Affix the (Z)-3-hexenol pouch to the bottom rung of the trap spreader with a zip tie so that the lure is hanging downward inside the trap. The rubber septa containing the lactone pheromone is added to this rung as well, using the safety pin provided.
8. Attach the wire limb hook to the top rung of the trap spreader by feeding the lower loop of the lure hanger through the top rung of the trap spreader. Secure with pliers.
9. Feed the modified hook attachment of the Mr. LongArm telescopic extension pole through the hole on the top of the wire limb hook to raise the trap into the host tree.

Appendix 3: Modified Hook Attachment for Mr Long Arm Extension Pole



1. Source a paint brush roller from your local hardware store.
2. Remove roller cage so that only the metal rod and handle remain.
3. Straighten the metal rod using a vice.
4. Make the first bend in the rod, as shown above.
5. Make the second bend in the opposite direction, as shown above.
6. Make the final bend to complete the “Z”, as shown above.
7. Angles for the final attachment shown above.
8. Pierce two holes on either side of a tennis ball. Push the hook attachment through the ball, which should sit near the second angle of the hook to prevent the trap from sliding down during trap deployment.



Appendix 4: CFIA Offices**ATLANTIC AREA**

1081 Main St
PO Box 6088
Moncton, NB

E1C 8R2
Tel: 506-851-7400
Fax: 506-851-2689

New Brunswick
500 Beaverbrook Court
Suite 430

Fredericton, NB
E3B 5X4
Tel: 506-452-4963
Fax: 506-451-2562

Newfoundland and Labrador

10 Barter's Hill
St. John's, NL
A1C 5X1
Tel: 709-772-4424
Fax: 709-772-2282

Nova Scotia
1992 Agency Drive
Dartmouth, NS
B3B 1Y9
Tel: 902-536-1091
Fax: 902-536-1098

Prince Edward Island
690 University Ave
Charlottetown, PEI
C1E 1E3
Tel: 902-566-7290
Fax: 902-566-7334

ONTARIO AREA

174 Stone Rd W
Guelph, ON
N1G 4S9
Tel: 226-217-8300
Fax: 226-217-8494

Central
709 Main Street West
Floor 1, Room 101
Hamilton, ON

L8S 1A2
Tel: 905-572-2201
Fax: 905-572-2197

Toronto
1124 Finch Avenue W,
Toronto, ON
M3J 2E2
Tel: 647-790-1100
Fax: 647-790-1104

Southwest
1200 Commissioners Rd
E, Unit 19
London, ON
N5Z 4R3
Tel: 519-691-1300
Fax: 519-691-1314

North East
345 College Street E
Belleville, ON
K8N 5S7
Tel: 613-969-3332
Fax: 613-969-3721

500 Huronia Road
Suite 103
Barrie, ON
L4N 8X3
Tel: 705-739-0008
Fax: 705-739-0405

19 Ontario Rd.
Walkerton, ON
N0G 2V0
Tel: 519-881-2431
Fax: 519-881-3455

107 Shirreff Ave
North Bay, ON
P1B 7K8
Tel: 705-495-5995
Fax: 705-495-5998

Unit 7 – 38 Auriga Dr.
Ottawa, ON
K2E 8A5
Tel: 613-773-8613
Fax: 613-773-8672

163 Simcoe St.
Peterborough, ON,
K9H 2H6
Tel: 705-742-6917
Fax: 705-742-8676

1219 Queen Street East
Sault Ste Marie, ON
P6A 2E5
Tel: 705-941-2094
Fax: 705-941-2101

977 Alloy Drive
Thunder Bay, ON
P7B 5Z8
Tel: 807-683-4370
Fax: 807-683-4383

QUEBEC AREA

Room 671 – 2001
Robert-Bourassa
Boulevard.
Montreal, QC
H3A 3N2
Tel: 514-283-8888
Fax: 514-493-6154

Place Iberville IV
2954, Laurier Blvd,
Ste-Foy, QC
G1V 5C7
Tel: 418-648-7373
Fax: 418-648-4792

Pièce 4500
3225 avenue Cusson
ST-Hyacinthe, QC
J2S 0H7
Tel: 450-768-1500
Fax: 450-768-1474

WESTERN AREA

8403 Coronet Road NW
Edmonton, AB
T6E 4N7
Tel: 780-395-6759
Fax: 780-395-6794

110 Country Hills
Landing NW
Floor 1, Room 102
Calgary, AB
T3K 5P3
Tel: 403-390-5736
Fax: 587-230-2451

4321 Still Creek Dr.,
Suite 400
Burnaby, BC
V5C 6S7
Tel: 604-292-5785
Fax: (604) 292-5603

269 Main St. Room 613
Winnipeg, MB
R3C 1B2
Tel: 204-259-1370
Fax: 204-259-1331

4475 Viewmont Avenue
Floor 1, Room 103
Victoria, BC
V8Z 6L8
Tel: 250-363-3454
Fax: 250-363-0144

1853 Bredin Road
Kelowna, BC
V1Y 7S9
Tel: 250-470-5176
Fax: 250-470-4899

3605 14th Avenue North
Lethbridge, AB
T1H 6P7
Tel: 403-382-4904
Fax: 403-382-3148

421 Downey Road
Room 201
Saskatoon, SK
S7N 4L8
Tel: 306-385-4921
Fax: 306-385-4942