Termite Report 2011

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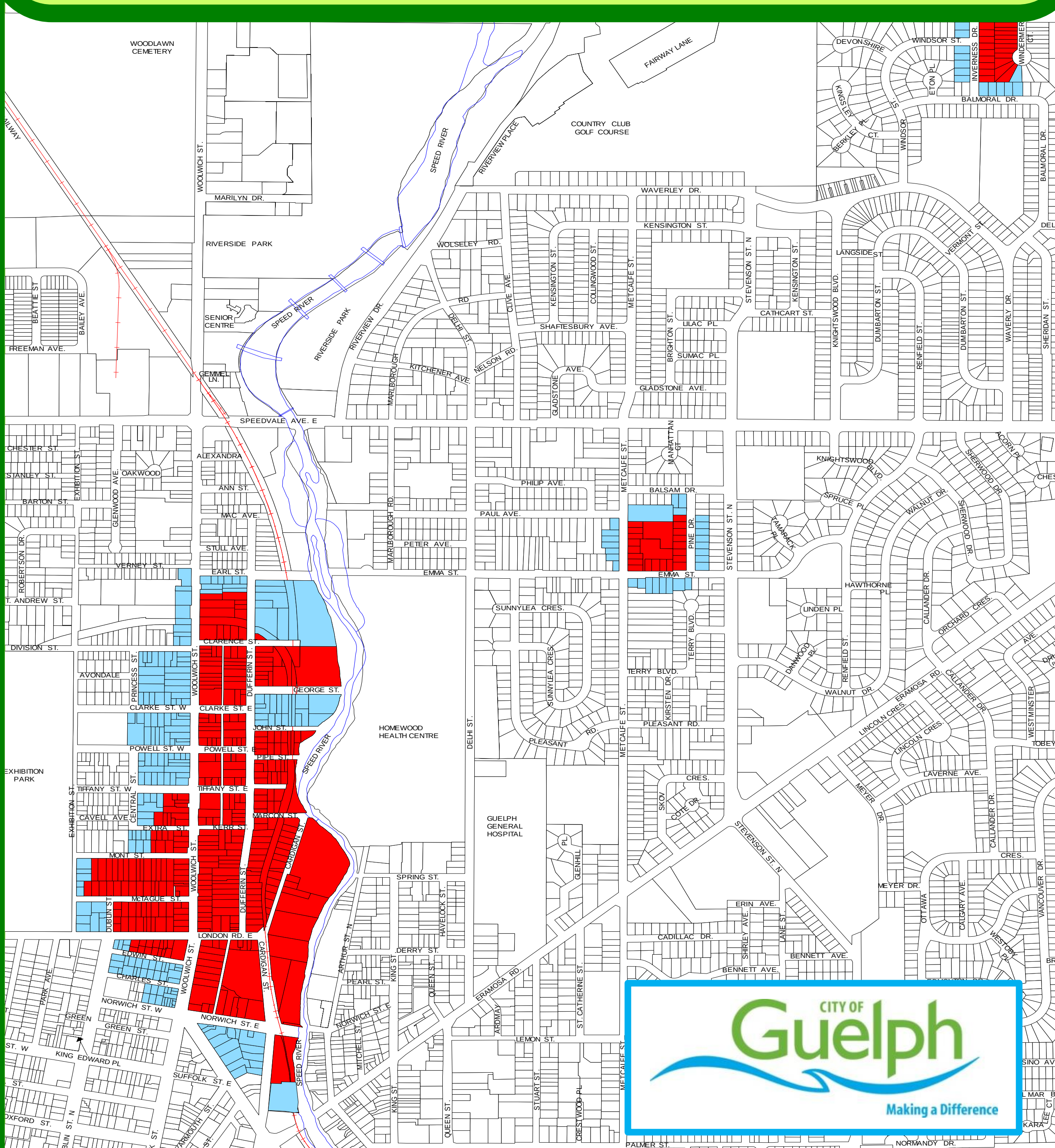

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Executive Summary

Guelph's Termite Management Areas Guelph has three termite management areas which have introduced populations of the eastern subterranean termite. The management areas are divided into red and blue zones. Red zone areas have had known termite infestations while blue zones are buffer areas. Each block is assigned a sector number (Figure 1). Approximately 3,100 traps are installed in the red zones and inner blue zones and are checked on a regular basis from spring through fall.

Windermere Area Inactive in 2011 The most encouraging finding in 2011 was the complete inactivity of all 259 traps in the Windermere management area. Consequently the boundaries of that area have been further constricted this year as indicated in Figure 1 for 2012.

Pattern of Activity in 2011 and Constriction of the Termite Management Areas The red and blue zones currently (2012) encompass 637 properties on portions of 38 blocks, down from a maximal extent of 869 properties on 48 blocks in 2009. See Figure 1 for sector numbers and the current zone designations for specific properties. New marginal activity was found on one property in Sector 3 and on three properties in Sector 48. However this expansion was offset by continuous inactivity in many peripheral red and blue zone areas, which have now been re-designated as follows. Thirty-five red properties were re-designated as blue due to inactivity. Thus there was a net reduction of 31 red properties. Another 98 formerly blue properties were removed from the termite management area and are now indicated as white areas (Figure 1). With continued management, we may anticipate continuous annual shrinkage of the termite management areas as termite populations are suppressed and hidden structural infestations are discovered, treated, and eliminated.

Second Year of Suppression with Zinc Borate 2011 was the second year of treatments under the current experimental authorization from the Pest Management Regulatory Agency (PMRA) to test zinc borate. Therefore this was the first year for comparing year over year trap yield as a way of assessing the efficacy of the zinc borate treatments. The total number of termites trapped in 2010 was 928,495 compared to 683,793 in 2011 (Figure 2). This represents a 26.4% reduction in the termite population over the previous year. Comparison of the first and second halves of 2011 suggests an even sharper level of decline. The number of termites trapped in May, June, and July was 495,433 compared to 187,201 collected in August, September and October (Figure 3). This represents a within-year decline of 62.2%. These measures of suppression are also supported by the continuous downward trend in the average number of termites trapped per inspection (Figure 4).

Detection and Treatment of Structural Infestations Seven structural (house) infestations were discovered during 2011 and structures were rebuilt, renovated, and/or treated. Although this was an increase over the three discovered in 2010, it was still less than half the number discovered in 2009. The ongoing process of discovery and remediation of hidden structural infestations will continue to be an important component of the program, as such infestations are likely to be a critical factor in sustaining the current pattern of infestation.

Termite Habitat Reduction Further progress was made in the removal of critical habitat. Thirty-one dead or infested trees and 34 stumps were identified and removed. This included 20 infested trees, logs, or stumps removed from the Grand River Conservation Authority land in sector 21. Two additional trees with superficial activity were sprayed. 210 borate rods were installed in guard rail posts, fence posts, and retaining walls in sectors 2, 7 and 37. A large planter box in sector 47 was found to be infested and was dismantled and removed. Disposal permits were provided to area residents to defray the cost of disposing of yard wood and demolition debris. A total of 200 disposal permits were issued in 2011, up from 156 permits issued in 2010.

Termite Inspections In 2011, the number of termite inspections for real estate transfers was 41, up from 38 in 2010. The number of termite inspections related to building permits was 50, over twice the number in 2010, indicating an increase in building activity in the termite management areas.

New Trap Installations In 2011, 40 new traps were installed along the newly completed section of the Trans Canada Trail which runs through sectors 8, 11, 12, 16, and 20 of the Woolwich Management Area. Another 40 new traps were installed in the newly completed Stewart Mill townhouses on Cardigan Street in sector 37. Thirty-four new traps were also installed in the red and inner blue areas of sector 3.

Lab Studies on Baits Further lab studies were conducted on borate baits to bracket the effective concentration. The bait acceptance threshold concentration was determined. This may allow future treatments to be conducted with very low concentrations of certain borate compounds.

Collaboration with USDA on Other Potential Actives In November, I attended a small conference of scientists at the United States Department of Agriculture's Forest Products Laboratory in Madison, Wisconsin to discuss similar projects there on area-wide termite control. A potentially effective control agent, (N'N-naphthaloylhydroxyl amine (NHA)), was obtained for testing. Lab tests however did not indicate a comparative advantage over Trap-Treat-Release with zinc borate. We will also be collaborating to evaluate two additional termite control actives: the insect-specific fungal pathogen *Metarhizium flavoviride* and Termidor Dry® with fipronil, both as potential dusts applied to trapped termites for release.

Guidelines for Construction and Renovation in Termite Management Areas In order to assist residents, builders and contractors in the termite management areas, guidelines have been enhanced, providing building details for new construction in termite management areas.

2011 Report As with previous annual reports, the full 2011 report will be posted on the City's termite web site at: www.guelph.ca > quick links > termites, by the last week of March.

Goals for the 2012 Season The goals for the upcoming season will be similar to 2011:

- This executive summary and graphs will be sent to residents at the end of March as an annual progress report.
- Two part- time summer technicians will be hired and will start work in mid-April. Traps will be refurbished with new cardboard rolls and any missing traps replaced during April and May.
- During the spring or early summer, trees and stumps on the embankment at the NE corner of sector 7 will be cleared and a retaining wall will be installed to shore up the slope on that corner.
- As in 2010 and 2011, the central focus of the season will be to continue doing Trap-Treat-Release treatments with zinc borate. Traps will be checked periodically and trapped termites will be treated with a resinous coating containing zinc borate and released back into active traps. Any trap used as a release port will be secured with plastic cable ties and identified with a treatment lid label and brick.
- Later in the season, letters will be sent to selected residents for required wood removal or to schedule borate rod installations in fence posts and retaining walls.

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Table 1. Extent of Guelph's Three Termite Management Areas in 2012

(Zones, Properties and Blocks)

Zones	Red		Blue		Red + Blue		White*		Total (R+B+W)		
Management Areas:	zones	properties	zones	properties	zones	properties	zones	properties	zones	properties	blocks
1) Woolwich Area	20	355	16	201	36	556	21	337	57	893	42
2) Windermere Area	1	20	3	13	4	33	3	27	7	60	4
3) Emma - Pine Area	1	22	4	26	5	48	0	0	5	48	4
Totals	22	397	23	240	45	637	24	364	69	1001	50

* historically included

Table 2. Woolwich Termite Management Area for 2012

Sector Number	Sector Name (SE corner)	Sector Type	Number Properties	Properties Installed	Number Traps Installed	Traps per Installed Property
000	Verney x Woolwich	White	14	0	0	0.0
00	Earl x Dufferin	White	18	0	0	0.0
0	Earl x GJR	White	10	0	0	0.0
1	Division x Woolwich	White	32	0	0	0.0
1	Division x Woolwich	Blue	9	4	12	3.0
2	Clarence x Dufferin	Blue	10	8	24	3.0
2	Clarence x Dufferin	Red	13	13	113	8.7
3	Clarence x Speed R.	Blue	6	1	17	17.0
3	Clarence x Speed R.	Red	1	1	17	17.0
4	Avondale x Princess	White	16	0	0	0.0
5	Clarke x Princess	White	13	0	0	0.0
6	Clarke x Woowich	Blue	26	9	27	3.0
7	Clarke x Dufferin	Red	26	26	227	8.7
8	George x Speed R.	Red	11	11	99	9.0
9	Powell x Woolwich	White	1	0	0	0.0
9	Powell x Woolwich	Blue	21	7	21	3.0
10	Powell x Dufferin	Red	21	21	129	6.1
11	John x Speed R.	Blue	15	15	45	3.0
12	Pipe x Speed R.	Red	13	13	99	8.4
13	Tiffany x Central	White	22	0	0	0.0
14	Tiffany x Woolwich	Blue	22	6	18	3.0
15	Tiffany x Dufferin	Red	15	15	116	7.7
16	Tiffany x Speed R.	Red	13	13	93	7.2
17	London x Exhibition	White	1	0	0	0.0
18	Cavell x Central	White	20	0	0	0.0
19	Extra x Woolwich	Blue	7	7	42	6.0
19	Extra x Woolwich	Red	12	12	51	4.3
20	Kerr x Dufferin	Red	15	14	84	6.0
21	Marcon x Speed R.	Red	10	10	79	7.9
22	Mont x Woolwich	White	17	17	59	3.5
22	Mont x Woolwich	Blue	8	8	27	3.4
22	Mont x Woolwich	Red	13	12	51	4.3
23	London x Dufferin	Red	43	42	214	5.1
24	London x Cardigan	Red	35	35	190	5.4
25	McTague x Woolwich	Blue	5	5	19	3.8
25	McTague x Woolwich	Red	35	35	174	5.0
26	London x Dublin	Blue	7	0	0	0.0
27	London x Woolwich	Red	28	26	121	4.7
28	Suffolk x Park	White	32	0	0	0.0
29	K. Edwd x Dublin	White	43	0	0	0.0
30	Edwin x Woolwich	Blue	4	4	21	5.3
30	Edwin x Woolwich	Red	15	15	69	4.6
31	Charles x Woolwich	Blue	25	9	27	3.0
32	Norwich x Norfolk	White	7	0	0	0.0
32	Norwich x Norfolk	Blue	18	6	18	3.0
33	Green x Norfolk	White	19	0	0	0.0
34	Green x Woolwich	White	26	0	0	0.0
35	Liverpool x Norwich	White	22	0	0	0.0
36	Norwich x Speed R.	Red	10	9	80	8.9
37	Norwich x Cardigan	Red	25	25	211	8.4
38	Suffolk x Woolwich	White	12	0	0	0.0
39	Yarmouth x Norwich	White	18	0	0	0.0
40	Woolwich x Cardigan	Blue	17	8	24	3.0
40	Woolwich x Cardigan	White	4	0	0	0.0
41	Eramosa x Speed R.	Red	1	1	6	6.0
41	Eramosa x Speed R.	Blue	1	0	0	0.0
Subtotals		Red	355	349	2223	6.4
		Blue	201	97	342	3.5
		White	323	0	0	0.0
TOTALS		R+B+W	879	446	2565	5.8
		R+B	556	446	2565	5.8

Table 3. Windermere Termite Management Area

Sector Number	Sector Name	Sector Type	Number Properties	Properties Installed	Number Traps Installed	Traps per Installed Property
42	Balmoral x Windermere	Red	20	20	142	7.1
42	Balmoral x Windermere	Blue	6	6	36	6.0
42	Balmoral x Windermere	White*	16	16	32	2.0
43	Windsor x Inverness	Blue	2	2	6	3.0
44	Balmoral x Inverness	Blue	5	5	15	3.0
44	Balmoral x Inverness	White*	1	1	3	3.0
45	Balmoral x Balmoral	White*	8	8	18	2.3
46	Balmoral x Victoria	White*	2	2	7	3.5
Subtotals		Red	20	20	142	7.1
		Blue	13	13	57	4.4
		White*	27	27	60	2.2
	TOTALS	**R+B+W**	**60**	**60**	**259**	

*Some traps removed in 2011, remainder to be removed in 2012.

Table 4. Emma - Pine Termite Management Area

Sector Number	Sector Name	Sector Type	Number Properties	Properties Installed	Number Traps Installed	Traps/ Installed Property
47	Emma x Pine	Red	22	22	222	10.1
48	Metcalfe x Balsam	Blue	3	4	15	3.8
49	Emma (south side)	Blue	8	8	24	3.0
50	Pine (east side)	Blue	8	8	24	3.0
51	Emma X Metcalfe	Blue	7	4	15	3.8
Subtotals		Red	22	22	201	9.1
		Blue	26	24	78	3.3
	TOTALS	**R + B**	**49**	**46**	**300**	

Table 5. Summary of Property and Trap Activity in Red Zone Blocks (1998-2011)

No.	Sec. No.	Number of Active Properties									Number of Active Traps								Number of Termites Trapped*								2011 Status
		1998▪	1999▫	2000▫	2001▫	2007◊	2008	2009	2010	2011	1999	2000	2001	2007	2008	2009	2010	2011	1999	2000	2001	2007	2008	2009	2010	2011	
1	2	--	--	--	--	4	4	4	4	6	--	--	--	3	19	15	20	16	--	--	--	2,069	100,316	43,297	117,978	73,541	New
2	3	--	--	--	--	--	--	--	--	2	--	--	--	--	--	--	--	3	--	--	--	--	--	--	--	2,864	New
3	7	9	4	10	5	17	23	23	25	25	6	11	6	22	61	41	88	75	1,112	22,623	20,534	8,112	307,782	246,585	389,776	298,183	Resurg.
4	8	--	--	--	--	3	6	5	7	5	--	--	--	3	7	4	8	9	--	--	--	1,838	37,295	13,120	33,383	10,596	New
5	10	--	--	--	--	--	--	4	4	5	--	--	--	--	--	1	6	8	--	--	--	--	--	1,133	13,293	15,275	New
6	12	--	--	--	--	0	3	4	4	1	--	--	--	0	1	3	3	1	--	--	--	--	279	11,923	8,485	50	New
7	15	--	--	--	--	4	7	8	13	12	--	--	--	4	8	14	33	24	--	--	--	4,186	16,753	16,221	32,430	29,633	New
8	16	1	1	4	1	8	6	4	6	3	1	5	1	4	4	3	11	2	10	4,097	606	2,817	23,061	5,573	32,269	19,816	Resurg.
9	19	--	--	--	--	0	0	0	0	0	--	--	--	0	0	0	0	0	--	--	--	0	0	0	0	0	New
10	20	1	1	1	0	1	2	6	4	6	1	2	0	0	5	7	10	9	3,100	19,227	0	0	26,610	31,406	70,521	35,309	Sup.
11	21	7	4	3	3	1	1	1	1	1	6	5	3	0	2	2	1	1	5,526	25,532	9,672	0	1,603	0	25	434	Sup.
12	22	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Erad.?
13	23	20	19	12	0	3	2	2	1	3	42	23	0	0	4	4	2	3	203,918	171,769	0	0	15,742	4,231	1,241	4,131	Sup.
14	24	15	12	12	1	1	0	1	3	4	37	15	1	0	0	2	4	6	121,087	46,767	3,211	0	0	1,245	2,375	9,467	Sup.
15	25	14	4	2	1	3	3	3	0	0	6	2	3	1	1	1	0	0	54,380	572	4,465	1,848	3,985	3,934	0	0	Erad.?
16	27	11	12	13	10	0	0	0	0	0	24	28	14	0	0	0	0	0	54,485	56,725	39,594	0	0	0	0	0	Erad.?
17	30	--	--	--	--	4	2	2	3	2	--	--	--	0	0	2	2	1	--	--	--	0	0	395	1,042	0	New
18	36	10	4	4	3	2	1	1	2	2	25	21	5	0	1	2	0	1	148,856	179,156	25,059	0	3,542	3,513	0	4,806	Sup.
19	37	11	7	9	4	3	3	4	4	6	11	18	6	0	5	2	10	14	45,985	132,158	34,886	0	6,590	4,521	10,121	22,887	Resurg.
20	41	1	1	0	0	1	1	0	0	0	1	0	0	0	0	0	0	0	4,332	0	0	0	0	0	0	0	Erad.?
21	42	--	--	17	2	0	1	1	1	0	--	33	4	0	2	1	1	0	--	155,148	5,285	0	1,520	1,693	741	0	Erad.?
22	47	--	--	--	--	13	12	14	18	21	--	--	--	7	24	28	54	59	--	--	--	1,333	160,183	101,020	215,556	156,801	New
Totals		**101**	**69**	**87**	**30**	**68**	**77**	**87**	**100**	**104**	**160**	**163**	**43**	**44**	**144**	**132**	**253**	**232**	**642,791**	**813,774**	**143,312**	**22,203**	**705,261**	**489,810**	**929,236**	**683,793**	9 New 3 Resurg. 5 Sup. 5 Erad.?

-- 13 blocks known to be infested and managed from 1999-2001

-- 9 additional new blocks infested after 2001

* Inter-year trap yields are not strictly comparable because traps were installed late in the year in 2007 and were checked more frequently in 2010 and 2011

▪ properties with live termites or termite damage ▫ properties with active traps ◊ properties with live termites or active traps

Table 6. Termites Trapped Per Inspection (2008-2011).

Sector	2008			2009			2010			2011		
	total	inspections	per insp.	total	inspections	per insp.	total	inspections	per insp.	total	inspections	per insp.
2	100,316	7	14,331	43,297	7	6,185	117,978	17	6,940	73,536	16	4,596
3	-	-	-	-	-	-	-	-	-	2,864	8	358
7	307,782	9	34,198	246,585	8	30,823	389,776	18	21,654	298,183	19	15,694
8	37,295	7	5,328	13,120	7	1,874	33,383	14	2,385	10,596	14	757
10	0	1	0	1,133	3	378	13,293	9	1,477	15,275	14	1,091
12	279	3	93	11,923	5	2,385	8,485	7	1,212	50	7	7
15	16,753	7	2,393	16,221	6	2,704	32,430	8	4,054	29,633	16	1,852
16	23,061	6	3,844	5,573	6	929	32,369	9	3,597	19,626	9	2,181
19	0	5	0	0	5	0	0	4	0	0	4	0
20	26,610	7	3,801	31,406	5	6,281	70,521	10	7,052	34,978	11	3,180
21	1,603	6	267	0	5	0	25	7	4	434	7	62
22	0	6	0	0	5	0	0	5	0	0	5	0
23	15,742	8	1,968	4,231	4	1,058	1,241	6	207	4,131	8	516
24	0	5	0	1,245	5	249	2,375	6	396	9,487	12	791
25	3,985	7	569	3,934	5	787	0	5	0	0	7	0
27	0	6	0	0	5	0	0	4	0	0	5	0
30	0	8	0	395	5	79	1,042	5	208	2	8	0
36	3,542	7	506	3,513	5	703	0	5	0	4,151	8	519
37	6,590	6	1,098	4,521	5	904	10,121	7	1,446	22,473	18	1,249
41	0	5	0	0	5	0	0	4	0	0	5	0
42	1,520	7	217	1,693	5	339	741	7	106	0	6	0
47	160,183	8	20,023	101,020	7	14,431	215,556	16	13,472	156,801	20	7,840

Table 7. Tree, Stump or Required Wood Removals			
No.	Sector	Address	Material
1	3	32 Clarence	old utility pole & wood debris
2	7	457 Woolwich St.	6 stumps & 1 tree
3	7	23 Clarence	brush pile
4	7	162 Dufferin	boards & brush
5	7	160 Dufferin	infested tree
6	7	156 Dufferin	infested debris & yard wood
7	7	166 Dufferin	infested demolition debris
8	7	adjacent to 166 Duff.	upper portions of 3 large trees
9	7	20 Clarke St	infested demolition debris
10	7	467 Woolwich	infested tree
11	7	471 Woolwich	boards & wood debris
12	7	471 Woolwich	old xmas tree
13	7	483 Woolwich	construction debris
14	8	167 Dufferin	6 stumps
15	8	adjacent to 167 Duff.	wood debris & 5 stumps
16	8	behind 167 Duff.	dead tree and wood pile
17	10	439 Woolwich	stump
18	10	423 Woolwich	retaining wall
19	10	128 Dufferin	building debris
20	10	132 Dufferin	stumps
21	12	15 John St.	wood pile & debris
22	14	400 Woolwich St.	dead spruce tree
23	15	116 Dufferin St.	stumps, debris, planters
24	16	115 Dufferin	infested tree
25	19	380 Woolwich St.	red wood chip mulch
26	19	392 Woolwich St.	brown wood chip mulch
27	20	22 Kerr St.	stump
28	21	Marcon X Cardigan	20 trees & stumps
29	23	367 Woolwich St.	black wood chip mulch
30	23	64 Dufferin	wood post retaining wall
31	23	16 Dufferin	tree & debris
32	24	77 Dufferin	stump
33	24	next to 140 Cardigan	infested stump
34	25	340 Woolwich St.	3 stumps
35	25	332 Woolwich	woody debris pile
36	27	312 Woolwich St.	red wood chip mulch
37	27	22 McTague	stump
38	30	14 London Rd. W	planter, stump, and boards
39	30	16 Londaon Rd. W	stump
40	37	239 Woolwich St.	guard rail posts & planters
41	37	265 Woolwich	infested fence post
42	37	60 Cardigan	infested baseboards
43	47	263 Metcalfe	wood planter/edging boards
44	47	271 Metcalfe	3 stumps & 5 planters
45	47	126 Emma St.	3 dead trees & wood pile
46	47	265 Metcalfe	infested boards

Table 8. Impel Borate Rod Installations in 2011

No.	Sector	Address	No. Rods Installed
1	2	Spurline Park	20
2	3	32 Clarence	10
3	7	guard rail posts	40
4	7	473 Woolwich	100
5	30	14 London Rd. W.	20
6	37	62 Cardigan	20
Total			210

Table 9. Termite Inspections by Year and Type

Year	Real Estate	Building Permits	Material Disposal	Total
2007	25	17	100	142
2008	44	19	128	191
2009	40	19	256	315
2010	38	24	156	218
2011	41	48	200	289

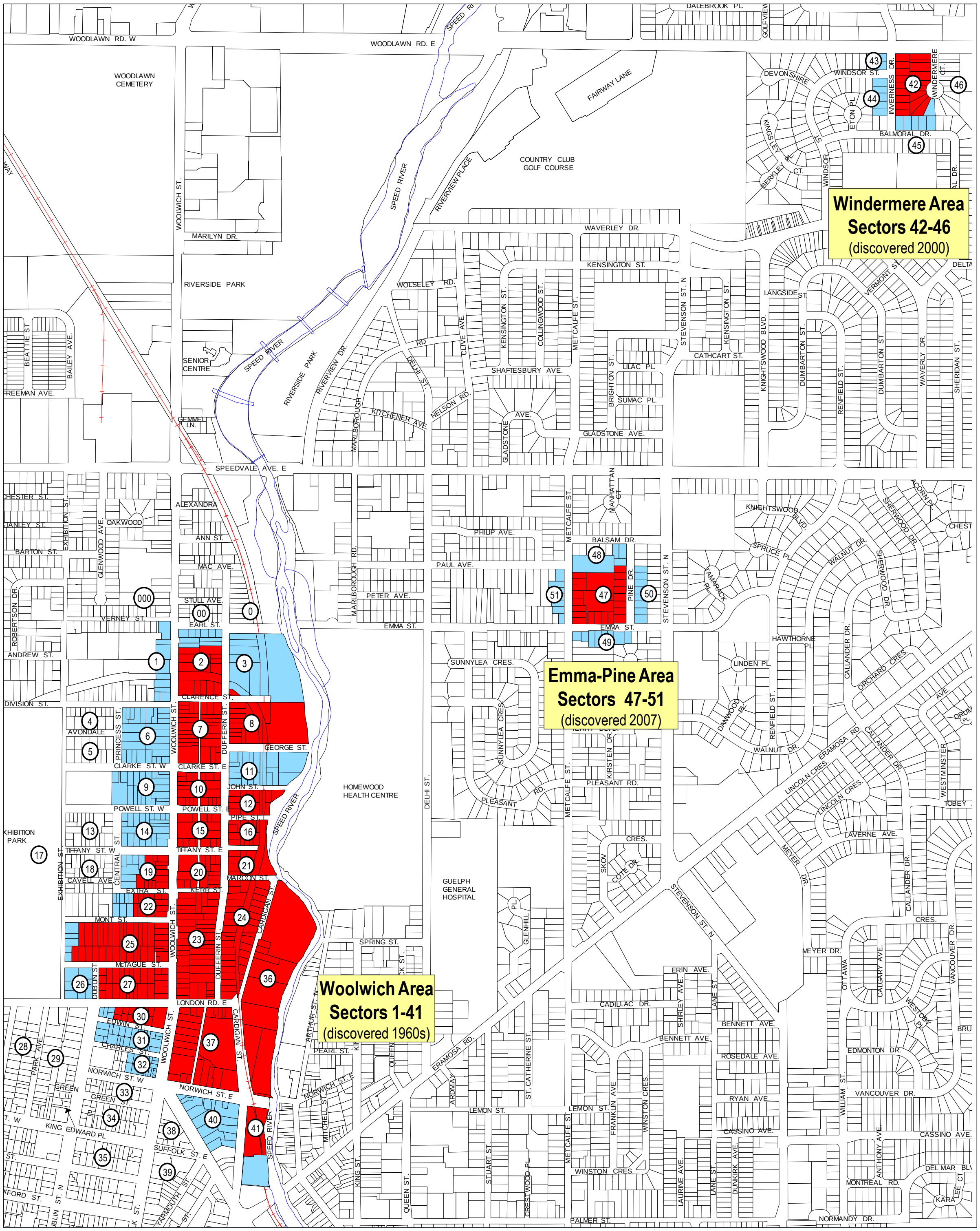

Figure 1. New boundaries of Guelph termite management areas for 2012.

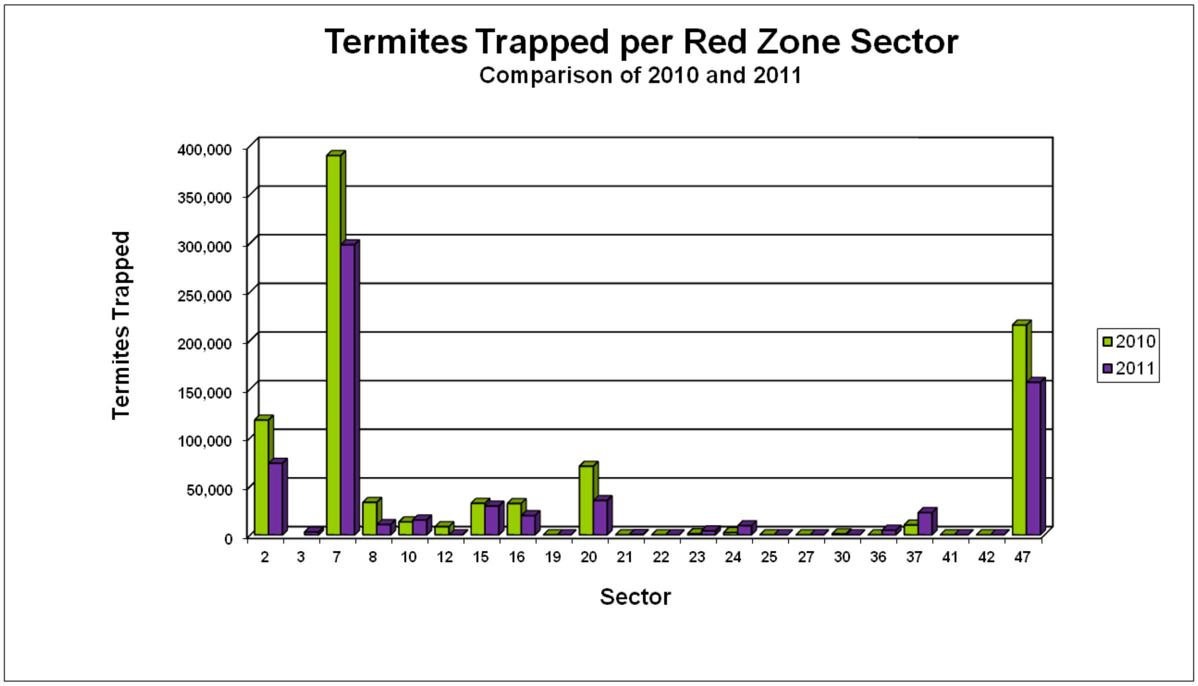

Figure 2. Comparison of total termites trapped per sector in 2010 and 2011.

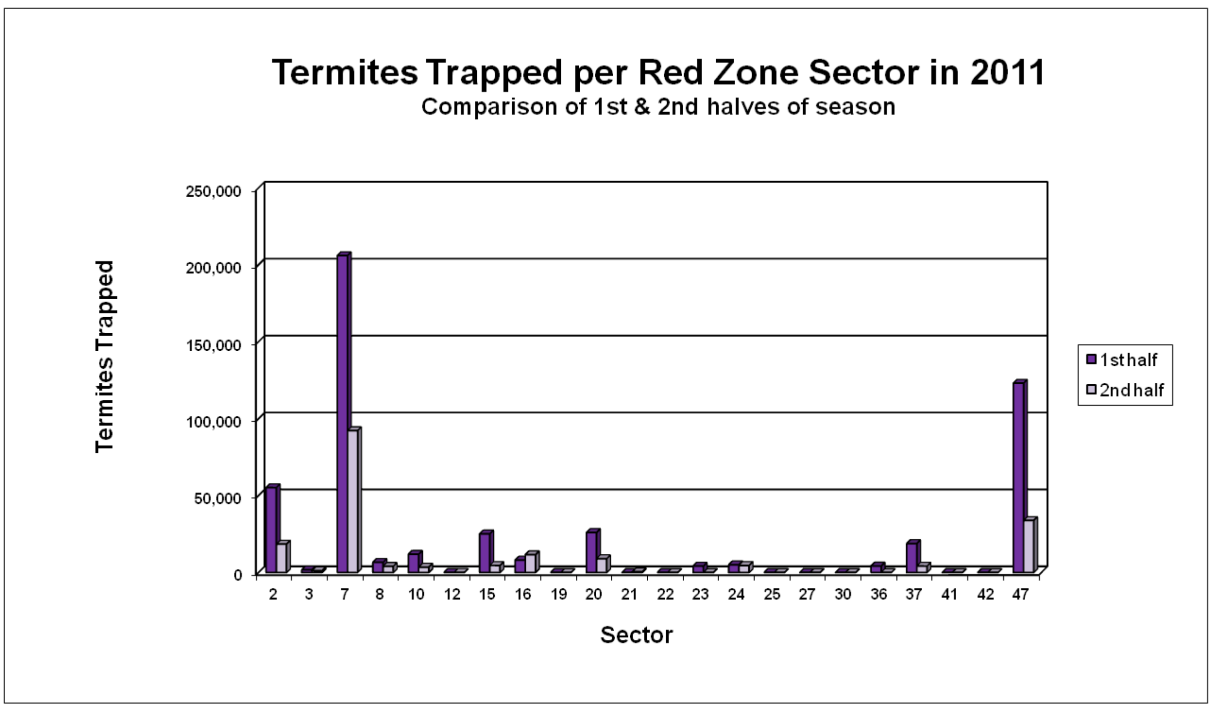

Figure 3. Comparison of termite trapped in first and second halves of 2011 by sector.

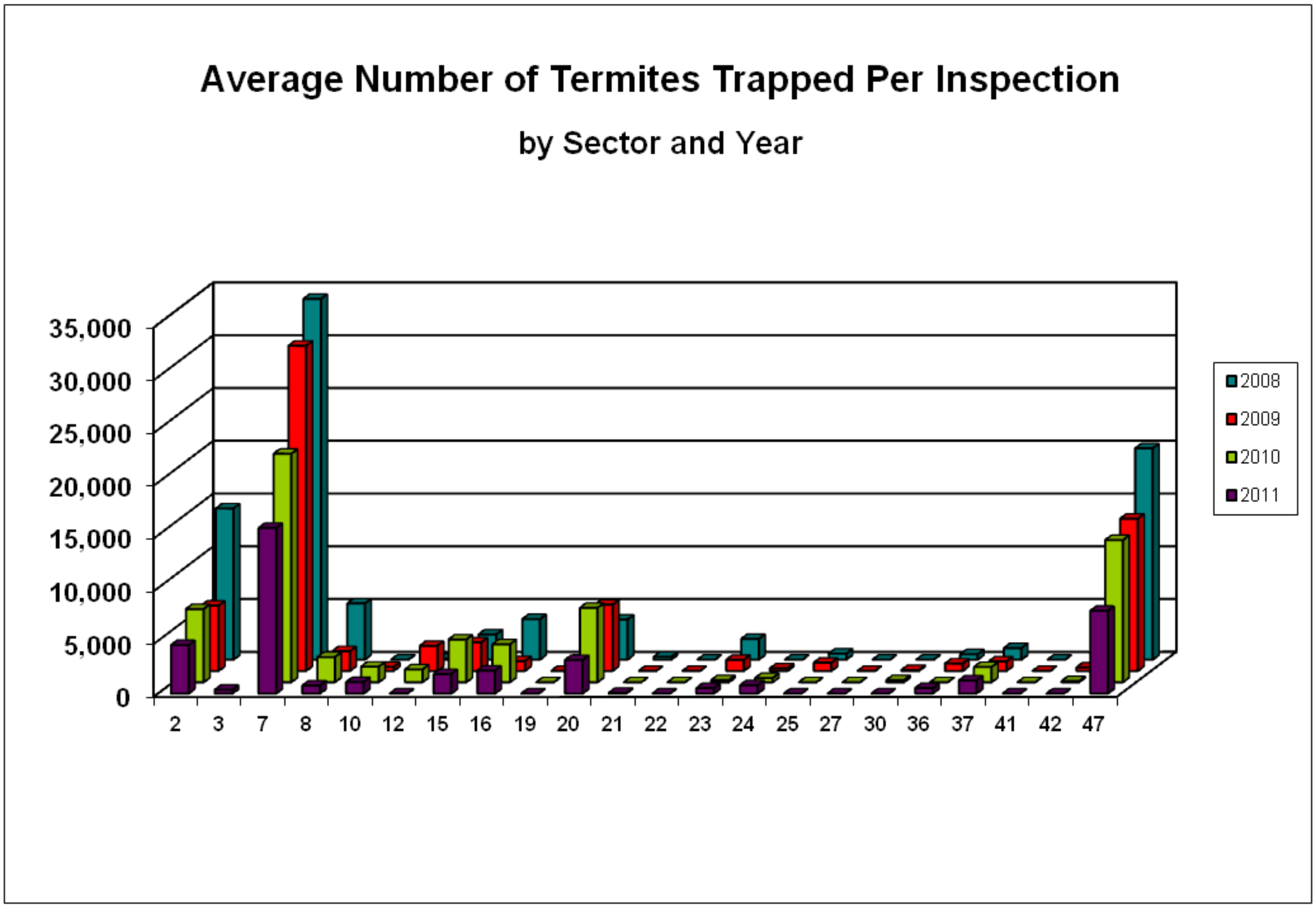

Figure 4. Average number of termites trapped per inspection by sector (2008-2011).

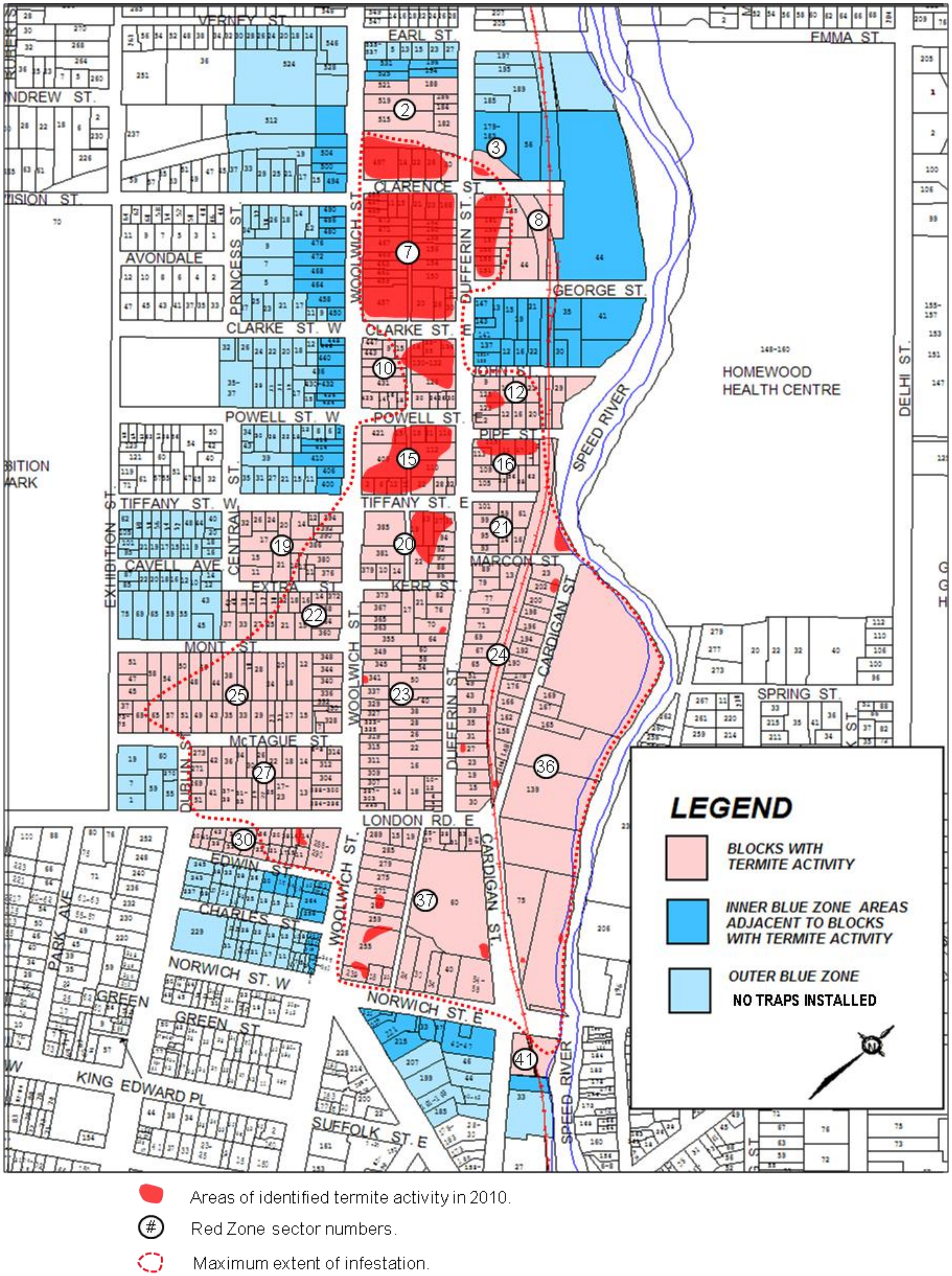

Figure 5. Areas of detected termite activity in the Woolwich management area in 2011.

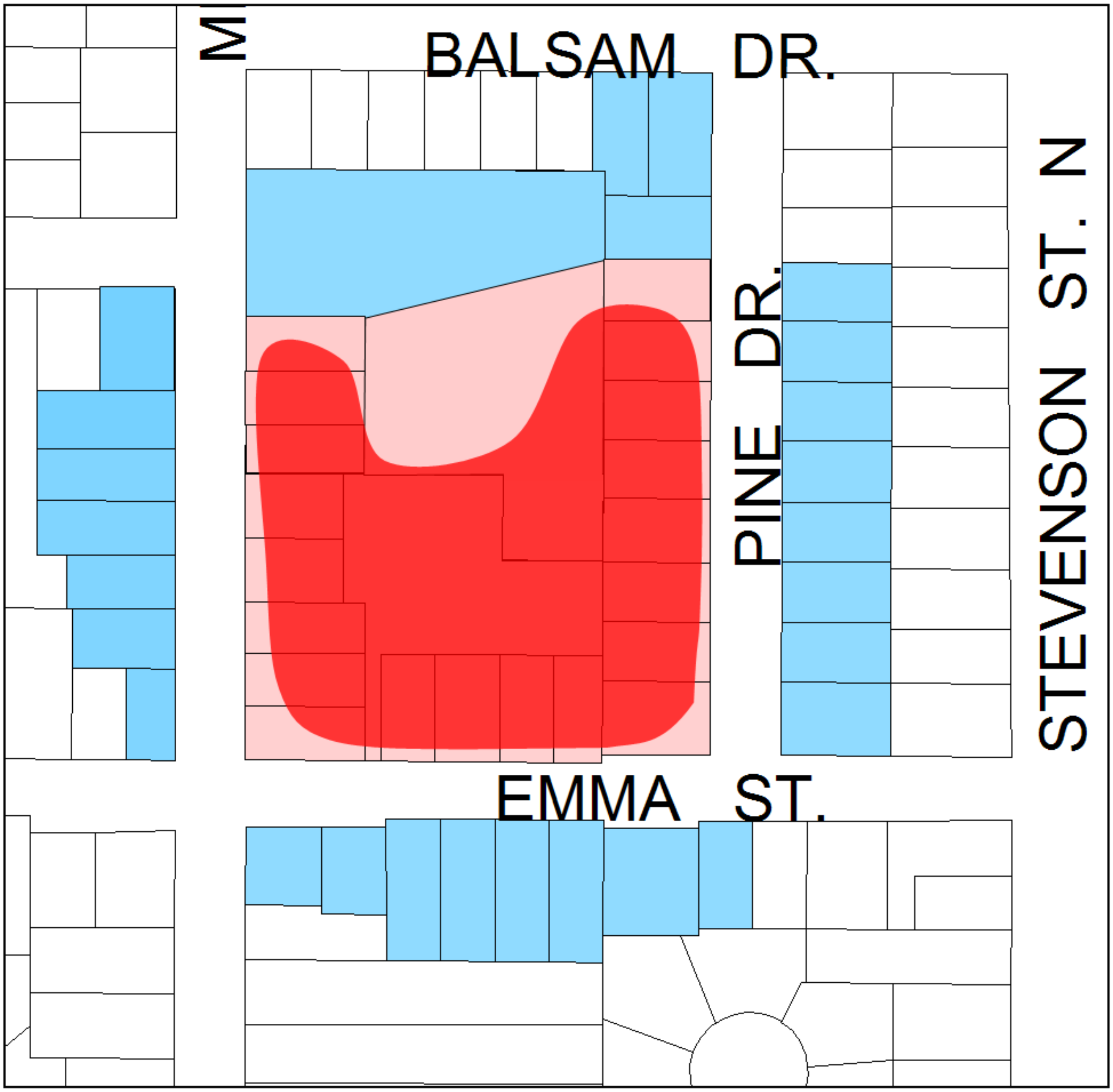

Figure 6. Areas of detected termite activity in the Emma-Pine management area in 2011.

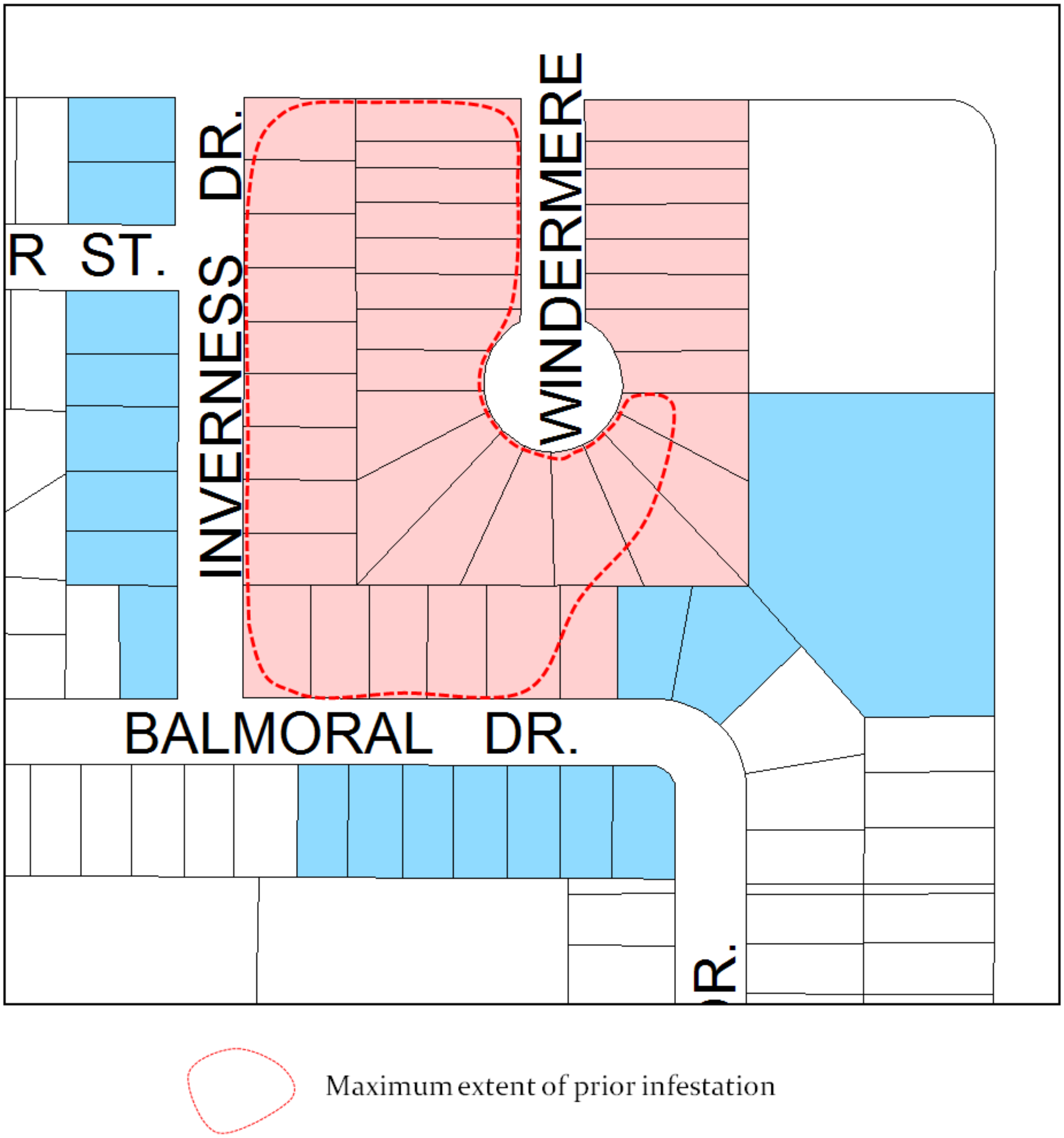

Figure 7. Areas of detected termite activity in the Windermere management area in 2011.

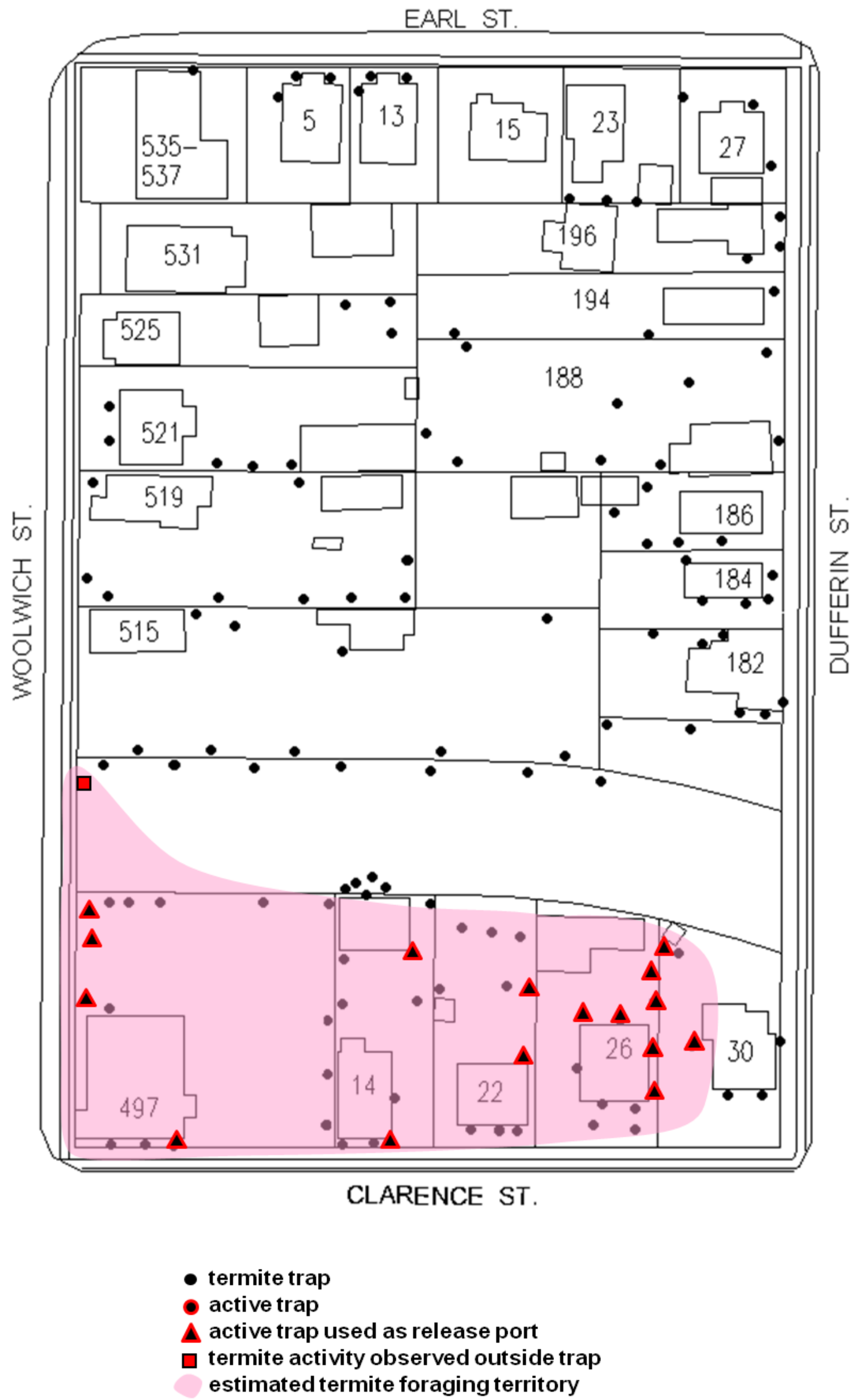

Figure 8. Trap activity in sector 2 in 2011.

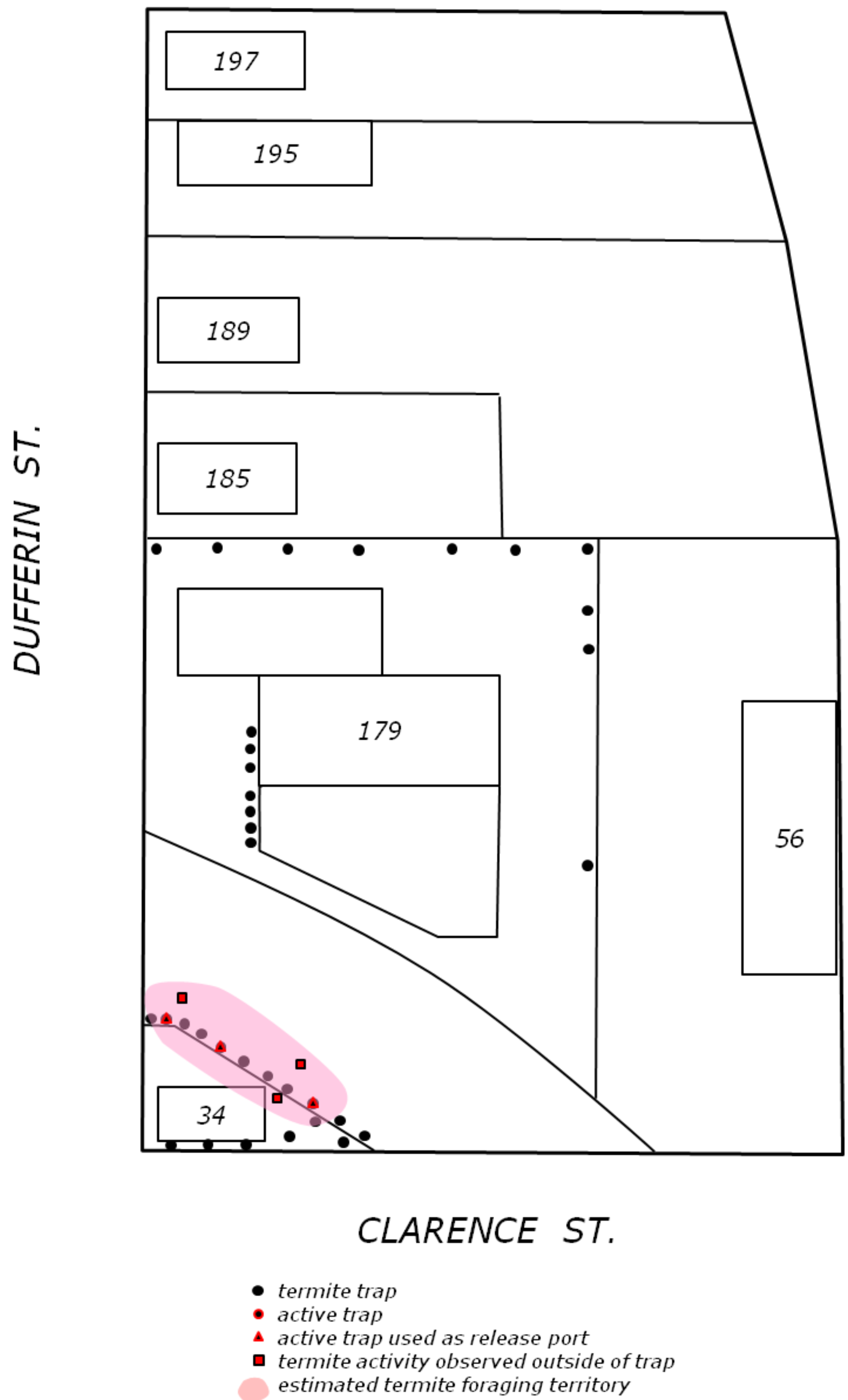

Figure 9. Trap activity in sector 3 in 2011.

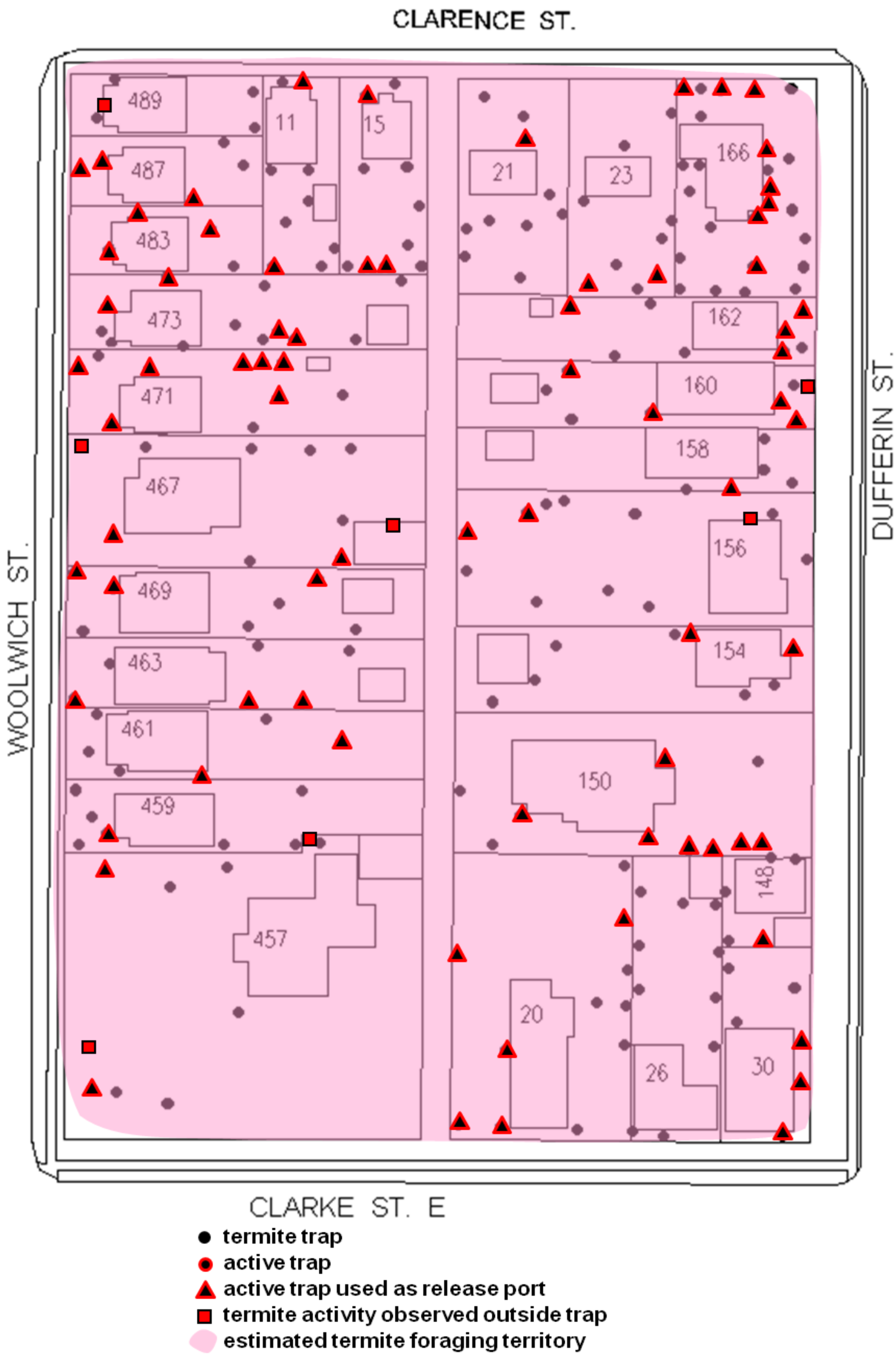

Figure 10. Trap activity in sector 7 in 2011.

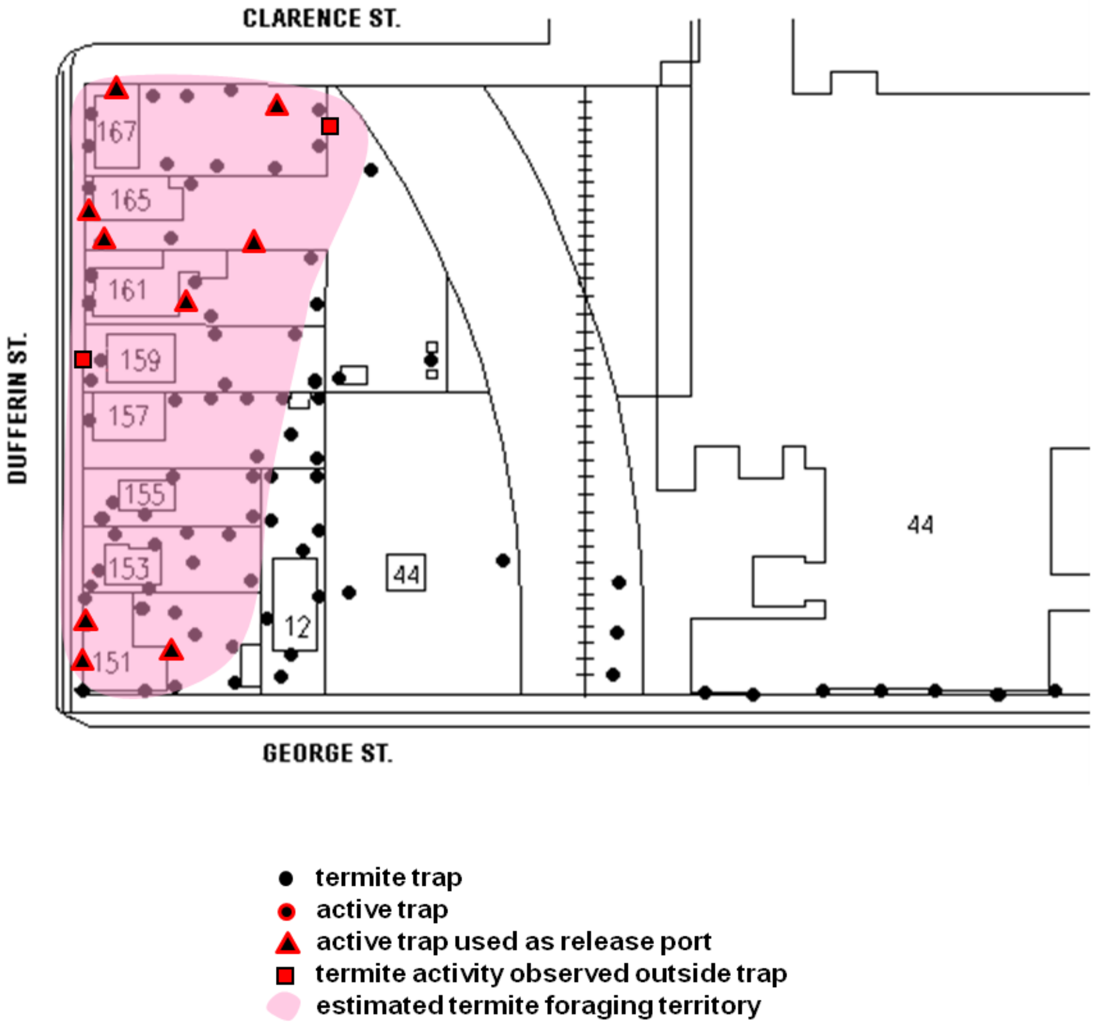

Figure 11. Trap activity in sector 8 in 2011.

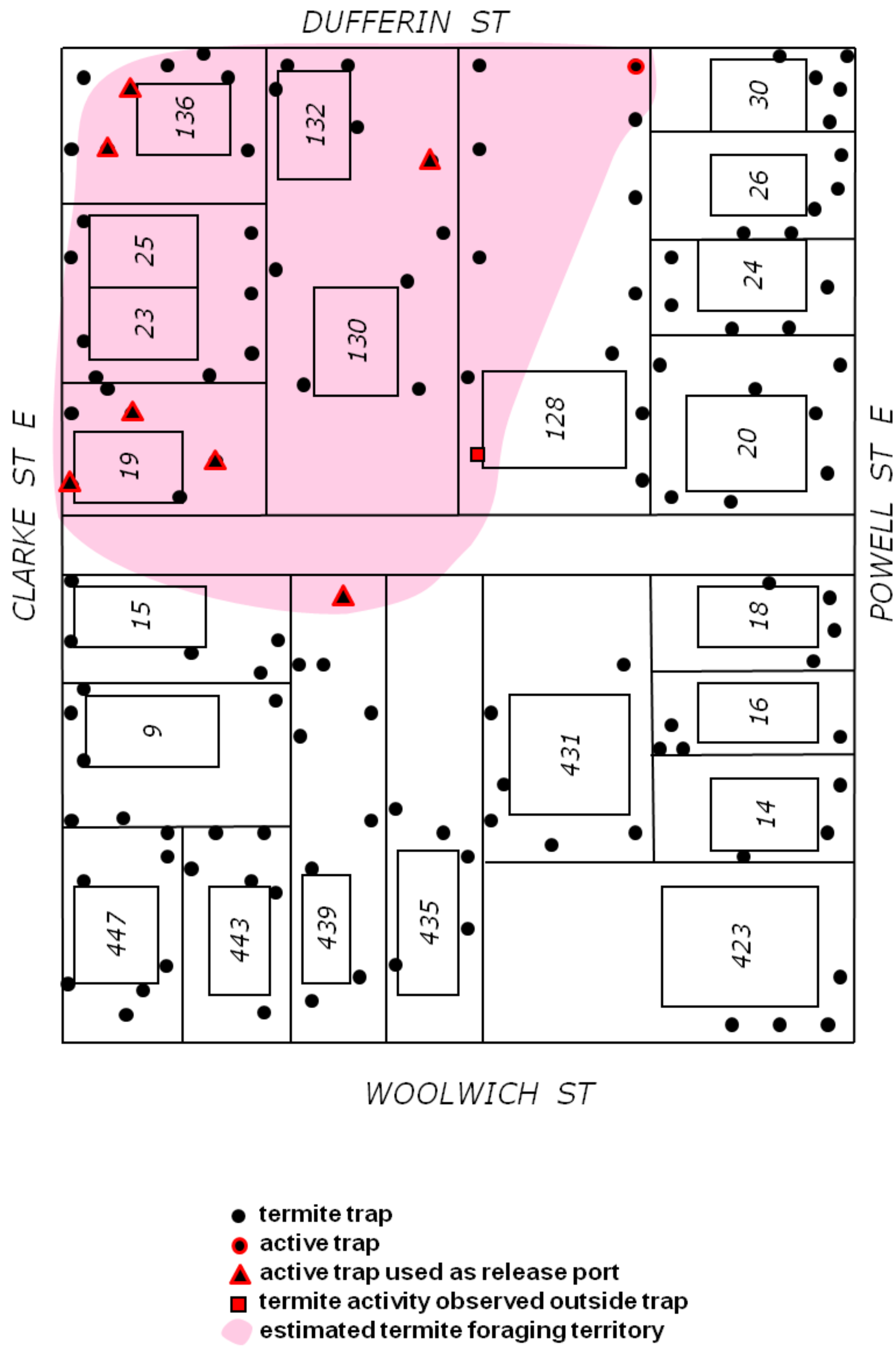

Figure 12. Trap activity in sector 10 in 2011.

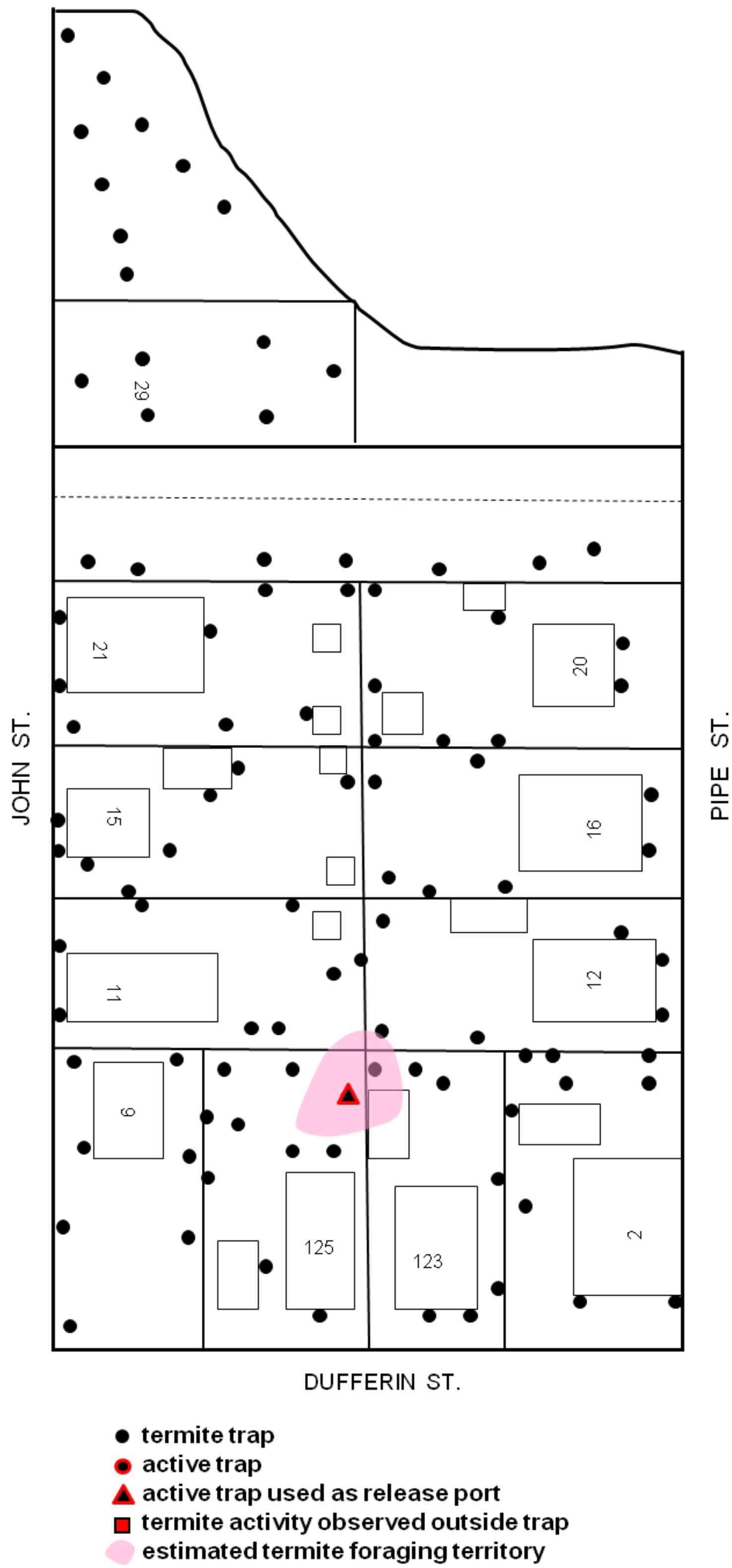

Figure 13. Trap activity in sector 12 in 2011.

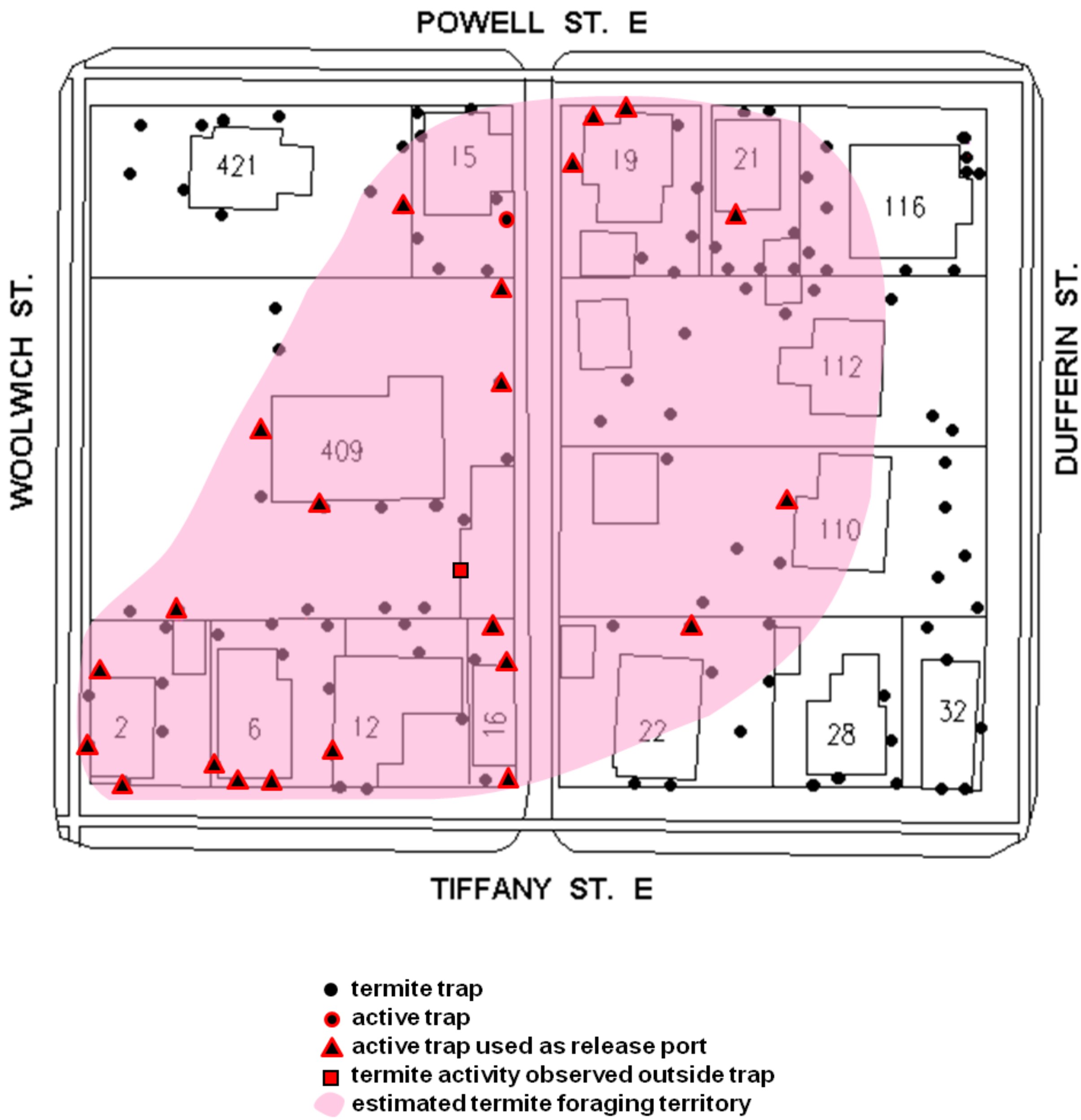

Figure 14. Trap activity in sector 15 in 2011.

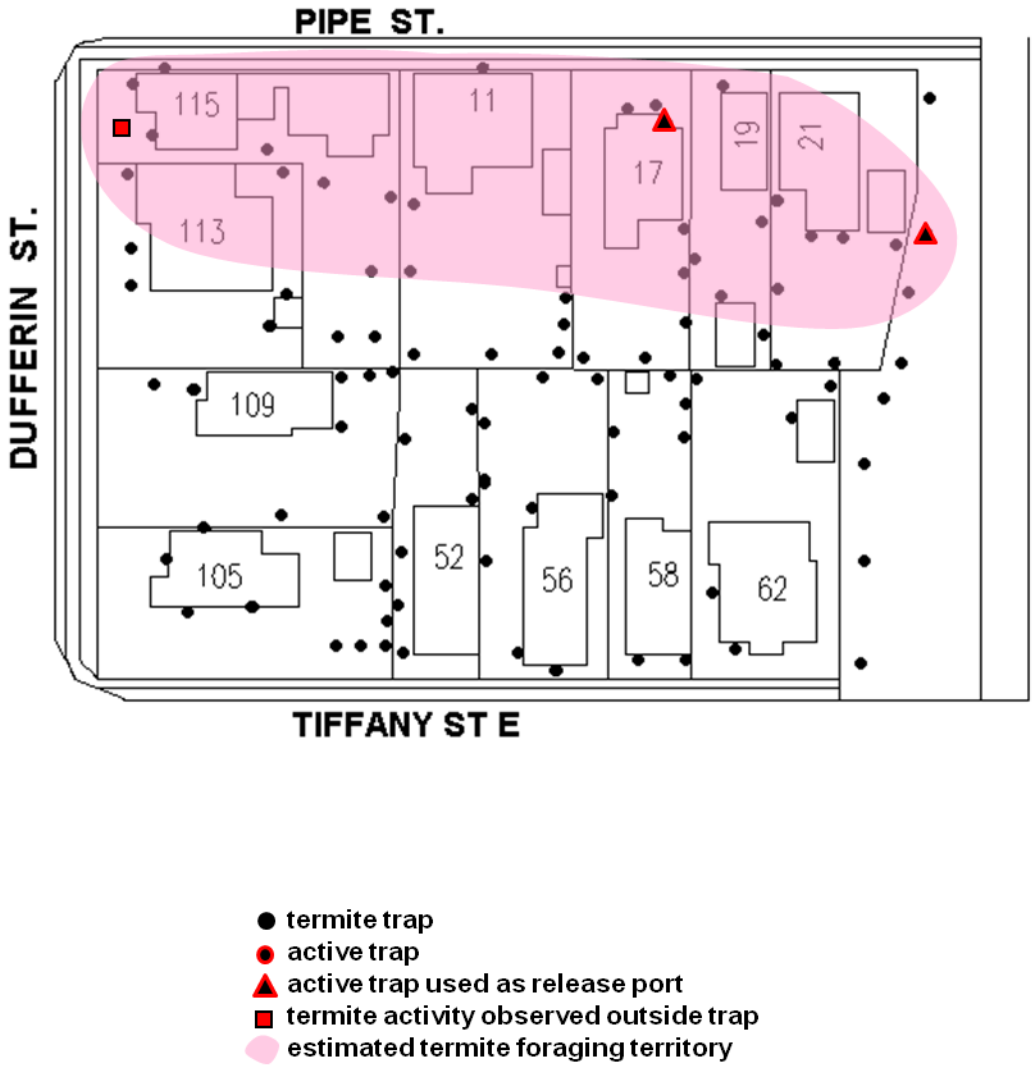

Figure 15. Trap activity in sector 16 in 2011.

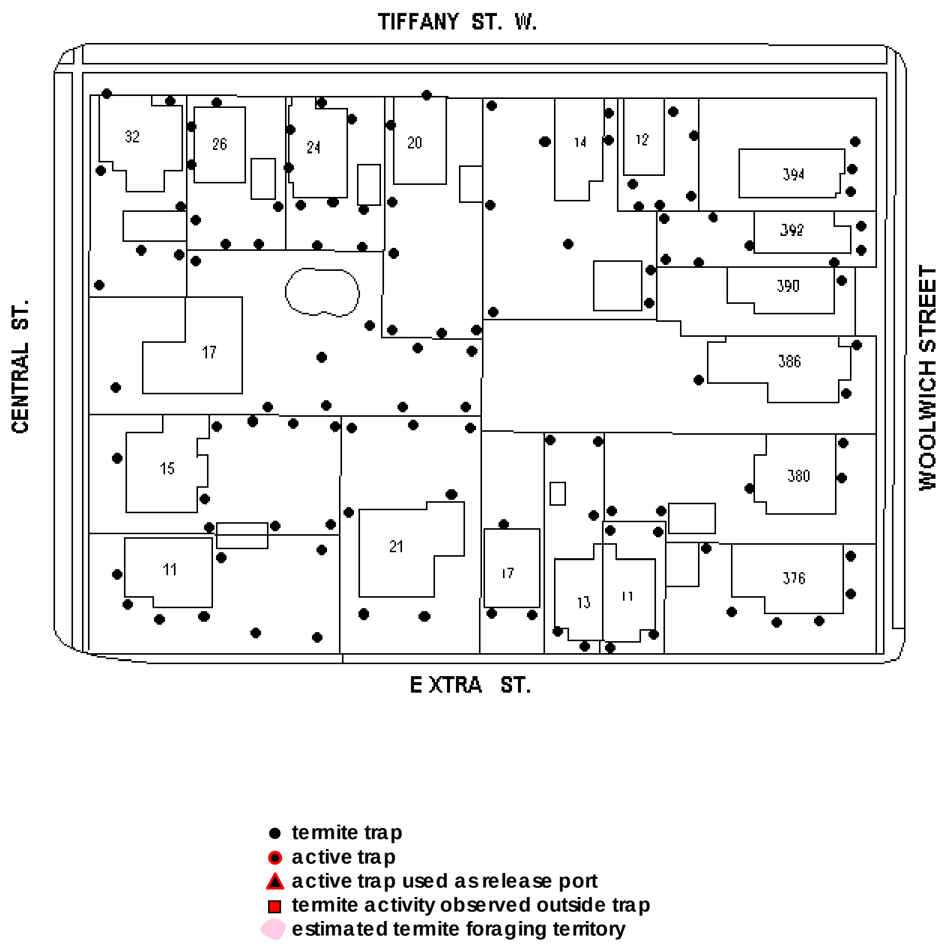

Figure 16. Trap activity in sector 19 in 2011.

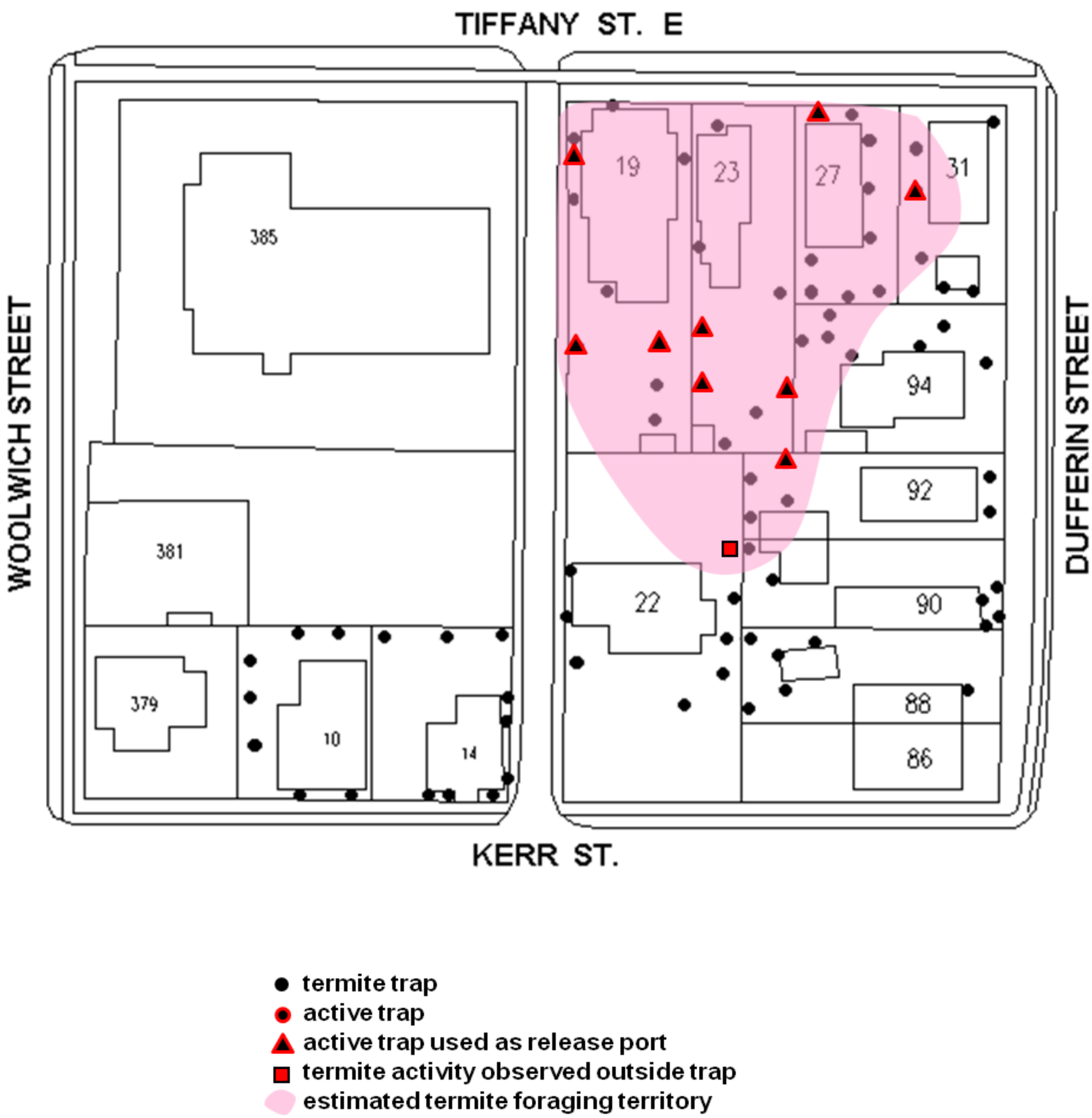

Figure 17. Trap activity in sector 20 in 2011.

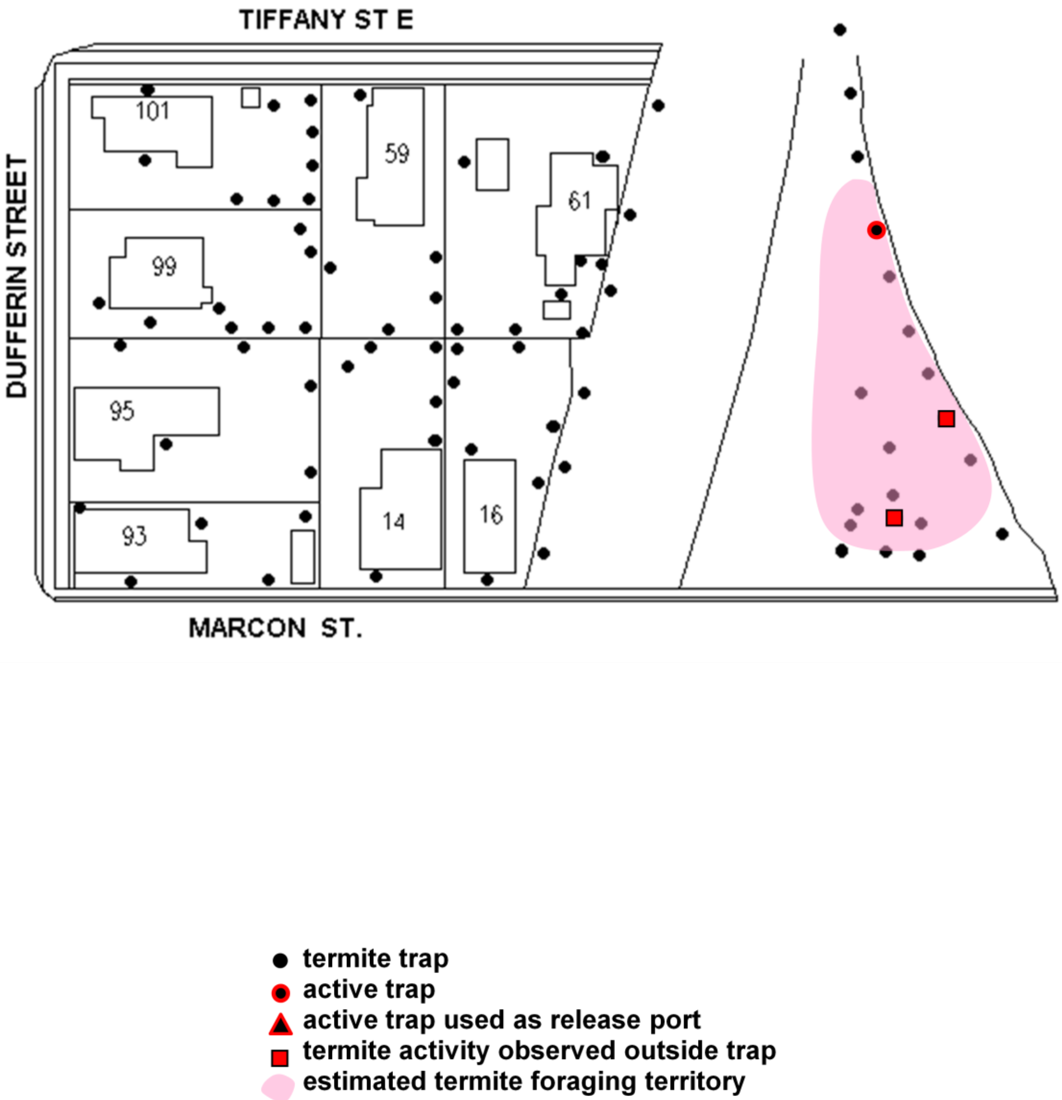

Figure 18. Trap activity in sector 21 in 2011.

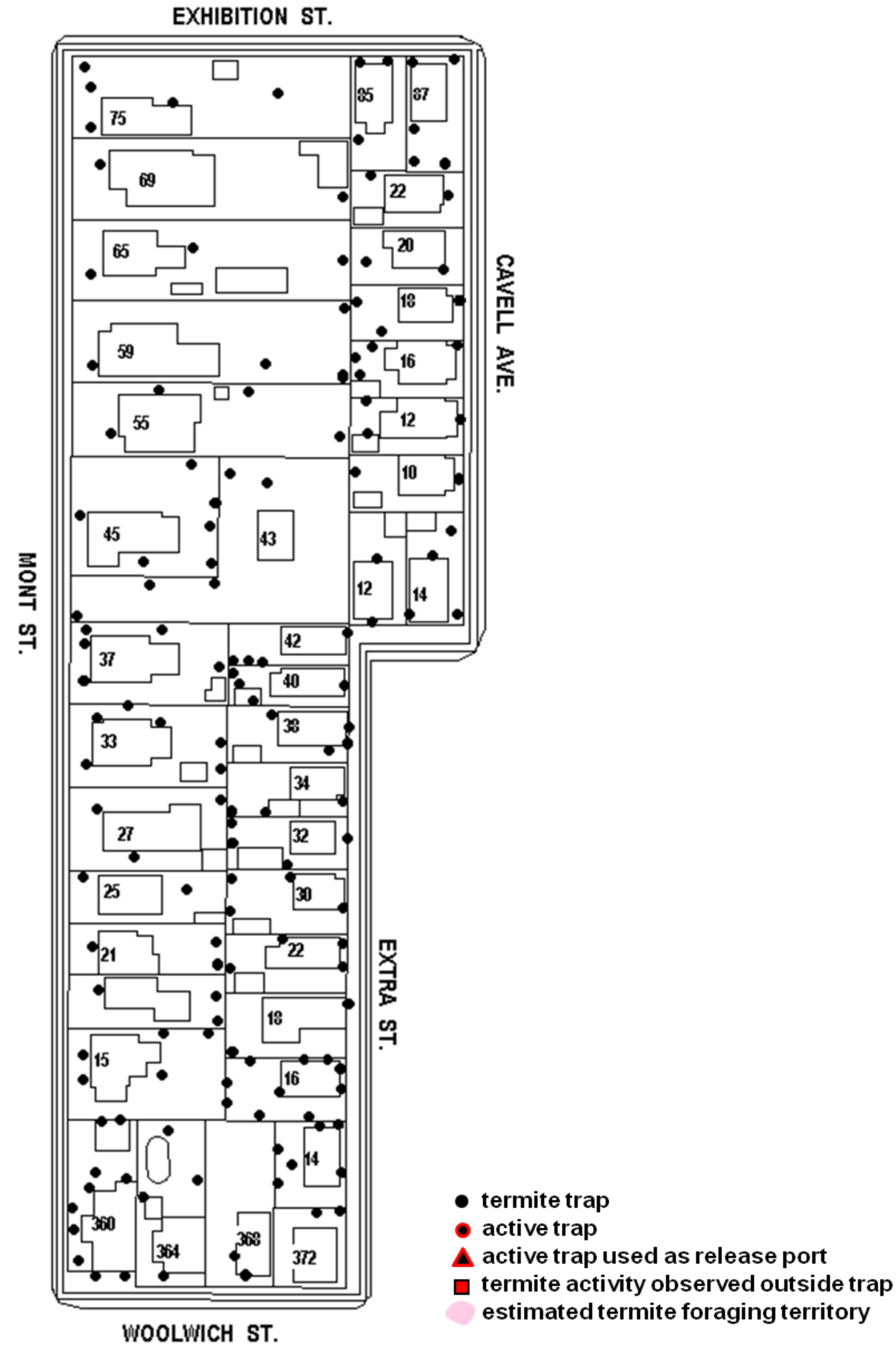

Figure 19. Trap activity in sector 22 in 2011.

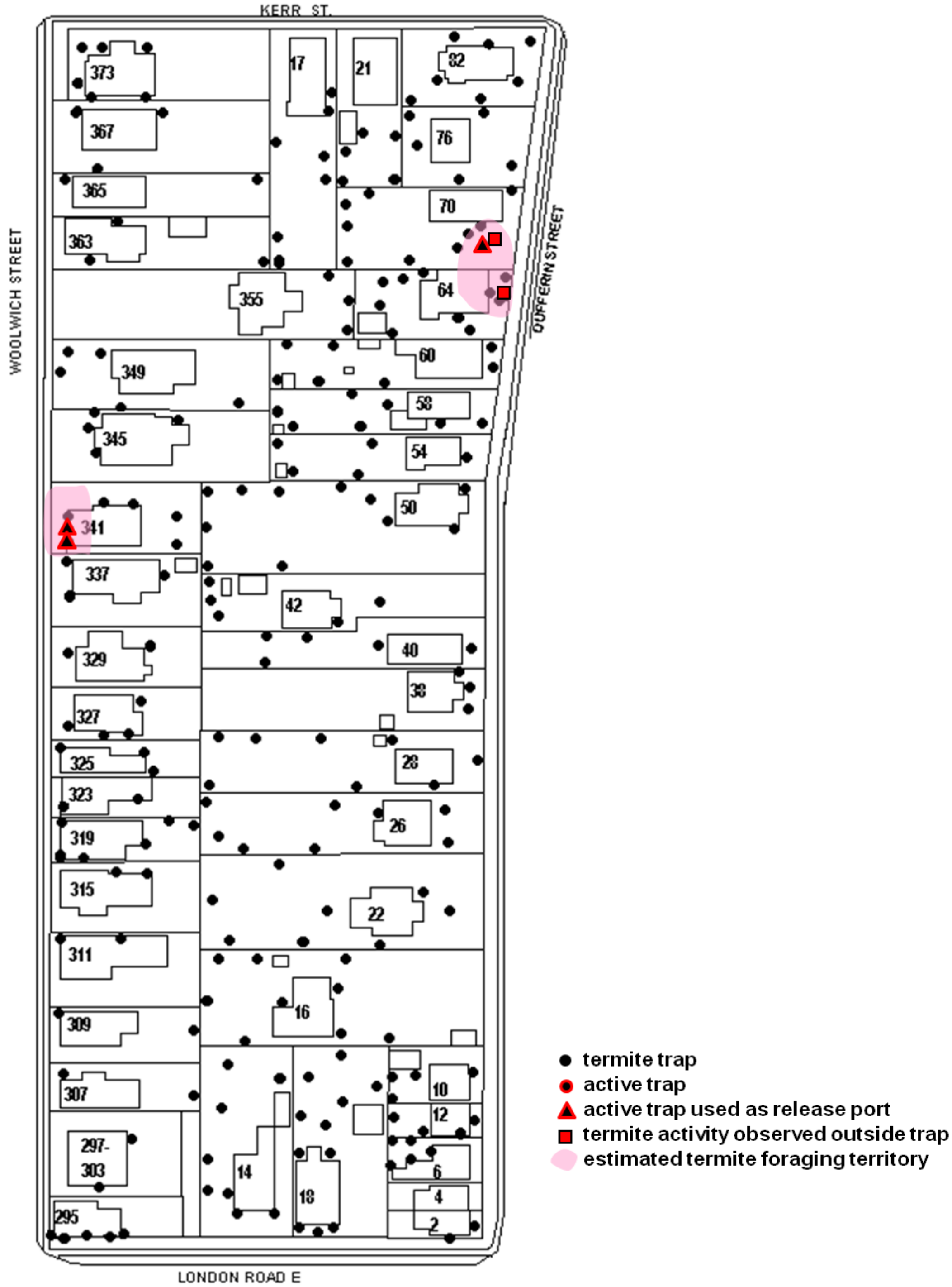

Figure 20. Trap activity in sector 23 in 2011.

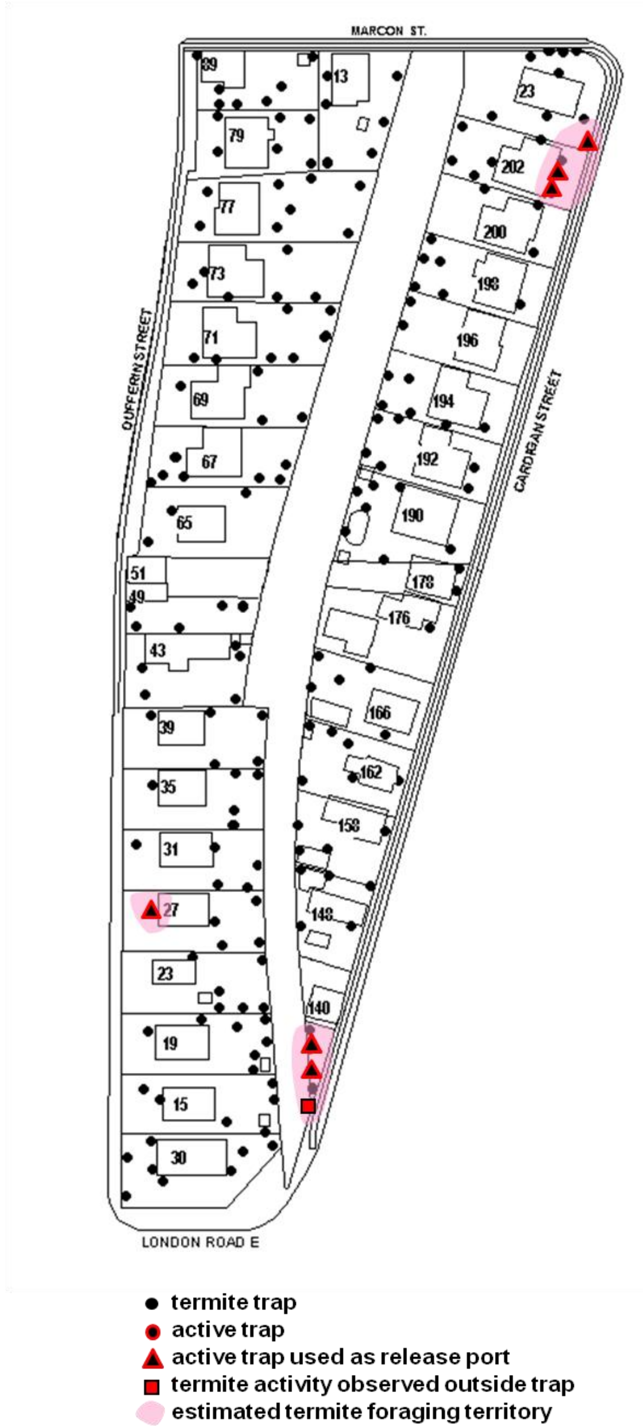

Figure 21. Trap activity in sector 24 in 2011.

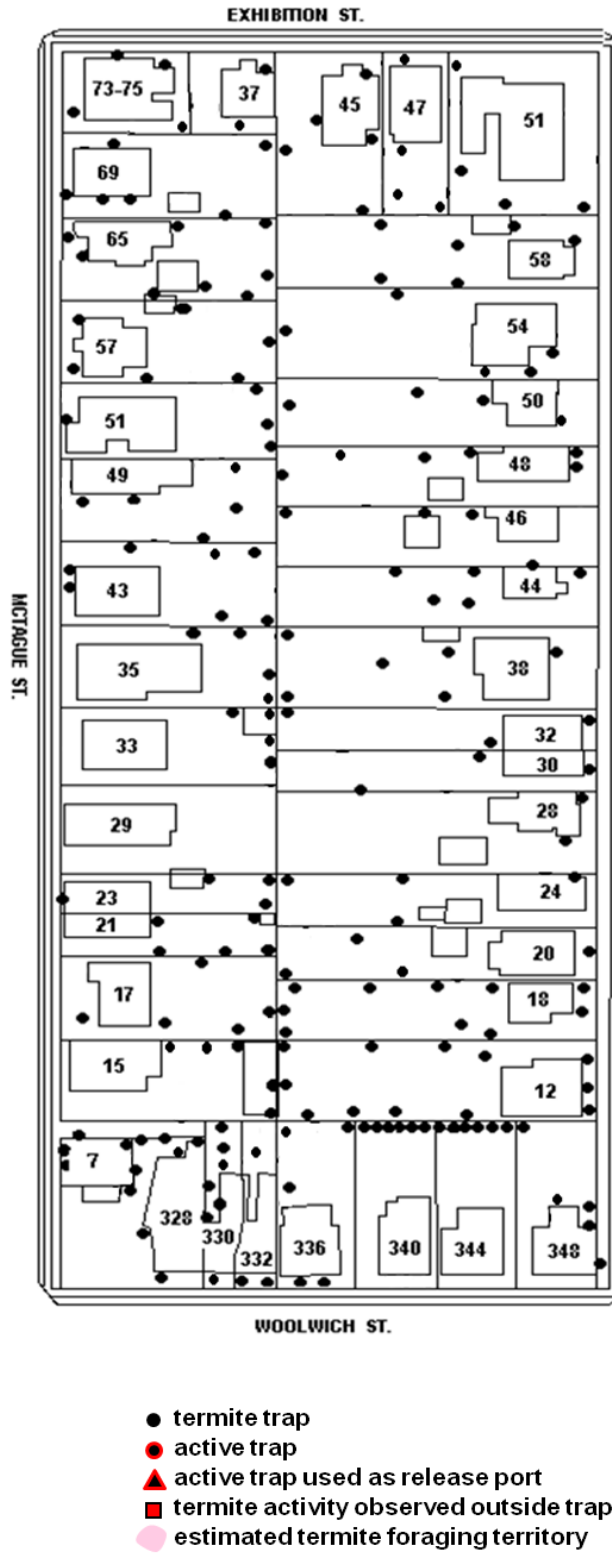

Figure 22. Trap activity in sector 25 in 2011.

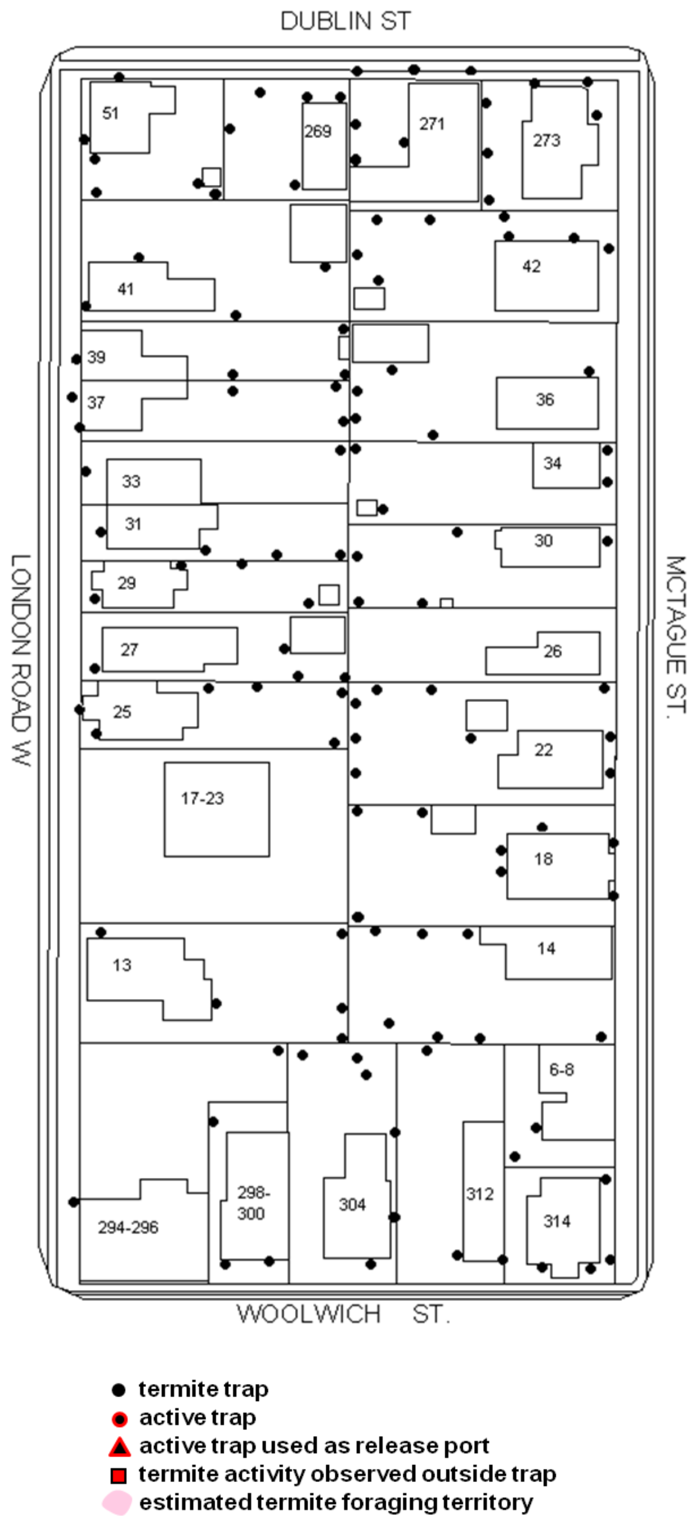

Figure 23. Trap activity in sector 27 in 2011.

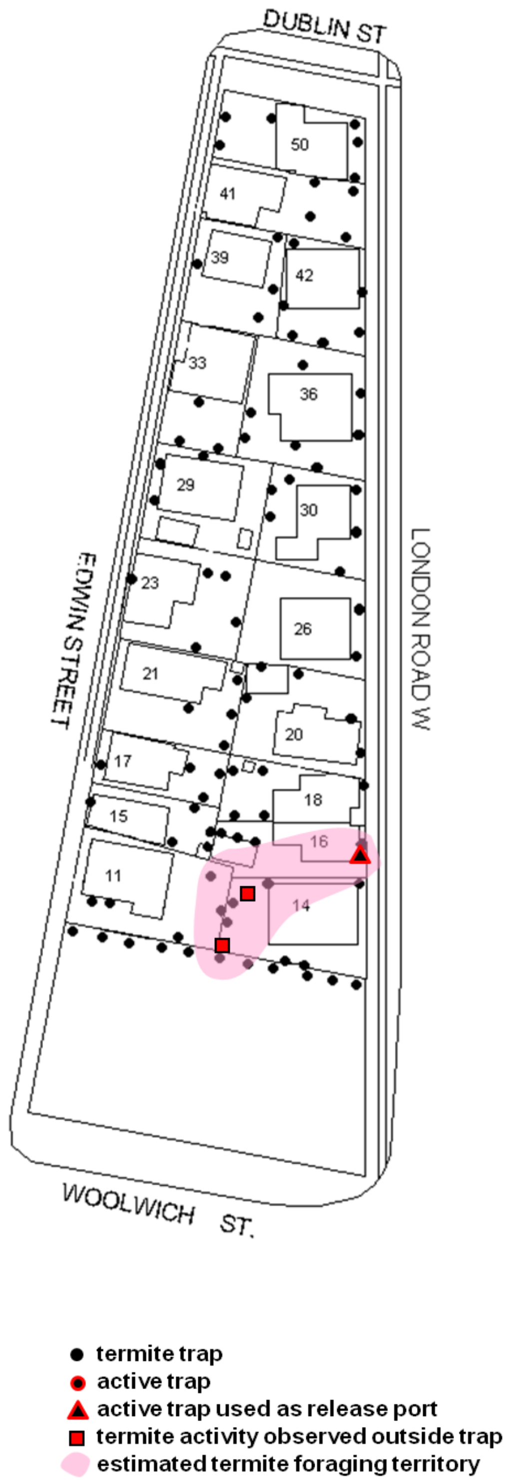

Figure 24. Trap activity in sector 30 in 2011.

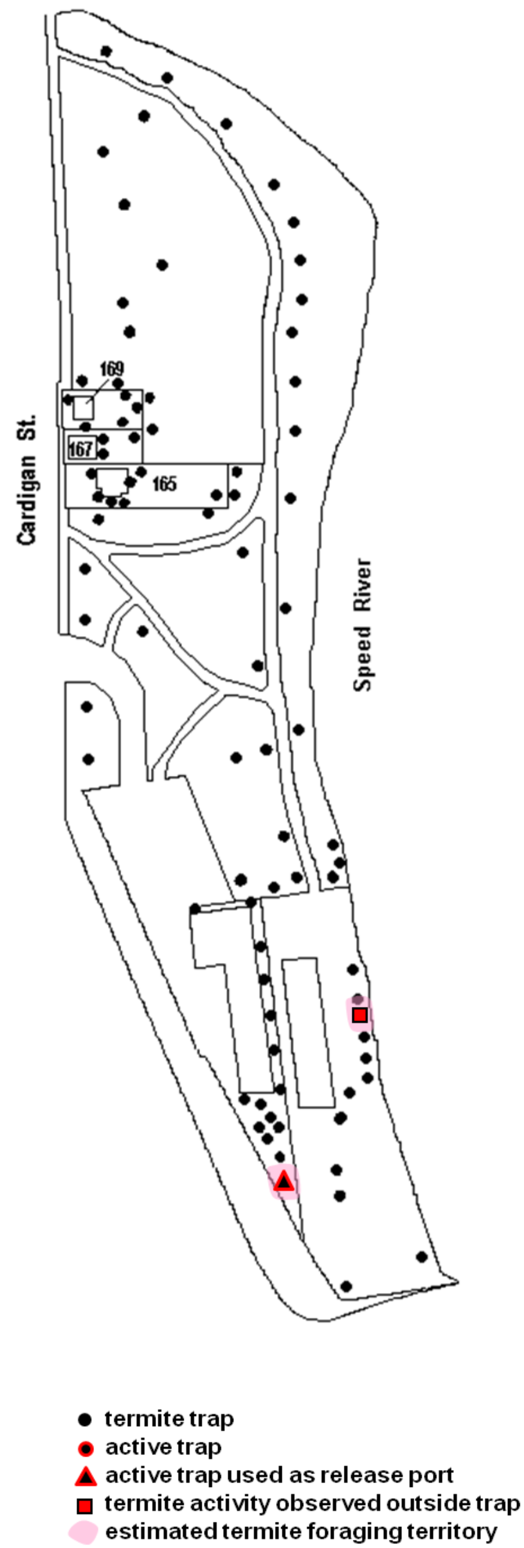

Figure 25. Trap activity in sector 36 in 2011.

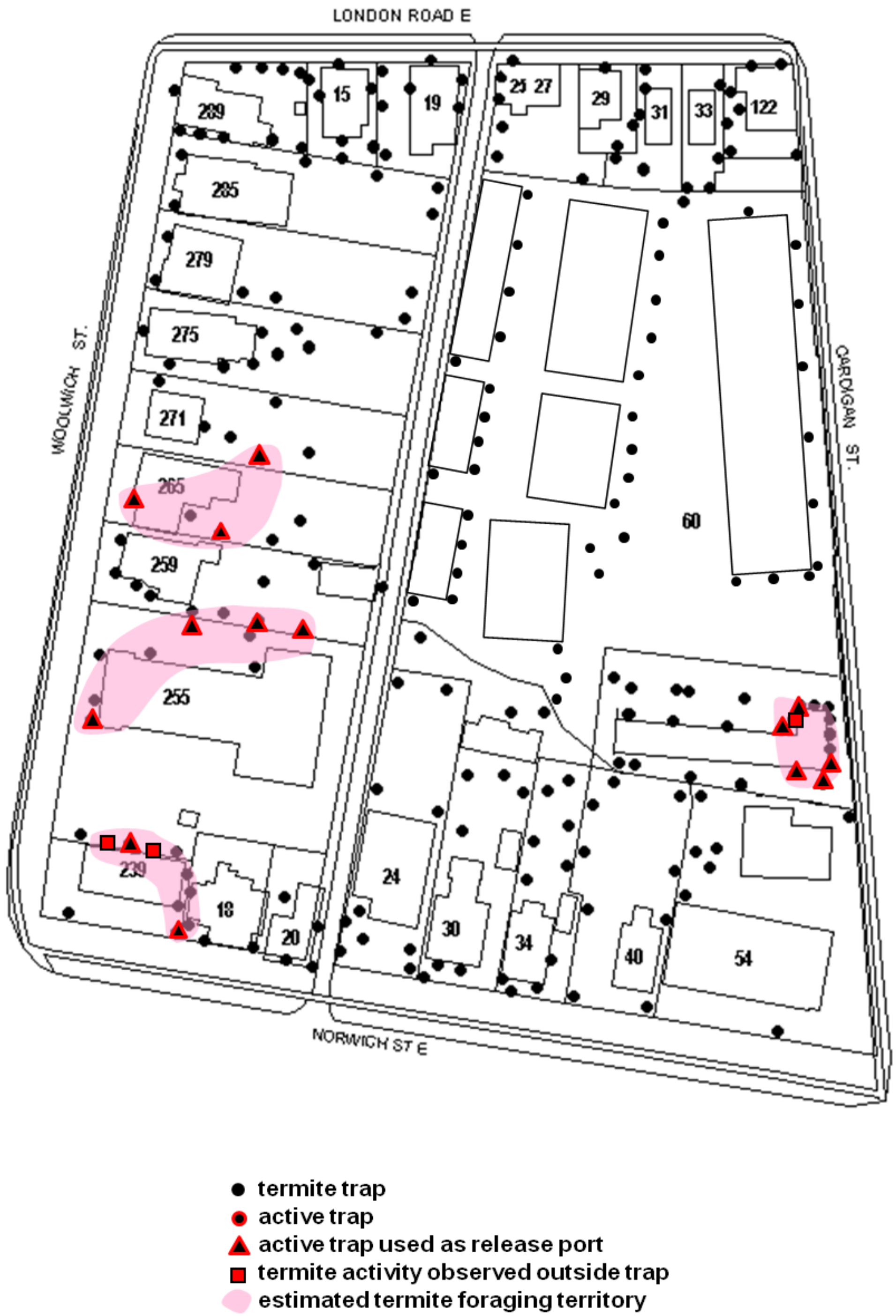

Figure 26. Trap activity in sector 37 in 2011.

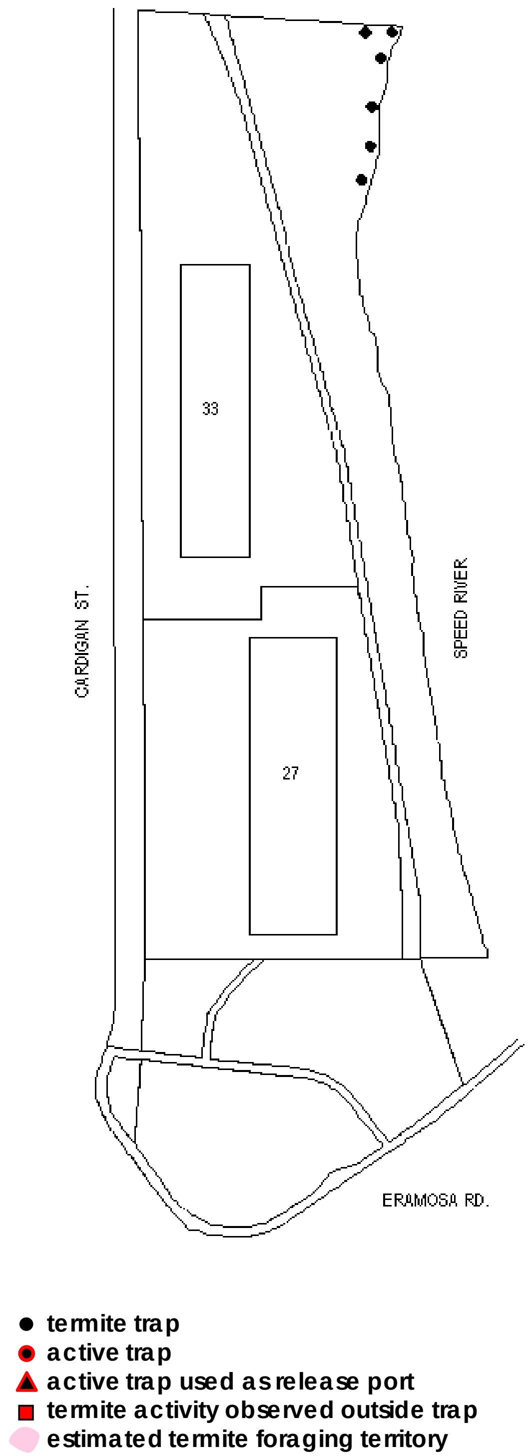

Figure 27. Trap activity in sector 41 in 2011.

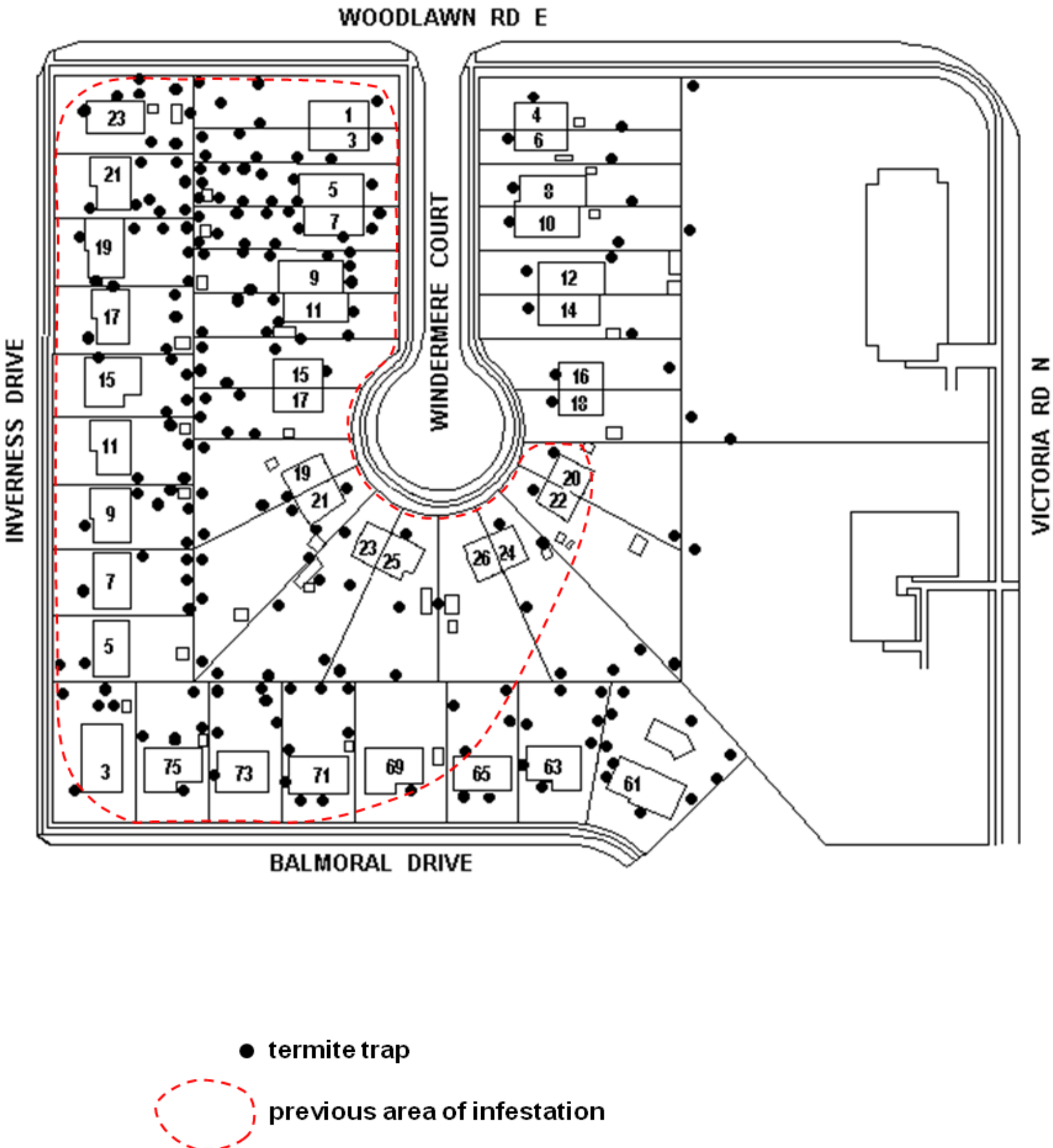

Figure 28. Trap activity in sector 42 in 2011.

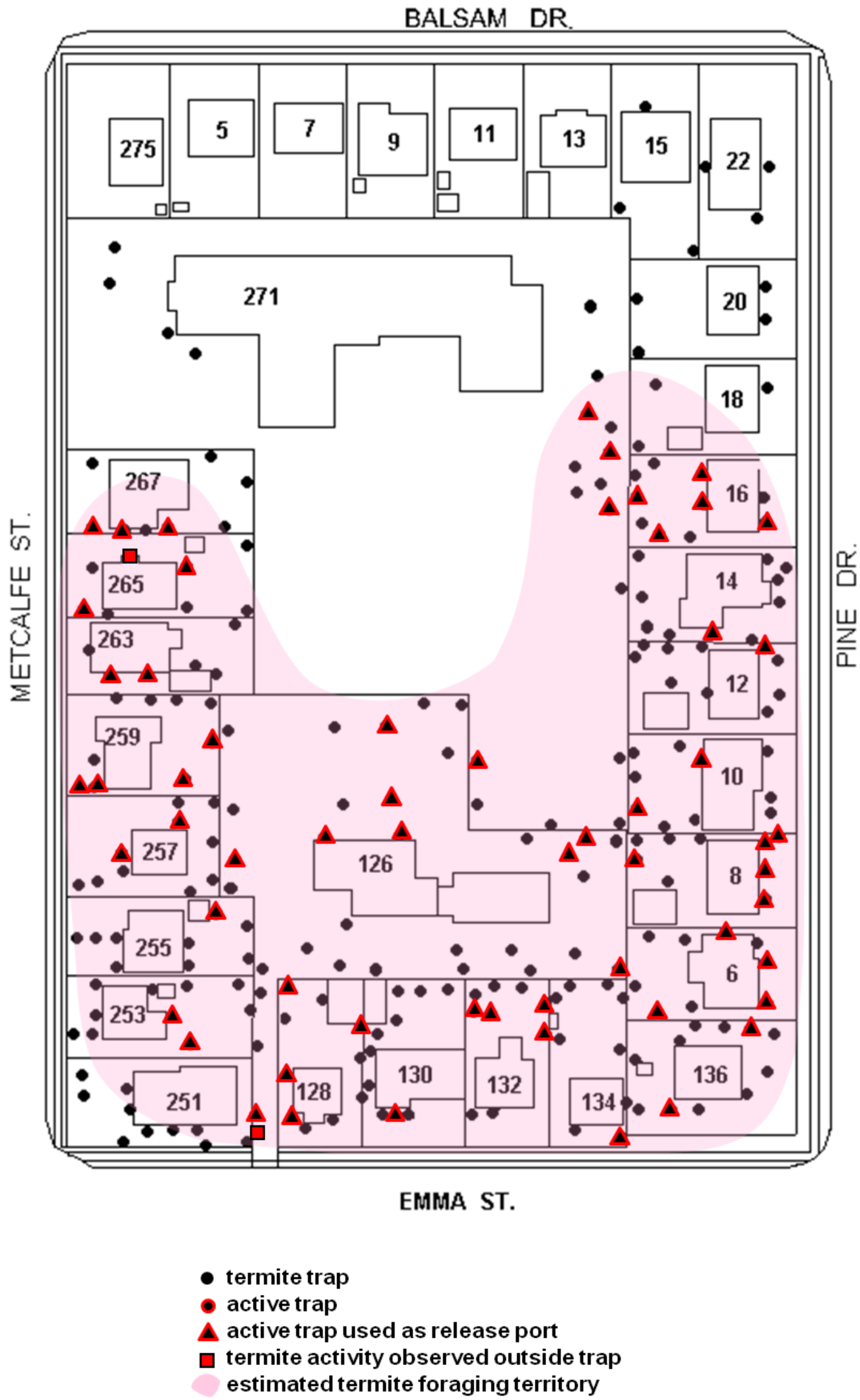

Figure 29. Trap activity in sector 47 in 2011.

Appendix 1.

Guelph Mercury wednesday

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Gains made in termite war

Far fewer properties in Guelph dealing with wood munchers than in the past

Scott Tracey, Mercury staff

GUELPH — The bad news is the mild winter and early arrival of summerlike weather will likely see termites becoming active earlier than before.

The good news is it appears there are far fewer properties in Guelph wrestling with the little wood munchers than has been the case in many years.

Dr. Tim Myles, the city's termite control officer, told the civic planning and building, engineering and environment committee this week the unusual weather can only been good for termites, as it is for any insects. "I would of course always prefer an extremely harsh winter because it can only be bad for them, and a mild winter can only be good," he told the committee, adding termites have likely already begun foraging.

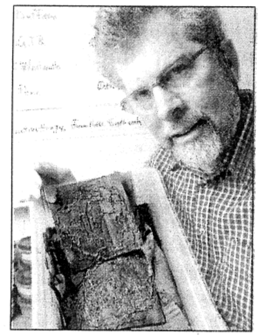
"I wouldn't be surprised if they're already popping up on a day like this," Myles said outside the meeting. But he added if it is a hot and dry summer "that won't be good for them.

"They're like us," he explained. "They like mild temperatures and they don't do very well with extremes one way or the other."

Myles told the committee the amount of termite activity in Guelph dropped more than 26 per cent last year over 2010.

"That's not as great as I'd hoped," he said in an interview, suggesting in-season testing had suggested a decrease of as much as 60 per cent could be possible, "but I'll take it."

➤ SEE TERMITES ON PAGE A5



MERCURY FILE PHOTO

Termite control officer Tim Myles.

Biggest surprise in Windemere area

➤ TERMITES FROM PAGE A1

There are three "termite management areas" in the city: Along Woolwich and Dufferin streets north of Norwich Street; in the Emma Street and Pine Drive neighbourhood; and along Windermere Court.

Myles said while there was a reduction last year in the size of the Woolwich zone, there was a slight increase in the number of properties in the Emma/Pine area with active termite infestations.

The biggest surprise, Myles said, was in the Windermere area where there was "complete inactivity" in all of the 259 traps last year.

Staff will keep an eye on the neighbourhood for one more year and, if there are still no termites detected, will declare it inactive next year.

stracey@guelphmercury.com

Appendix 2.

Laboratory Evaluation of Zinc Borate, Disodium Octaborate Tetrahydrate, and Sodium Fluoride in Resinous Formulations at Various Ratios of Treated to Untreated Termites

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Abstract A laboratory test was conducted to evaluate the kill ratios of three compounds: zinc borate, disodium octaborate tetrahydrate (DOT), and sodium fluoride, when applied to termites as resinous formulations, followed by release of treated termites among untreated termites. The highest kill ratio was obtained with zinc borate which registered a maximum kill ratio of 1:35 (one treated termite killed 35 untreated termites). Disodium octaborate tetrahydrate registered a maximum kill ratio of 1:10, and sodium fluoride registered a maximum kill ratio of 1:6.

Introduction In an ongoing effort to evaluate potential actives for area-wide control of the eastern subterranean termite *Reticulitermes flavipes*, three actives were tested each at four different ratios of treated to untreated termites: 10:100, 5:100, 2:100, and 1:100.

Materials and Methods The three test compounds were zinc borate, disodium octaborate tetrahydrate (DOT), and sodium fluoride. Talcum powder served as an inert treatment control. And there was also an untreated control group. All compounds were applied to termites in a resinous formulation in which the resin to active was 1 part to 6 parts. Absolute ethanol made up 59% and Phthalo Green dye #7 made up 1% of the final formulation. The formulation was applied to the termites with a foam rubber applicator. The formulation was allowed to completely dry on the treated termites for 5 minutes and then the treated termites were introduced by forceps into groups of 100 untreated termites. Each replicate had 100 treated termites held in a 9 cm plastic petri dish with one water saturated disc of filter paper, and the specified number of treated termites at the following ratios, treated to untreated: 10:100, 5:100, 2:100, and 1:100. Each dish was sealed with Parawax and all dishes held in a plastic sweater box at 95% RH at room temperature. There were three replicates for each compound and control at each treatment ratio. Termite mortality was counted about every 4 days. The test ran for 33 days.

Results See Figures 1-4.

Conclusion The highest kill ratio was obtained with zinc borate which registered a maximum kill ratio of 1:35 (one treated termite killed 35 untreated termites). Disodium octaborate tetrahydrate registered a maximum kill ratio of 1:10, and sodium fluoride registered a maximum kill ratio of 1:6. The mortality curves are shown in Figs. 1-4.

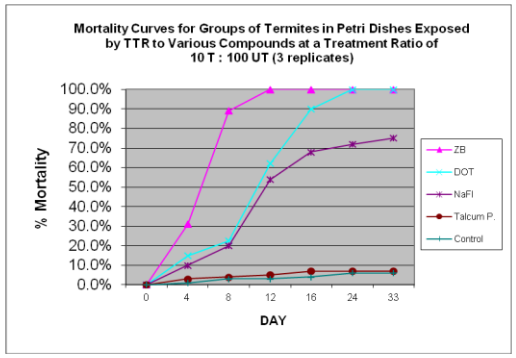

Fig. 1. 10 treated to 100 untreated termites.

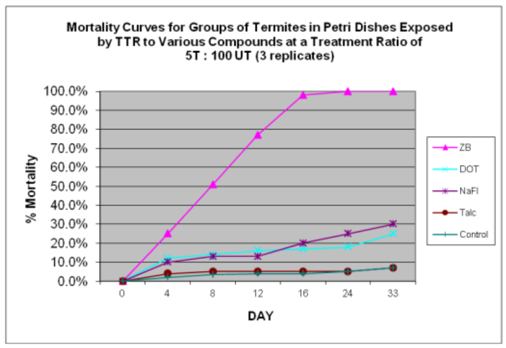

Fig. 2. 5 treated to 100 untreated termites.

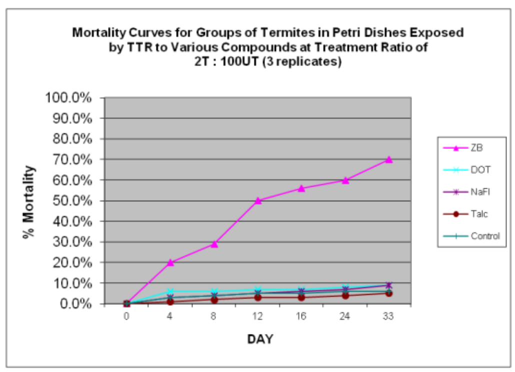

Fig. 3. 2 treated to 100 untreated termites.

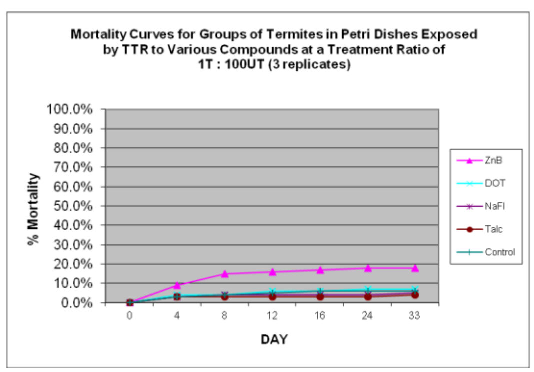

Fig 4. 1 treated to 100 untreated termites.

Appendix 3

Laboratory Evaluation of Three Species of the Bio-control Fungus *Metarhizium* at Various Ratios of Treated to Untreated Termites

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Abstract Three species of the entomopathogenic fungus *Metarhizium* spp. were tested to evaluate their potential to induce transmissible mortality when groups of the eastern subterranean termite were exposed at different ratios of treated to untreated termites. The species tested were *M. flavoviride*, *M. brunneum*, and *M. robertsii*, all from Canadian source isolates. The treatment consisted of rolling the termites in *Metarhizium* conidia dust. The conidia-dusted termites were then introduced into groups of 100 untreated termites at the following ratios: 0T: 100UT (control), 1T: 100UT, 2T: 100UT, and 4T: 100UT (where T = treated and UT = untreated). All three species caused high mortality at all treatment ratios within one week. *Metarhizium flavoviride* caused the most rapid mortality, followed by *M. brunneum* and lastly *M. robertsii.* This test confirms the bio-control potential of *Metarhizium* spp. for termite control.

Introduction In an ongoing effort to identify least-toxic, potential control agents for area-wide control of the eastern subterranean termite, *Reticultiermes flavipes*, laboratory tests were conducted to evaluate three locally occuring species of the entomopathogenic fungus, *Metarhizium*, the causal agent of green muscardine disease in insects.

Materials and Methods Two species of *Metarhizium* were obtained from termite cultures in the City of Guelph (*M. flavoviride* and *M. robertsii*). A third species, *M. brunneum*, was obtained from an isolate collected near Guelph, using wax moth larvae (*Galleria* sp.) for field baiting from Professor Michael Bidochka of Brock University, St. Catharines, Ontario. All three species were maintained on lab cultures on Potato Dextrose Agar. Two month old culture plates were used as sources of conidia for the tests. The culture plates were inverted and tapped with forceps to dislodge the conidia into a glass petri dish. The fresh conidia were then immediately used to dust the treatment termites. The termites were dusted by introducing them into the petri dish and swirling them in the conidial dust for one minute until fully coated. The conidia-dusted termites were then picked up with forceps and dropped one at a time into dishes holding 100 untreated termites on water-saturated filter paper. The conidia-dusted termites were introduced into groups of 100 untreated termites at the following ratios: 0T: 100UT (control), 1T: 100UT, 2T: 100UT, and 4T: 100UT (where T = treated and UT = untreated). There was only one replicate per species and ratio. After the specified number of treated termites were introduced, the dishes were sealed with Parafilm wax, and all dishes were placed in a closed plastic box at 95% RH at room temperature.

Results In all cases, with all three species of *Metarhizium*, it was observed that the conidia-dusted termites elicited grooming, alarm, and aggregation around the dusted termites, biting, and sometimes dismemberment, as has been previously reported (Myles, 2002). Grooming was very intense and within12 hours all dusted individuals were groomed clean. Most, if not all treated individuals, were killed and cannibalized. A dark area was visible in the crops and/or anus of untreated termites marking the conidia in the guts within 12 hours indicating that a high percentage of the untreated termites obtained conidia in their guts either by grooming, cannibalism, or trophallaxis.

Metarhizium flavoviride was the dustiest (most powdery) and coated the termites best. *Metarhizium robertsii* was the least powdery, and tended to remain somewhat in clumps, thus the dusted termites were only slightly darkened by the dusty powder. Whereas *M. flavoviride* and *M. brunneum* dusted termites took on the color of the respective conidia, green or brown.

Mortality curves for the three *Metarhizium* species are shown in Figs. 1-3.

Conclusions All three species caused high mortality at all treatment ratios within one week. *Metarhizium flavoviride* caused the most rapid mortality, followed by *M. brunneum* and lastly *M. robertsii*. This test confirms the high kill ratio potential of *Metarhizium* spp. for termite control. *Metarhizium* species are common locally occurring soil fungi that show great potential as natural bio-control agents. It would appear that when used in a trap-treat-release approach in which a small fraction (l% or less) of the target termite population is trapped and dusted with conidia, the released termites could cause high levels of mortality. Approval for field testing is urgently needed to confirm this potential advantage over the currently approved chemical treatment methods that use large amounts of chemicals in close proximity to human habitations, only to block termite access to structures without causing any significant colony level mortality.

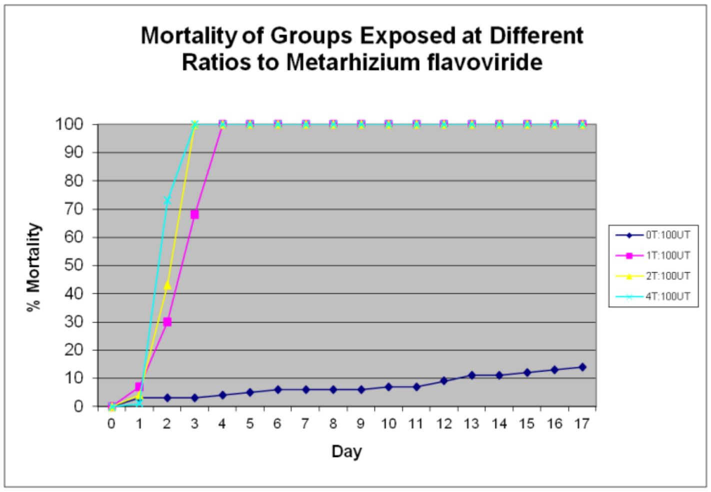

Figure 1. Mortality following conidia dusting with *M. flavoviride*.

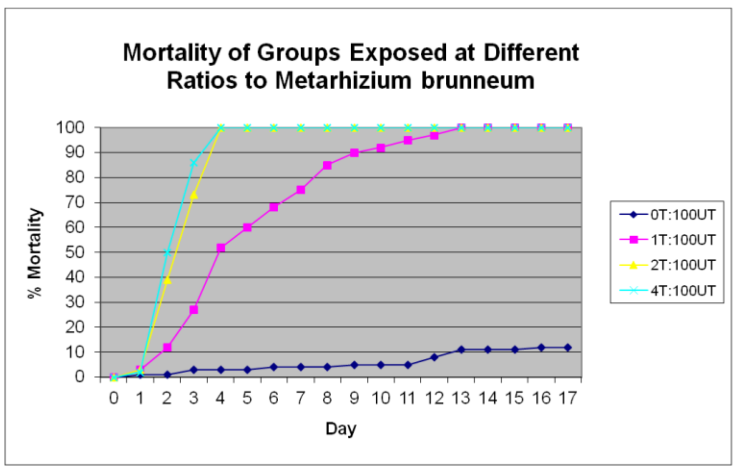

Figure 2. Mortality following conidia dusting with *M. brunneum*.

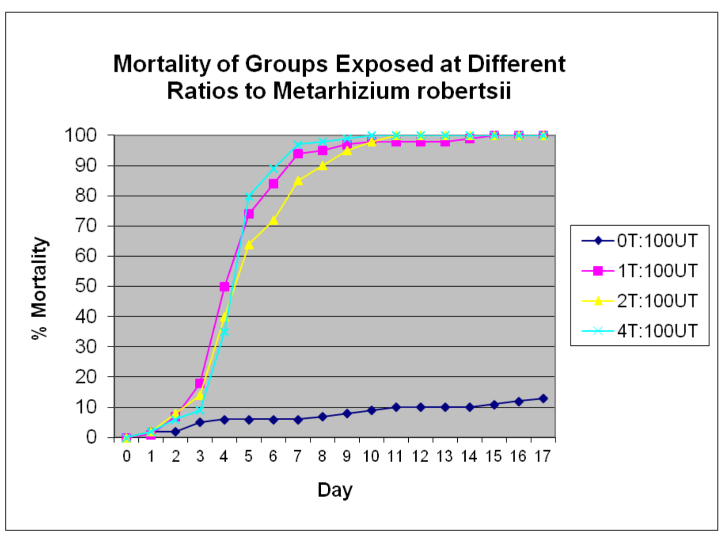

Figure 3. Mortality following conidia dusting with *M. robertsii.*

Appendix 4.

Laboratory Evaluation of *Metarhizium flavoviride* Conidia in a Dust Dilution Series at Various Ratios of Treated to Untreated Termites

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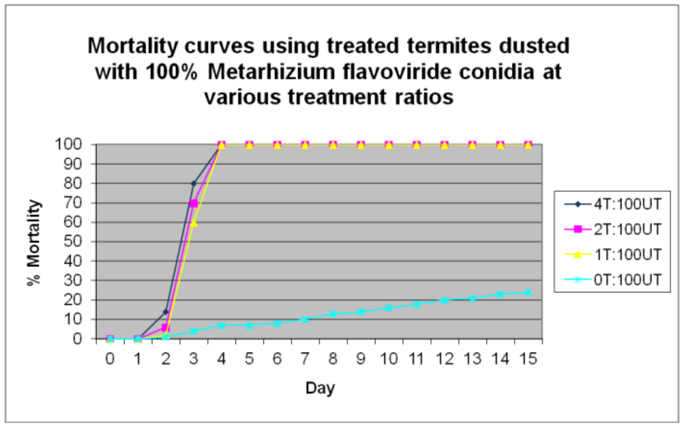
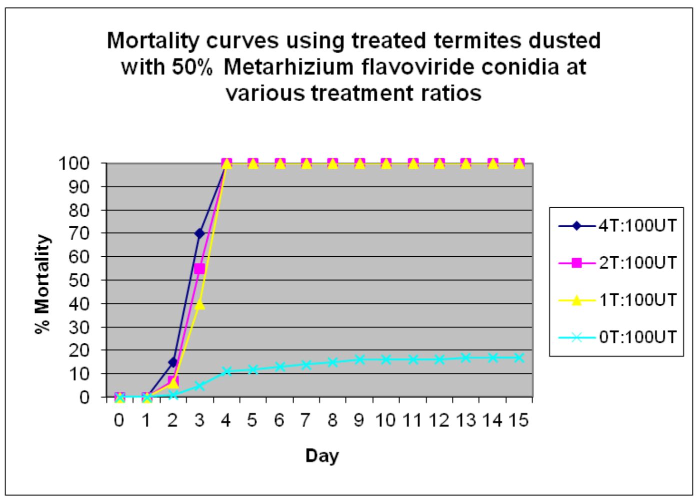
Abstract Conidia of the entomopathogenic fungus, *Metarhizium flavoviride* were mixed with talcum powder to give the following formulations: 100% (pure conidia), 50% (1 part conidia to 1 part talcum powder), 25% (1 part conidia to 3 parts talcum powder), 12.5% (1 part conidia to 7 parts talcum powder), and 6.25% (1 part conidia to 15 parts talcum powder). Eastern subterranean termites, *Reticulitermes flavipes*, were then dusting with each of these formulations and the dusted termites were then introduced into groups of 100 untreated termites in petri dishes at the following ratios: 0T:100UT (control), 1T:100UT, 2T:100UT, and 4T:100UT. Mortality was recorded daily for 15 days. For the 100%, 50%, and 25% formulations at all treatment ratios mortality curves were similar with a one day lag followed by up to 20% mortality on the second day, 30-80% mortality on the third day and greater than 90% mortality on the fourth day However with the 12.5% and 6.25% dilutions, mortality curves lengthened as the treatment ratio declined. This suggests that dust dilution of conidia serves to lengthen the lag period and the rate of mortality, thus providing more time for treated termites to interact with untreated termites and thus optimizing transmission from treated to untreated termites. The optimum dust dilution may be about 5% or even lower.

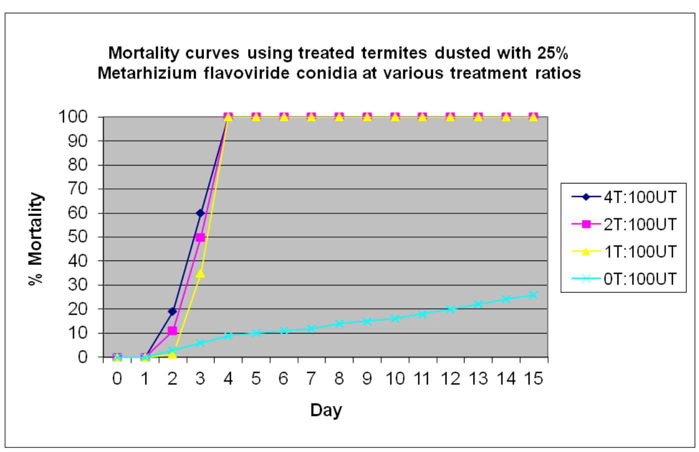
Introduction In an ongoing effort to evaluate and refine the use of the entomopathogenic fungus *Metarhizium flavoviride* for termite control, a dust dilution series was set up to evaluate the effect of reducing the conidial load on the treated termites.

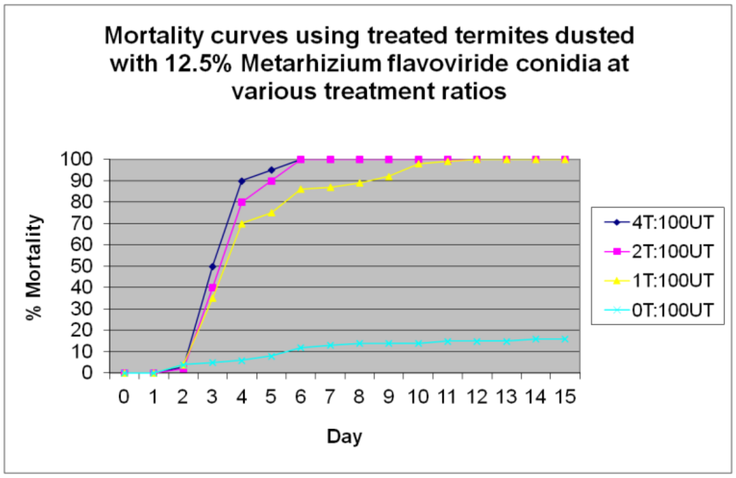
Materials and Methods Conidia of the entomopathogenic fungus, *Metarhizium flavoviride* were mixed with talcum powder to give the following formulations: 100% (pure conidia), 50% (1 part conidia to 1 part talcum powder), 25% (1 part conidia to 3 parts talcum powder), 12.5% (1 part conidia to 7 parts talcum powder), and 6.25% (1 part conidia to 15 parts talcum powder). Eastern subterranean termites, *Reticulitermes flavipes*, were then dusting with each of these formulations and the dusted termites were then introduced into groups of 100 untreated termites in petri dishes at the following ratios: 0T:100UT (control), 1T:100UT, 2T:100UT, and 4T:100UT. Mortality was recorded daily for 15 days.

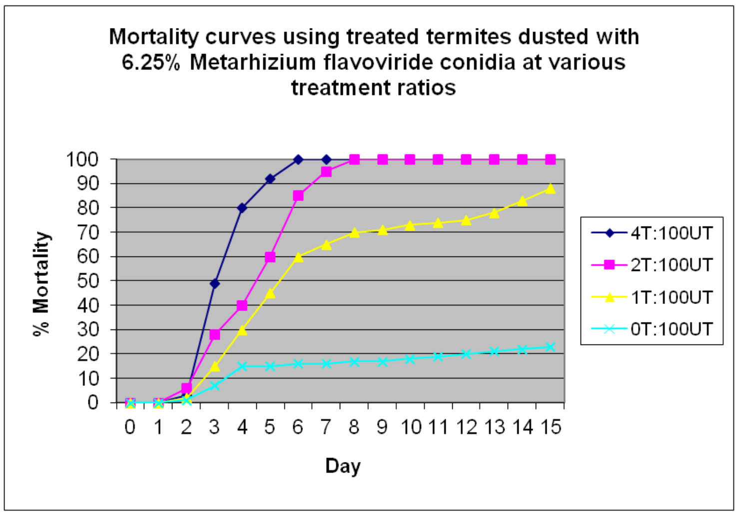
Results Mortality was recorded daily for 15 days. For the 100%, 50%, and 25% formulations at all treatment ratios mortality curves were similar with a one day lag followed by up to 20% mortality on the second day, 30-80% mortality on the third day and greater than 90% mortality on the fourth day However with the 12.5% and 6.25% dilutions, mortality curves lengthened as the treatment ratio declined. See Figures 1-5.











Conclusions The results suggests that dust dilution of conidia serves to lengthen the lag period and moderate the rate of mortality, thus providing more time for treated termites to interact with untreated termites and thus optimizing transmission from treated to untreated termites. The optimum dust dilution may be about 5% or even lower.

Appendix 5.

Laboratory Evaluation of *Metarhizium flavoviride* Conidia in a 5% Dust Formulation for Termite Control

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Abstract Eastern subterranean termites, *Reticulitermes flavipes,* were treated by dusting with a formulation consisting of 5% conidia of the entomopathogenic fungus *Metarhizium flavoviride* and 95% talcum powder, and then introduced into groups of untreated termites in soil cups. The tested ratios of treated to untreated termites were 0T:500UT (control), 10T:500UT, 20T:500UT, 30T:500UT, 50T:500UT, 100T:500UT where T=treated, and UT = untreated. All termites in treatment groups were dead after one week, indicating a potential control ratio of 1:50 in a soil environment. However, mortality in the control was also unusually high at 50% indicating inadvertent exposure and/or an unhealthy test population. The experiment should be repeated with a healthy field fresh termite population.

Appendix 6.

Laboratory Evaluations of N'N-naphthaloyl Hydroxyl Amine (NHA) for Termite Control

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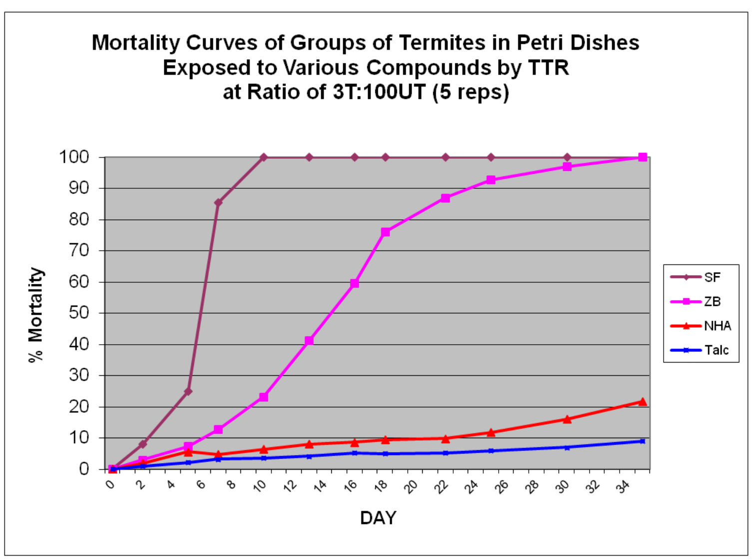
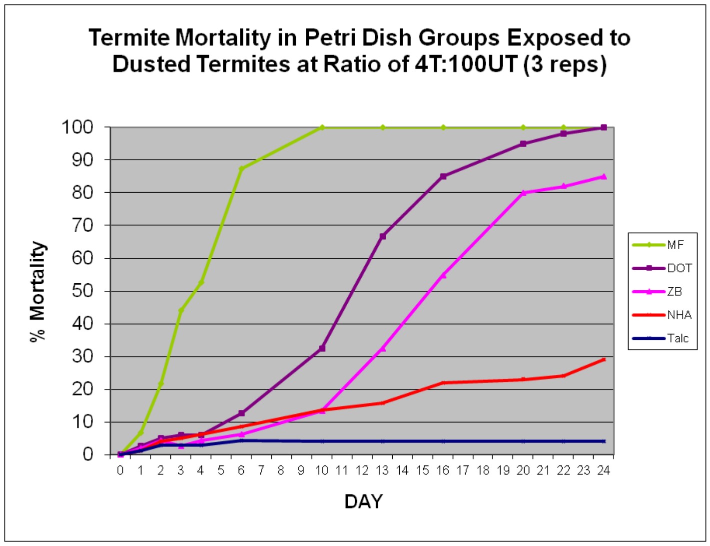
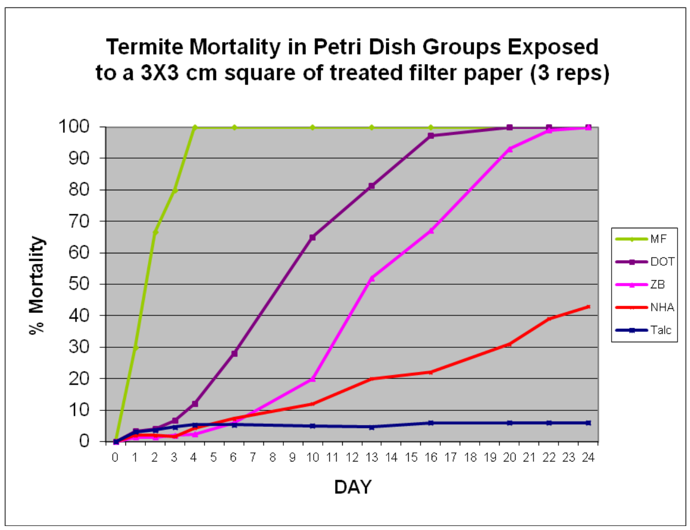
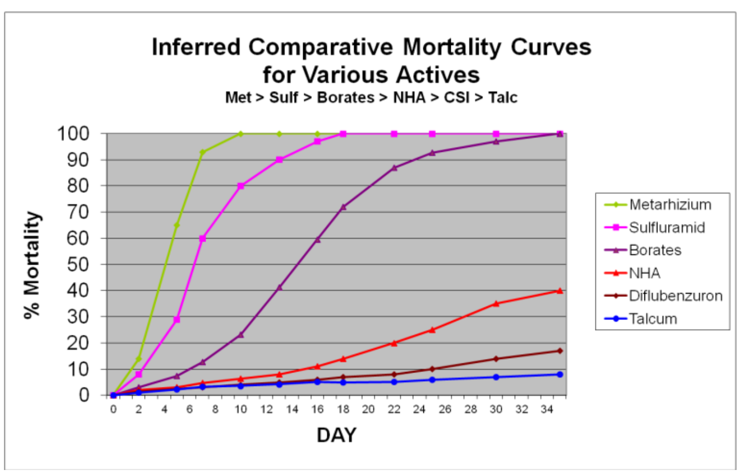
Abstract N'N-napththaloyl hydroxyl amine (NHA) has shown some promise in termite baiting projects recently conducted by USDA researchers at various sites in southern Wisconsin. It was therefore of interest to obtain a sample and compare it with zinc borate as currently being field tested in Guelph, Ontario. In the first test NHA was made up in a resin formulation and compared to sulfluramid and zinc borate at a ratio of 3 treated to 100 untreated termites. In a second test NHA was used as a dust applied to termites at a ratio of 4 treated to 100 untreated, and as a bait toxicant applied to filter paper. In the second test, NHA was compared with parallel tests of zinc borate, disodium octaborate tetrahydrate and *Metarhizium flavoviride* conidia. NHA was slower acting than *Metarhizium* and borates but faster acting than diflubenzuron (based on earlier tests). NHA is a moderately effective active when used as either a dust or bait toxicant for termite control. (see figures below).




Termite Mortality in Petri Dish Groups Exposed to Dusted Termites at Ratio of 4T:100UT (3 reps)
% Mortality
DAY
MF
DOT
ZB
NHA
Talc


Termite Mortality in Petri Dish Groups Exposed to a 3X3 cm square of treated filter paper (3 reps)
% Mortality
DAY
MF
DOT
ZB
NHA
Talc


Inferred Comparative Mortality Curves for Various Actives
Met > Sulf > Borates > NHA > CSI > Talc
% Mortality
DAY
Metarhizium
Sulfluramid
Borates
NHA
Diflubenzuron
Talcum

Appendix 7.

Laboratory Evaluation of Lead as a Potential Termite Bait Toxicant

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Abstract A one-month lab test of lead applied to filter paper showed no significant effect on termite mortality.

Introduction Lead in small doses is known to have certain slow-acting toxic effects on mammals. It was therefore of interest to evaluate lead as a potential bait toxicant for termite control.

Materials and Methods VWR filter paper discs were covered on one side with lead by scratching in pencil-like fashion using a South Bend brand lead casting sinker (10.5 g). The filter paper discs were saturated in water and placed on the bottom of 9 cm diameter Falcon brand plastic petri dishes. One gram of termites (ca. 345 termites) was placed in each replicate. The dishes were sealed with ParaFilm wax. There were three replicates of the treatment and control. Termite mortality was checked every two or three days for 30 days.

Results The lead treated filter paper was observed to be fed upon, and passed through the termite gut. Lead coloured fecal material was observed. No quantitative difference was noticed in the amount of filter paper consumed between the treated and untreated filter paper. After 30 days the treatments showed an average of 4.92% mortality and the controls showed an average of 4.06% mortality.

Conclusion It was concluded that lead does not show good potential as a termite bait toxicant.