Tree inspection and control of infestations of Oak Processionary Moth *Thaumetopoea processionea* (Linnaeus) (Lepidoptera: Thaumetopoeidae) (OPM) in the UK in 2010

Client: Plant Health Service, Forestry Commission

February 2011

Ralph Parks Ltd
Plant Health Inspector, Forestry Commission
Longcross House
Shaftesbury
Dorset
SP7 8QP
ralph@ralphparks.co.uk

Martin Townsend
Consultant Ecologist
26 Bartholomew Road
Oxford
OX4 3QQ
martin.townsend4@ntlworld.com

CONTENTS

Tables:

Figures:

Appendices:

EXECUTIVE SUMMARY

I) The campaign to control and eradicate Oak Processionary Moth in the UK in 2010 is described. This is a continuation of work carried out in 2007, 2008 and 2009.

II) A team of Plant Health Inspectors (Forestry) surveyed and served Statutory Notices under the Plant Health Order (2005) to owners of infested sites, in the core area of Ealing, Brent, Richmond Upon Thames and Hounslow. Local authorities, rail companies and other landowners also initiated control measures.

III) A total of 2,117 OPM nests were recorded, in 804 trees, and a total of 74 Notices under the PHO were issued in London. A training course was run by FC inspectors for the London Tree Officers' Association, and staff and volunteers from Royal Parks and National Trust.

IV) The overall total and that for the individual boroughs are broadly similar to 2009. The figures tend to mask major successes at some sites and major increases and new infestations at others. For example in Richmond, overall there was a 45% decline, but two major sites showed reductions by a factor of 100. Richmond Park had the largest increase from 5 to 326 nests. This is partly explained by increased survey effort. Overall, the geographical distribution continues to slowly expand.

V) The infestation pattern in London is similar to that observed in previous years, with the greatest expansion from the original importation sites in the southwest quadrant. Two centres of infestation are still evident, the northern in Ealing and Brent being much smaller than the southern in Richmond and Ealing, but their patterns are similar. Reasons for the apparent pattern are unclear, but appear likely to be partly due to greater abundance and continuity of the foodplant in certain areas. Other factors such as prevailing

wind may be involved, but detailed spatial analysis would be needed to establish their relative importance.

VI) Reports received of OPM outside the main area were investigated and the PHO used where necessary. A new outbreak was discovered in Pangbourne, Berkshire, in October 2010 by an arborist contractor, having resulted from the importation of an infested tree in 2008. A total of 45 nests, in 7 trees, have been found associated with this importation, and 5 Notices under the PHO issued. An infested tree (1 nest) was discovered in Sheffield by local Tree Officers. Surveys at the infested area in Leeds (discovered previously) have proved negative.

VII) As in previous years, control by nest removal proved difficult to achieve due to a number of practical issues, and the necessity of using this method (due to timing) resulted in at least 300+ nests reaching maturity. However, if planned well and implemented by experienced operatives, removal has proved to be effective in reducing numbers.

VIII) Control by Bt or pesticides proved more effective than removal, and easier to plan and implement. Bt and Deltamethrin (pyrethroid) have been used, and both have proved highly effective. For Bt (specific to lepidopteran larvae), timing is crucial. Deltamethrin is broad-spectrum and more effective against larger larvae, but full consideration of its wider environmental effects is essential.

IX) Experts agree that now that the moth is established in the core area, eradication is no longer feasible. Management action will now concentrate on minimising the rate of spread from the known infested areas, and eradicating OPM from sites of new importations, where possible.

X) Reducing the rate of spread is partly dependant upon controlling numbers in the core area to prevent OPM reaching plague stage, during which dispersal is likely to be far greater than that which we have seen thus far.

Experience and knowledge gained over the past four years should enable councils, landowners and managers to control OPM populations, and reduce them to acceptable levels.

XI) Control by bio-agent or pesticide is generally more effective than control by removal of larval or pupal nests, due to a number of factors including timing, cost implications, practicalities and aspects of the life cycle of the moth. At the current population level and extent, with careful planning it should be possible to achieve control using a combination of methods (using guidance provided) and avoid large-scale, irreversible ecological damage. If OPM is allowed to become out of control, it seems likely that this would be far harder to achieve.

1. INTRODUCTION

1.1 Background

This report summarises the surveys for Oak Processionary moth, a quarantine pest as defined by the Plant Health (Forestry) Order 2005, carried out by Forestry Commission Plant Health Inspectors in 2010. This is a continuation of the work undertaken in 2007, 2008 and 2009. The results of previous surveys, the life cycle and arrival of the pest in London are documented by Townsend (2007, 2008) and Townsend and Parks (2009).

1.2 Remit

- Carry out Plant Health inspections in the London boroughs known to be affected, namely Brent, Ealing, Hammersmith & Fulham, Hounslow and Richmond Upon Thames.

- Carry out inspections in neighbouring London boroughs and elsewhere in the UK to follow up reports of OPM being present.

- Manage and co-ordinate the Forestry Commission inspection team.

- Serve notice under article 31 (4) of the Plant Health (Forestry) Order 2005 (as amended) on owners or occupiers of premises containing infested trees. Re-inspect premises to ensure compliance with notices.

- Work with landowners, contractors and local authority staff, provide training, issue the information and guidelines, as provided by the Forestry Commission, for safe removal and destruction of OPM from infested sites.

- Provide advice and information to interested parties.

- Report to the Outbreak Management Team (OMT) and provide reports on progress, findings and problems to the OMT

1.3 Aims

- To control the breeding population within the outbreak zone by surveying, and issuing statutory notices in order to facilitate the destruction of the pest.

- To provide information on the development of the outbreak to assist local authorities and other agencies in the UK to plan future control and contingencies.

- To provide information to assist the European Commission to develop Plant Health policy and regulation.

- To increase the awareness of OPM and its deleterious effects among professionals and the wider public.

1.4 National and EU legislation

The Plant Health (Forestry) Order 2005 was amended in 2008 to include Oak Processionary Moth as a quarantine pest (SI2008/644). Consequently, any oaks above 2m in height imported into the UK from EU member states must be accompanied by a plant passport stating that: “they have been grown in a nursery and that no symptoms of *Thaumetopoea processionea* (L.) have been observed at the place of production or in its immediate vicinity since the beginning of the last complete cycle of vegetation.”

2. METHODS

2.1 Tree inspection

Tree inspections for groups of larvae and larval/pupal nests were undertaken from May to October. Trees were examined with the naked eye and with good-quality binoculars. Telescopes were used to inspect high canopies and to take digital photographs of larvae or nests for evidential and training purposes.

Taking into account the large number of trees involved, and the expanding search area, emphasis continued to change in 2010 from recording details of the locations of nests within individual trees, to noting whether a tree was infested, how many nests or larval clusters were present, and their approximate location in the tree. Since the Statutory Notices require that an aerial search is undertaken in each infested tree, it is normally the case that contractors find any nests not easily visible to inspectors at ground level, without the need for additional inspector time.

A ten-figure Ordinance Survey grid reference was recorded for each infested tree using hand-held Garmin GPSMap 60Csx units. The co-ordinates of each infested tree were collated and forwarded to the relevant landowner and/or their contractor.

2.2 Use of the Plant Health (Forestry) Order 2005 (as amended in 2008)

Where the presence of Oak Processionary Moth was confirmed by an Inspector, the owner or occupier of the land was served with a statutory notice under article 31 (4) of the Plant Health (Forestry) Order 2005 (as amended). The notice requires the removal of the pest from the tree and safe disposal of larvae or nests.

The date for compliance with Notices issued in May and June was 16th July.

Thereafter, the time limit for compliance was 14 days from the date of the Notice. These timings were chosen due to the dates of the first pheromone trap catch in 2009, which was over the weekend ending 20th July. For Notices served after the presumed start of adult emergence, it was felt that a reasonable period of notice, in terms of practicalities, had to be given.

Notices also prohibit the movement off-site of arisings from infested trees without written authority of an inspector. Therefore all Notices have an expiry date of 31st May 2011 to ensure that egg plaques or early instar larvae are not inadvertently transported off-site during this stage of the life cycle.

Attached to and part of the Notice were a covering letter and a copy of the Forestry Commission Forest Research document *Survey and intervention in relation to different phases of the oak processionary moth life cycle:*

http://www.forestry.gov.uk/pdf/oak_processionary_moth_control_options.pdf/$FILE/oak_processionary_moth_control_options.pdf

Inspectors gave advice verbally and by email to landowners and contractors, where requested, in order to help them interpret the guidance in the particular circumstances in which they were working. The guidance note includes advice on PPE, but does not include a generic risk assessment. All risk and COSHH assessments remained the responsibility of the landowner or their contractor.

The guidance note also specifies the pesticides that are licensed for use to control Oak Processionary Moth, and the circumstances in which their use is permitted, and inspectors holding pesticide training gave verbal advice to contractors. However, the responsibility for Local Environmental Risk Assessments for Pesticides remains with the landowner or contractor.

The Plant Health (Forestry) Order 2005 empowers inspectors to enter any premises for inspection purposes on production of their authority. If the premises are not a domestic dwelling, an inspector cannot be denied access as long as the timing of the visit is reasonable. However, where the premises are a domestic dwelling and access is denied, an inspector can apply to court for a warrant

Notice was not served on the London Boroughs of Brent, Ealing, Hammersmith and Richmond Upon Thames, since they had initiated in-house survey and control measures. A total of 75 Notices were served by RP and 4 by MT (tables 1 and 2)

2.3 Resources applied in 2010

Forestry Commission:	Team of five inspectors. Time > 1600 hours.
Forestry Commission:	Project management.
LB Ealing:	Surveyor contracted, spray contractor engaged.
LB Brent:	Contractor engaged.
LB Hounslow:	Reactive measures only.
LB Richmond:	Surveyor contracted, spray contractor engaged.
RBGK:	Spray contractor engaged.
Old Deer Park block: (LB Richmond)	Spray contractor engaged.
TFL:	Surveyors employed by Metronet and Tubelines.
Richmond Park:	Staff and volunteers. Time > 710 hours.
Network Rail:	Contractors engaged.
Contractors:	At least 10 companies were involved.

2.4 Training in inspection techniques

A training course in OPM surveying was designed to instruct new contract Plant Health Inspectors. This course was then adapted to train third parties.

The training course was delivered to the following groups:

- London Tree Officers' Association (including associate contractor members);
- National Trust staff and volunteers at Osterley Park (together with representatives of LB Hounslow); and
- Richmond Park staff and volunteers.

2.5 Dissemination of information

In addition to pages on the Forest Reseach website, http://www.forestry.gov.uk/fr/INFD-6URJCF, the Forestry Commission issued press releases concerning the outbreak. Over the last 12 months, there has also been coverage in trade publications, local and national media.

Plant Health inspectors carried and distributed copies of the Forestry Commission OPM Pest Alert and Tree Pest Advisory Notes, and these have been displayed on notice boards in affected amenity sites.

In Pangbourne, a meeting has been convened between affected site owners and managers, county and parish council staff and other interested parties. An article has already been published in the parish magazine, and it is hoped that further dissemination of information to residents and commercial premises in the local area will be an outcome of discussions at the meeting.

2.6 Actions by OMT members

2.6.1 Ealing Borough Council

Ealing BC employed a surveyor and carried out prophylactic spraying. The infestations in Brent are very close to Ealing. LB Ealing undertook the management of OPM on property owned by LB Brent on its behalf.

2.6.2 Hounslow Borough Council

Hounslow BC undertook clearance work under notice. Due to the borough's "contracted out" internal structure, there were often delays in determining the ownership of, and responsibility for, trees. In addition, Hounslow BC wrote to households near to trees known to be infested in 2009, the letter containing links to the Forest Research website.

2.6.3 Richmond Upon Thames Borough Council

Richmond BC employed a surveyor and carried out prophylactic sprays. However, the authority's resources were swamped by a large population discovered on its property in early July, resulting in many nests reaching maturation and emergence.

2.6.4 Royal Parks

A team of volunteers in combination with parks staff were used to survey in Richmond Park, and later in the year in Bushy Park and Hampton Court Park when infestations were discovered. Parks staff were used to remove nests.

2.6.5 Transport for London

Contract surveyors were employed by Tubelines (Piccadilly Line) and on the Central Line.

3. RESULTS

3.1 Overall summary of findings during the 2010 season

Results for 2010 are summarised in Table 1, along with previous years for comparison. Table 2 shows the results from the major sites. Figures 1-3 show infestation areas. Appendix I lists site-specific information. Appendix II lists observations on the life history of the moth. Tables 4 and 5 give a breakdown of Statutory Notices served.

Table 1: Summary of nest totals by council area (rail infrastructure totals included but London Parks given separately)

Borough	Nests 2007	Nests 2008	Nests 2009	Nests 2010	Infested trees 2010
Brent	76	18	15	33	11
Ealing	458	53	310	293	161
Hammersmith and Fulham*	-	-	2	0	0
Hounslow	3	13	361	403	131
Richmond	171	424	1,757	960	336
Richmond Park	-	0	5	326	154
Bushy Park	-	-	-	3	3
Hampton Court Park (Home Park)	-	-	-	53	14
Berkshire (Pangbourne)	-	-	-	45	7
Leeds	-	-	1	0	0
Sheffield	-	-	-	1	1
Totals	**708**	**508**	**2451**	**2117**	**804**

Notes:
*does not include totals for one infested site which geographically lies within Richmond but is under the control of Hammersmith & Fulham.
"-" indicates area not surveyed (infestation not then present or known).

Table 2: Nest totals from major sites. "-" area not surveyed (OPM not present or known).

Site	2007	2008	2009	2010
Kew Riverside Estate, Richmond	50	25	70	7
Royal Mid-Surrey Golf Course, Richmond	5	29	758	7
Royal Botanic Gardens Kew, Richmond	100	295	600	10
Old Deer Park Sports Club, Richmond	2	9	52	19
Old Deer Park, Richmond	9	23	35	9
Petersham Meadows, Richmond	1	13	43	107
Petersham Common, Richmond	-	0	26	187
Barnes Common, Richmond	-	-	28	120
Richmond Park	-	0	5	326
Piccadilly Line, Ealing	117	10	196	144
Network Rail, Ealing	180	9	34	16
Central Line, Ealing	139	17	33	18
First Central Business Park, Brent	8	9	12	12
Chiswick House, Hounslow	0	6	116	127
Syon Park, Hounslow	3	4	105	21
Cavendish School, Chiswick	-	-	49	56

3.2 Sites outside the core area

3.2.1 Leeds

The batch of imported trees, one of which was originally found to have been infested, have been removed and destroyed. Further surveys by an FC inspector did not locate any other OPM infestations.

3.2.2 Pangbourne, Berkshire

In October 2010, the FC was informed by an arborist contractor familiar with OPM who was called in to assess the health of the tree (which is also diseased), of a tree infested with OPM in the village of Pangbourne, Berkshire, and this was shortly thereafter confirmed by an inspector. The infested tree, an 8m *Q. robur*, imported from Holland, was planted on 29th February 2008. From October 2010 to January 2011 the area surrounding the importation site was surveyed to a radius of 0.5-1km. A total of 45 nests were found, the majority (42) being within 40m of the imported tree, and the furthest at a distance of c.300m from the importation site (figure 1).

The origin of the imported tree has been traced to a nursery in Holland, and work is ongoing, along with staff from FERA, to trace further importations into Britain of oak sourced from the company involved. A meeting has been convened involving affected landowners, councils and others in Pangbourne in order to co-ordinate control efforts in 2011.

3.2.3 Sheffield

The single infested tree was planted on 12th March 2010 in the City Cemetery. The nest was found by a Sheffield City Council Tree Officer who sent a photograph to Forest Research. An FC inspector went to site the following day, 6th August 2010. The inspector removed the nest, examined it and then destroyed it on site.

Three live pupae were found in the nest, but >20 larval exuviae were present on and around the nest, suggesting that more than 3 larvae were or had been present. The fate of any additional larvae is unknown, but it is possible that some pupated away from the nest and survived to emerge as adults.

Sheffield City Council has subsequently carried out a survey to determine the locations of nearby oaks in advance of an FC survey in 2011.

3.4 False positives

Table 3: False positives reported to Forest Research.

Date	Location	Cause
06/05/10	Garden in Richmond	Brown-tail (*Euproctis chrysorrhoea*)
23/05/10	Street tree in Harrow	Brown-tail (*Euproctis chrysorrhoea*)
03/06/10	Roadside in Hounslow	*Yponomeuta*
05/06/10	Roadside in Hounslow	*Yponomeuta*
10/06/10	Garden in Hounslow	Lichen on an early mature Oak

3.5 Observations on the OPM life cycle made in 2010

i) Egg plaques under observation at RBGK hatched 17-18th April.

ii) There is no field data on the timings of transition from 1st to 3rd instars, but third instars were seen on 5th May, the date of the first inspections.

iii) The transition from 3rd to 4th instars was first observed on 6th May.

iv) The transition from 4th to 5th instars was first observed on 27th May.

v) The transition from fifth to sixth instars and the construction of final nests was first observed on 12th June.

vi) Pupation could not be directly observed as it takes place within the nests. Contractors were asked to report pupae, and the first date given by a contractor for the presence of pupae was 6th July.

The range of development has been observed to span at least four weeks, possibly six weeks or more. Early stage 4th instars were seen in the same tree as new 5th instars on 27th May. Late stage 4th/early stage 5th instars were seen on 15th June.

In Europe, OPM larvae have been seen to form pupal nests in the soil (Dissescu, 1968). This has also been observed in the UK by FC inspectors.

Table 4: Summary of notices served in 2010.

Notice category	**Number served**
Amenity (Sports grounds etc)	12
Commercial premises	7
Community organisations	2
Education establishments	3
Formal Gardens	2
London Borough	1
Nature Reserve	2
Parkland	4
Private residences	25
Residential	17
Transport infrastructure	3
churchyards	1

Table 5. Breakdown of the locations of the notices.

Borough or location	**Number served**
Ealing	15
Brent	4
Hounslow	29
Richmond	25
Transport	2
Pangbourne, Berkshire	5
Royal Parks	?

4. DISCUSSION

4.1 Status and changes in the distribution and infestation pattern of OPM in London

As figure 1 shows, two epicentres are still apparent in the London infestation zone, centred on the two known importation sites, in Ealing and Richmond respectively. However, the two pioneer populations appear to be at most c.1 km apart (1 nest in Gunnersbury Park is not shown in the figure). Whether the populations are in fact interbreeding is not easy to assess, but given the difficulties of surveying low-level populations in an urban matrix, they seem likely to be closer together than appears to be the case.

As in previous years (figures 4-6), there is a marked difference between the distribution of the northern population in Ealing and Brent, and the southern population centred on Richmond and Hounslow. In the north, there has again been very little extension of the known range, even along rail embankments, which are believed to be highly favourable habitat. In the south, we have seen the population expand over a much wider area from the importation site beside the River Thames.

However, the behaviour of the two populations is somewhat similar in both areas, in that, relative to the size of the infestation area, expansion south and west (or southwest) has been much greater than that which has occurred in a northerly or easterly direction. The scale is different, but the pattern is broadly similar, with the exception that in the north, expansion west has been much less. Possible reasons for the pattern are:

i) Habitat – areas of parkland and woodland with abundant oak provide continuity and optimum breeding habitat, likely to facilitate more rapid spread and increase in population size. Conversely (especially given the relatively sedentary habits of the female), oaks scattered through an urban matrix present a discontinuous, sub-optimal habitat. In these circumstances,

spread is likely to be slower and population size suppressed. Optimal habitat is much more extensive in the southern part of the infestation zone than in the north. Moreover, in both areas, parkland and woodland are mainly situated south or west of the importation site. Thus, the pattern in the distribution of suitable habitat could largely explain that of the moth.

ii) Differential efficiency of control measures in different (i.e. optimal and sub-optimal) habitat in the infestation zone. In the urban matrix, access to oak trees is sometimes more problematical than in open parkland. Although inspectors have included trees on private land, it is possible that some are simply missed in back gardens or ‘dead spaces’. However, where oaks are present, there are usually some that are accessible, so if the moth is present on ‘missed’ trees, it is likely to be detected in the area, although there may be a delay in detection.

iii) Timing – numbers have consistently been smaller in the north, suggesting that importation occurred later in Ealing than in Richmond. It is thought that this occurred at a similar time in both areas (2003-4), but there is a degree of uncertainty with regard to the timing in Ealing, and although that of the original plantings matches, some trees may have died and been replaced. These could have been the source of the moth.

iv) Its smaller size and more limited distribution may have made the northern population more manageable, at least in terms of reducing spread.

v) Prevailing wind. Spread is occurring more or less against the prevailing westerly wind, although detailed analysis of the prevailing wind direction during the flight period would be needed to establish exactly how the moths are responding to atmospheric conditions.

4.2 Patterns and trends specific to boroughs and royal parks

4.2.1 Ealing and Brent

Numbers in Ealing and Brent overall remain similar to 2009, with negligible spread, the infestation concentrated around the corridors formed by the LUL Central line, the A406 Hanger Lane and the LUL Piccadilly Line, and south to Hangar Hill Park. At the major sites (and, broadly, at others), success in reducing numbers has varied. For example, looking at the rail sites, all achieved a major reduction from 2007-8, but although numbers remained suppressed at two sites, they increased sharply at the third in 2009 and remained high in 2010. At the Brent site listed, numbers have remained low and are fairly consistent. Lack of compliance at one site on the northern fringe in Brent is likely to result in an increase in spread here.

4.2.2 Hounslow

A small increase in numbers occurred compared to 2009. Significant reductions at some sites (e.g. Syon Park 2009 = 105, 2010 = 21) were cancelled out by the discovery of new sites and increases at others.

Broadly the distribution is similar to 2009, but significant spread and establishment has occurred in Osterley Park to the west, and in and around Chiswick House grounds, both large areas of parkland and gardens with numerous oak trees. There are still only a small number of sites north of the M4, notably in Gunnersbury, Gunnersbury Park and in the residential area west of Gunnersbury Park. There has been geographical spread from Richmond into the Isleworth area.

4.2.3 Hammersmith & Fulham

In 2009, one infested tree was located near in a local authority park near to the boundary with Hounslow. This nest was removed rapidly and before the flight period of the moth.

In 2010, OPM was not found within the geographical boundaries of Hammersmith and Fulham. However, a site for which this authority has ownership within Richmond was again infested in 2010. The data for this site has been included in the totals for Richmond.

4.2.4 Richmond

Numbers were high, but were significantly reduced compared to 2009. Significant successes occurred in terms of reduction in numbers at key central sites, namely RBGK and the Royal Mid-Surrey Golf Course. This is in sharp contrast to previous years at these sites, where numbers were increasing sharply. In 2010, some private sites were found to be infested to the east of this area, with old nests being present on isolated garden trees. There were significant increases in the south of the borough (Petersham, Petersham Common, Barnes Common and Richmond Golf Course), representing major establishment in this area. The infestation found north of Roehampton University in 2009 was not detected in 2010.

The success at the central sites appears to be the result of early pesticide application to known infested trees, including (at some sites) the cumulative effect of a combination of pesticide application and nest removal over several years. However, one site achieved a reduction in nest numbers from 1,000+ (including old nests discovered in winter 2009-10) to single figures. Here, compliance was late in 2009 such that adults were allowed to emerge from many hundreds of nests.

4.2.5 Richmond Park

A sharp increase in nest numbers was recorded, from 5 in 2009 to 326 in 2010. This may in part be due to an increase in survey effort (as provided by Royal Parks) in an area with thousands of oak trees. However, sharp increases have been observed over one year at well-surveyed sites, and the sudden increase appears to be mainly the result of extensive colonisation and establishment. There was a concentration of nests along the western boundary adjoining densely infested parts of Richmond Borough, but the map also shows nests to be well distributed across the park.

4.2.6 Hampton Court Park and Bushy Park

In September 2010, nests were discovered in Hampton Court Park by park staff. An FC inspector subsequently discovered 14 infested trees containing 58 nests, five of which were from 2009 or before. Subsequently, an inspector discovered 3 nests in Bushy Park, to the north. The most recent discovery (not shown on figure 2), in February 2011, was of 2 nests near the National Physical Laboratory on the northern edge of the park.

The source of these infestations is uncertain. The sites are 3-4km from the nearest known sites in Richmond, although the intervening areas of Teddington and Kingston-upon-Thames have yet to be surveyed, and the direction is in accordance with the overall trend, i.e. movement to the south/southwest. The infestation in Hampton Court Park appears to be centred on a tall *Q. cerris*, which is consistent with some other outlier infestations. One of the 3 infested trees in Bushy Park is also a tall *Q. cerris*, and is roughly 1km from the other two.

However, there have been recent plantings of heavy standard oaks in Hampton Court Park, imported from two nurseries in Holland in 2007, 2008 and 2009 (one of which was the source of at least one other importation to the UK). Therefore, the importation of infested material cannot be ruled out,

especially as some of the plantings pre-date the 2008 amendment to Plant Passport regulations to include the requirement of imported trees to be free of OPM.

4.3 Treatment Methods

As mentioned under Methods, section 2.2, several options are available, and infestations can be dealt with by any or a combination of methods including manual nest removal and the use of pesticides.

4.3.1 Nest removal

The limitations imposed by the short window of opportunity for effective control of OPM are discussed by Townsend (2010). Where nest removal is employed, the current cycle of survey for OPM, reporting to the Local Authority and or serving notice undoubtedly puts pressure on the available contractor resource.

Larvae first become visible to ground-based surveys in early May (occasionally earlier, from mid-April), but many infestations are not discovered until much later. Third and fourth-instar larvae tend to remain in the tree canopy and are difficult to see from the ground. It is only later in the season that fifth instar larvae descend lower into the tree as they now require larger branches on which to coalesce and then to form pupal nests.

During 2010, nest formation was first observed during the second week of June. Adult emergence starts around the third week of July and peaks in the first two weeks of August. Therefore, there is about a five-week period between the first formation of nests and the first emergence of adults.

Nest removal can be effective in drastically reducing numbers, even on heavily wooded sites, for example, Network Rail Ealing. Here, no spraying has been carried out since the discovery of the outbreak. However, in order

to be effective it must be done by skilled operatives before the onset of adult emergence. The use of vacuum equipment on nests and larvae greatly increases the cost effectiveness of the method, making it more likely that landowners will be willing to co-operate.

4.3.2 The use of arborist contractors

Due to the dangers to human health from the urticating hairs carried by the larvae, specialist PPE must be worn by any operatives coming into close proximity to the nests. However, many infested trees cannot be accessed by MEWP (mobile elevated work platform). Therefore, tree climbing operations need to be undertaken by suitably qualified arborists wearing full forensic PPE. There are also health and safety considerations involving:

- working at height and LOLER checking of PPE;
- heat stress for operatives climbing in forensic PPE; and
- exposure of climbing and ground staff to urticating hairs.

For climbing operations to be cost effective, the contractor must also be efficient at locating nests in infested trees. In a number of cases (in 2010 and in previous years) poorly trained operatives have missed nests clearly visible from the ground, requiring follow-up visits (after follow-up inspections) and thereby increasing costs considerably to the site owner. Unfortunately, resources are not usually available to provide inspectors to accompany contractors.

In addition, on wooded sites, the contractor must be able to find the correct tree. FC inspectors routinely provided 10-digit grid references of infested trees, but this was only of use if the contractor had the relevant GIS equipment and has been trained in its use. In 2010, as a result of large numbers of nests being found in July on land owned by local authorities and neighbouring complex sites, there was a shortage of contractors. This was of strategic importance because many nests reached maturation before they could be manually removed. At least 300 or so nests found by surveyors

were not removed in time for adult emergence in 2010, due to a combination of the above and other factors (table 6).

Table 6. Estimates of the number of nests reaching maturation in 2010.

Site	**Estimate of Number of nests in August or later**
Site 105	100
Site 97	20
Site 98	30
Site 112	26
Site 88 (Discovered September)	53
Site 69	25
Private sites Ealing	20
Private sites Hounslow	8
Private sites Richmond	1
Berkshire (Discovered October)	45

The shortage of contractor resource can partly be explained by the following factors:

- volume of work in short time period;
- limited productivity due to PPE requirements;
- the lack of an industry standard training course for OPM removal;
- unwillingness of some contractors to undertake OPM removal;
- capital investment required for specialist vacuum equipment;
- local authority procurement procedures; and
- quarantine requirements concerning safe disposal of nests.

4.4 Pesticide treatments in 2010

Prophylactic sprays were undertaken on some sites by Brent, Ealing and Richmond. This means spraying trees early in the larval season, on trees considered likely to be infested, mainly those known to have been infested in the previous year, or those near previously infested trees.

Several pesticides are licensed in the UK for use against lepidopteran larvae on amenity vegetation. The definition of amenity vegetation is widely drawn and includes trees in gardens and public places. However, it does not include woodlands. The appropriate pesticides are listed in the FC document *Survey and intervention in relation to different phases of the oak processionary moth life cycle*, which is routinely issued with each Statutory Notice under the Plant Health Order 2005. This document also indicates when in the life cycle of the moth each pesticide should be used.

In most cases in the UK where pesticides have been applied, either Bt (biological control specific to lepidopteran larvae) or Deltamethrin (Decis) (a broad-spectrum pyrethroid insecticide) have been used against OPM. Successful application of Bt requires the ingestion of contaminated foliage by the larvae. It is highly effective when applied early in the season (i.e. to early instar larvae), but is less effective on larger larvae. It is specific to moth and butterfly larvae. Deltamethrin is effective against larvae at all stages, and kills on contact.

Bt treatments have proved effective in London, but on very large heavily-infested sites, it may be impractical to spray all trees before larvae grow too large for it to be effective. Therefore in these cases it might be necessary during the treatment to switch to a chemical pesticide such as Deltamethrin, and this has been the case at some sites in London.

Two approaches of the use Deltamethrin were trialled in 2010. In Ealing, borough council contractors sprayed only the scaffold branches of trees from

within the canopy using hand-held equipment. The rationale for this method was that it ensures that overspray and drift are more localised and the leafing area is not directly targeted, reducing collateral damage. OPM larvae are highly mobile from the third instar onwards, therefore they are likely to come in contact with residual chemical on the scaffold branches. The disadvantage of this method is access, because a MEWP is the preferred method of getting the spray equipment into the tree. The method is not approved or recommended by the Forestry Commission.

In several sites in Richmond, entire trees were sprayed with Deltamethrin using ground-based pumps applying high-volume, low-pressure jets. This system can be applied to most trees, because a significant length of hose can be deployed from the pumping rig. The major disadvantage is that there is indiscriminate collateral damage to virtually all other insect life within the target tree over the period that the chemical remains active. Also, there is the potential for overspray and drift, and it cannot be used within a buffer zone of watercourses. Both methods were found to be highly effective in the control of OPM, as can be seen from the table below.

Due to the potential for damage to non-target insects, and the local ecosystem generally, the Forestry Commission does not recommend Deltamethrin as a prophylactic agent, and recommends that Bt is used wherever possible and that Deltamethrin usage is limited to circumstances when Bt is not likely to succeed.

Table 7: Effect of chemical treatments.

Site number	Nests 2009	Treatment 2010	Nests 2010
109	600	Bt and Deltamethrin	10
93	>1000	Bt and Deltamethrin	4
Not assigned	10	Deltamethrin	0
108	52	Deltamethrin	19
107	15	Deltamethrin	0
Richmond other	46	Bt and Deltamethrin	13
117	70	Deltamethrin	7
118	10	Manual nest removal	19
69	116	Manual nest removal	127

These results are all from Richmond, and it can be seen that there was a dramatic reduction in nest formation in the first seven sites compared to the last two, where pesticide was not applied.

However, these results are not from a properly constituted study, merely observations gathered during the season's fieldwork. There has been no comparative study undertaken on the use of Deltamethrin for either method, nor has there been a published study in the UK on the effect of blanket treatment on biodiversity. (Data has been collected at one major site in Richmond on the effects on biodiversity of Deltamethrin use in 2010 and publication is expected).

Richmond Park is designated an SSSI partly on the basis of its invertebrates, and is also a National Nature Reserve. The invertebrates include several rare species associated with oak, which are a major consideration in terms of the likelihood of damage caused by OPM. The managers have stated that they do not have any plans to use chemical control on a widespread basis due to the damage that it would cause to the SSSI.

Furthermore, the blanket treatment of large expanses of oak could have a significant effect on the breeding success of birds such as Great Tit *(Parus major)* and Blue Tit *(Parus caerulus)*. Both species depend on invertebrates during the breeding season, with Lepidoptera accounting for 76% of the diet of nestlings (Cramp *et al*).

Another problem with pesticide spraying is that it can be difficult to persuade landowners that this is worthwhile, at least until they have seen the result of ineffective, ill-timed action against OPM.

4.5 Late nest-forming larvae

As mentioned earlier in this report, there is a stagger in larval development, and this has a significant effect on the efficiency of the survey-and-remove method. More than 200 nests from 2009 were discovered during fieldwork in the larval period in 2010. However, in several locations, “old” nests were found in trees that had been thoroughly surveyed by experienced FC inspectors. Whilst it is possible that these nests were overlooked, some of the trees were subject to multiple inspections by more that one inspector, therefore it is probable the nests formed up after the last inspection.

Late-forming nests were also documented by Richmond Park staff in south-east Richmond. These observations suggest that a survey-and-remove method will need to be undertaken over a longer period, with increased costs and inconvenience for landowners.

5. CONCLUSIONS

- Experts agree that the moth is established in the core area (Richmond, Hounslow, Ealing and Brent). Slow expansion continues, and as control measures are proving very effective in reducing numbers in some places, increases in population size are still occurring elsewhere. Taking all of this into account, it is concluded that eradication of OPM from the core area is no longer feasible.

- Management action will now concentrate on minimising the rate of spread of the moth from the known infested areas, and eradicating OPM from sites of new importations, where possible.

- Reducing the rate of spread is partly dependent upon controlling numbers in the core area to avoid OPM reaching plague stage, during which dispersal is likely to be far greater than that which we have seen thus far.

- Experience and knowledge gained over the past four years should enable councils, landowners and managers to control OPM populations, reducing them to an acceptable level.

- Control by bio-agent or pesticide is generally more effective than control by removal of larval or pupal nests, due to a number of factors including timing, cost implications, practicalities and the habits of the larvae. At the current population level and extent, with careful planning it should be possible to achieve control using a combination of methods (using guidance provided) and avoid large-scale, irreversible ecological damage. On the other hand, if OPM is allowed to get out of control, it seems likely that this would be far harder to achieve.

6. ACKNOWLEDGEMENTS

A large number of people have been involved with this work, in various capacities. They are too numerous to mention, but the authors are most grateful to all of them. Staff at the Forestry Commission (Plant Health), Forest Research, the Borough Councils and the Royal Botanic Gardens Kew provided invaluable assistance.

The Outbreak Management Team would like to thank landowners and site managers for their kind co-operation with our ongoing efforts to control OPM.

7. REFERENCES

Cramp, Simmonds & Perrins (1977-1994) *Handbook of the Birds of Europe the Middle East and North Africa, The Birds of the Western Palearctic,* Volumes I -IX (Oxford University Press).

Dissescu,G.: Cheianu, I. (1968):Cercetari asupra bioecologiei omizii procesionare a stejarului(*Thaumetopoea processionea L*) Bucuresti; Centr. de document. tehn.pentru econ. forest. 26, P 81-102) cited in: Schwenke, W. (1978), Die Forstschädlinge Europas, Bd.3 Verlag Paul Parey.

Forest Research (2010) *Survey and intervention in relation to different phases of the oak processionary moth life cycle.* (http://www.forestry.gov.uk/pdf/oak_processionary_moth_control_options.pdf/$FILE/oak_processionary_moth_control_options.pdf)

Townsend, M.C. (2008) Report on survey and control of Oak Processionary Moth *Thaumetopoea processionea* (Linnaeus) (Lepidoptera: Thaumetopoeidae) (OPM) in London in 2007 (report to Forestry Commission (http://www.forestry.gov.uk/pdf/fcopmsurvey07.pdf/$FILE/fcopmsurvey07.pdf)

Townsend, M.C. (2009) Report on survey and control of Oak Processionary Moth *Thaumetopoea processionea* (Linnaeus) (Lepidoptera: Thaumetopoeidae) (OPM) in London in 2008 (report to Forestry Commission. (http://www.forestresearch.gov.uk/pdf/fcopmsurv08reppub.pdf/$FILE/fcopmsurv08reppub.pdf)

Townsend, M.C. Parks, R.A. (2010) Report on survey and control of Oak Processionary Moth *Thaumetopoea processionea* (Linnaeus) (Lepidoptera: Thaumetopoeidae) (OPM) in London in 2009 (report to Forestry Commission)

Figure 1: Map of Pangbourne showing importation site (red spot), location of other infested trees (blue spots) and survey area (red line).

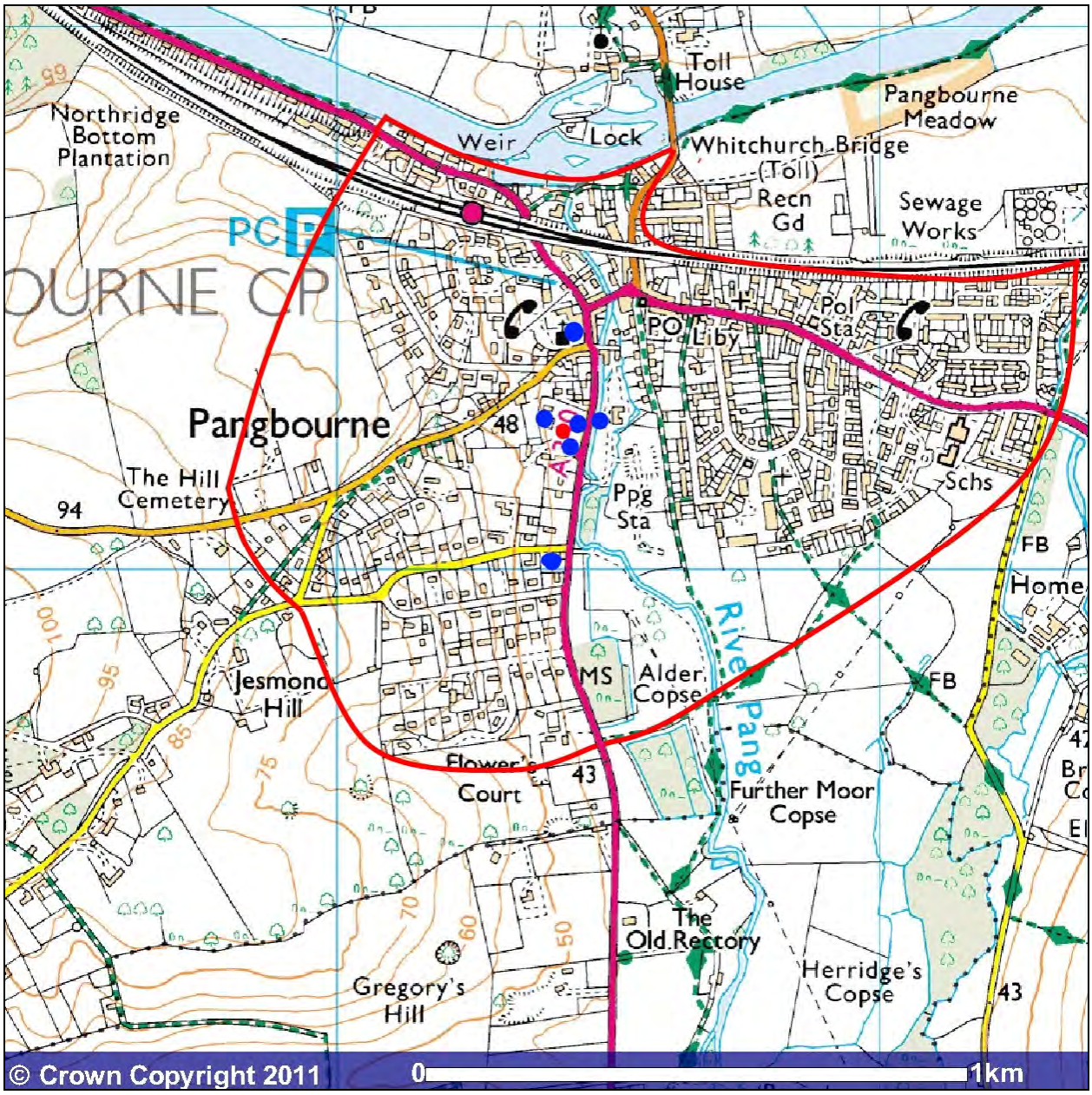


Figure 2: Map showing sites of OPM-infested trees located by inspectors and surveyors in London in 2010 (map courtesy of the Forestry Commission).

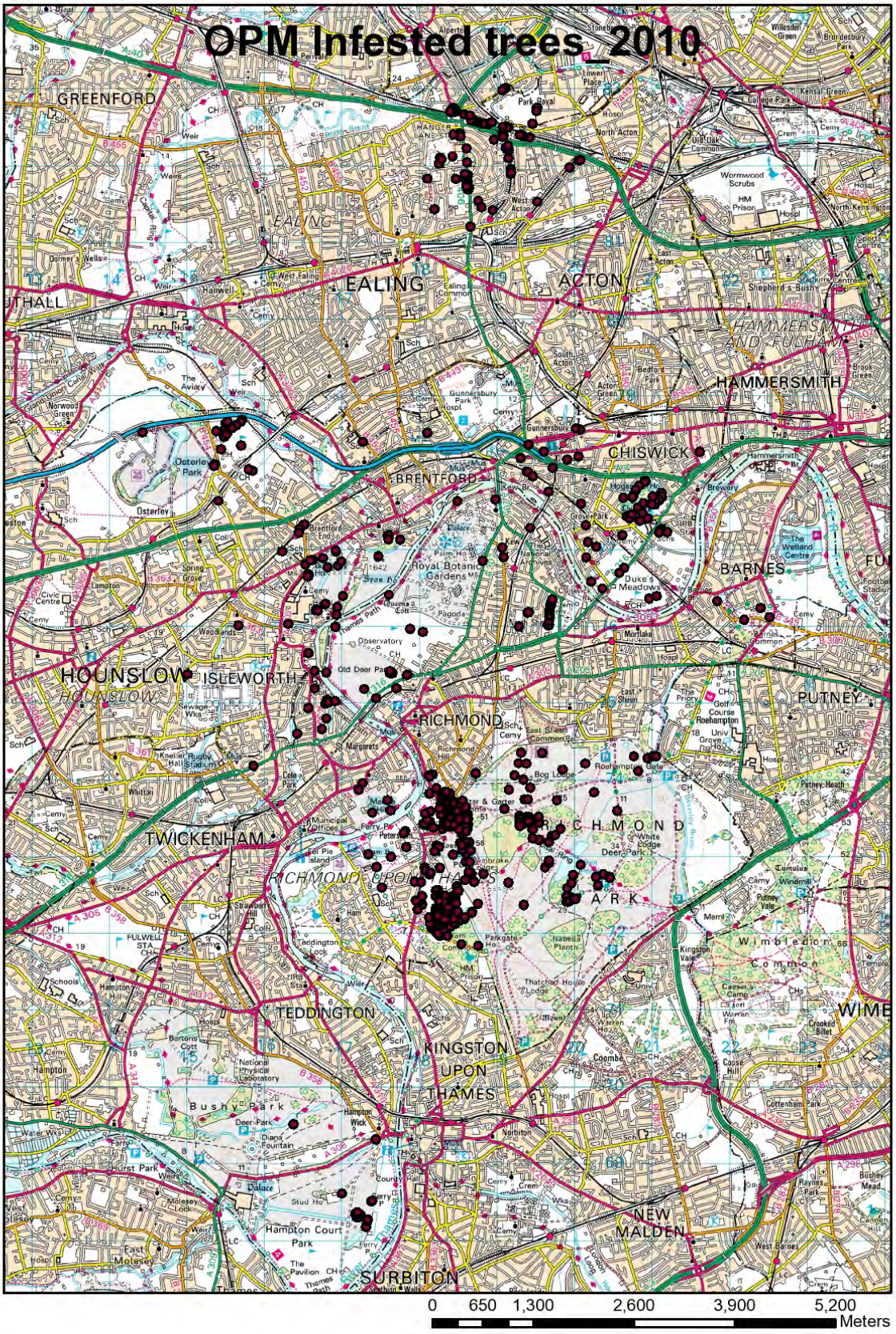


Figure 3: Map showing London and Pangbourne infestations and proposed protected zone. (Map courtesy of the Forestry Commission).

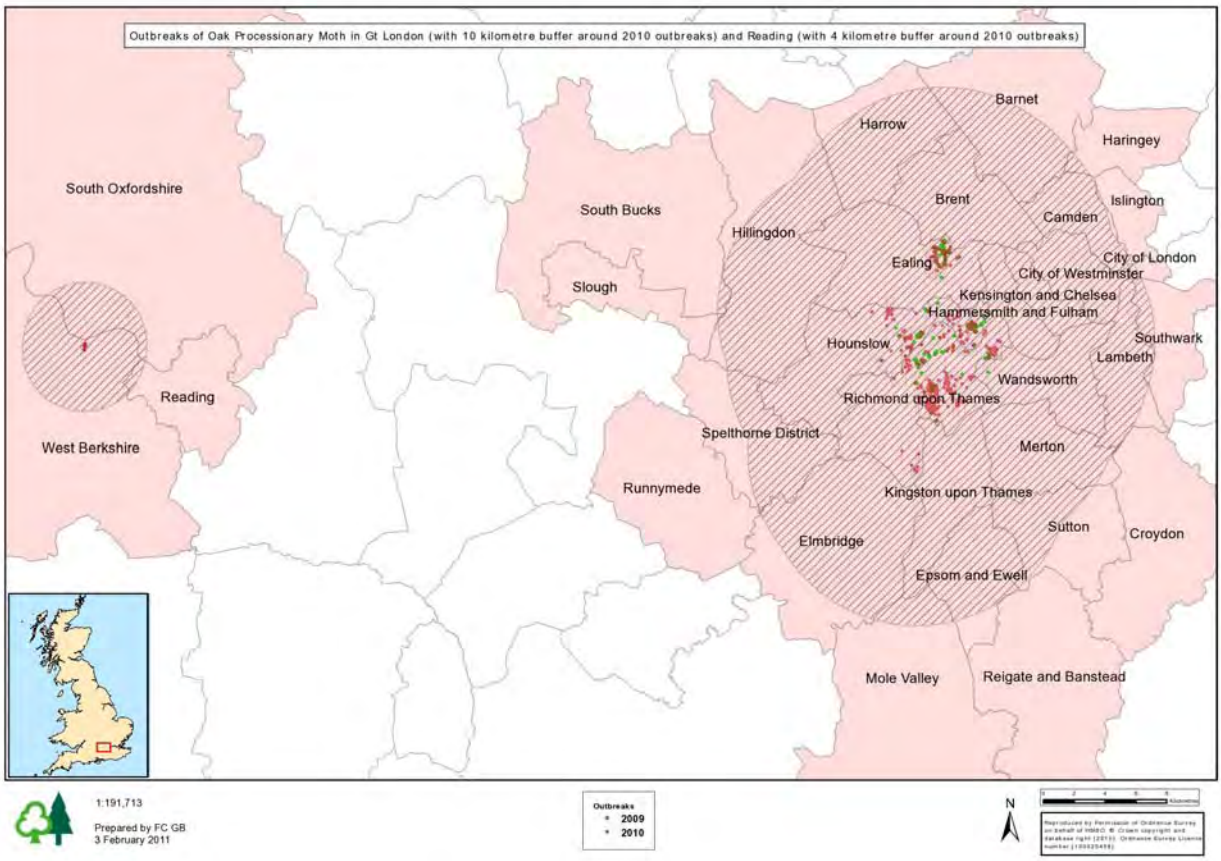


Figure 4: Distribution and density of OPM infestations in 2009 (map courtesy of the Forestry Commission).

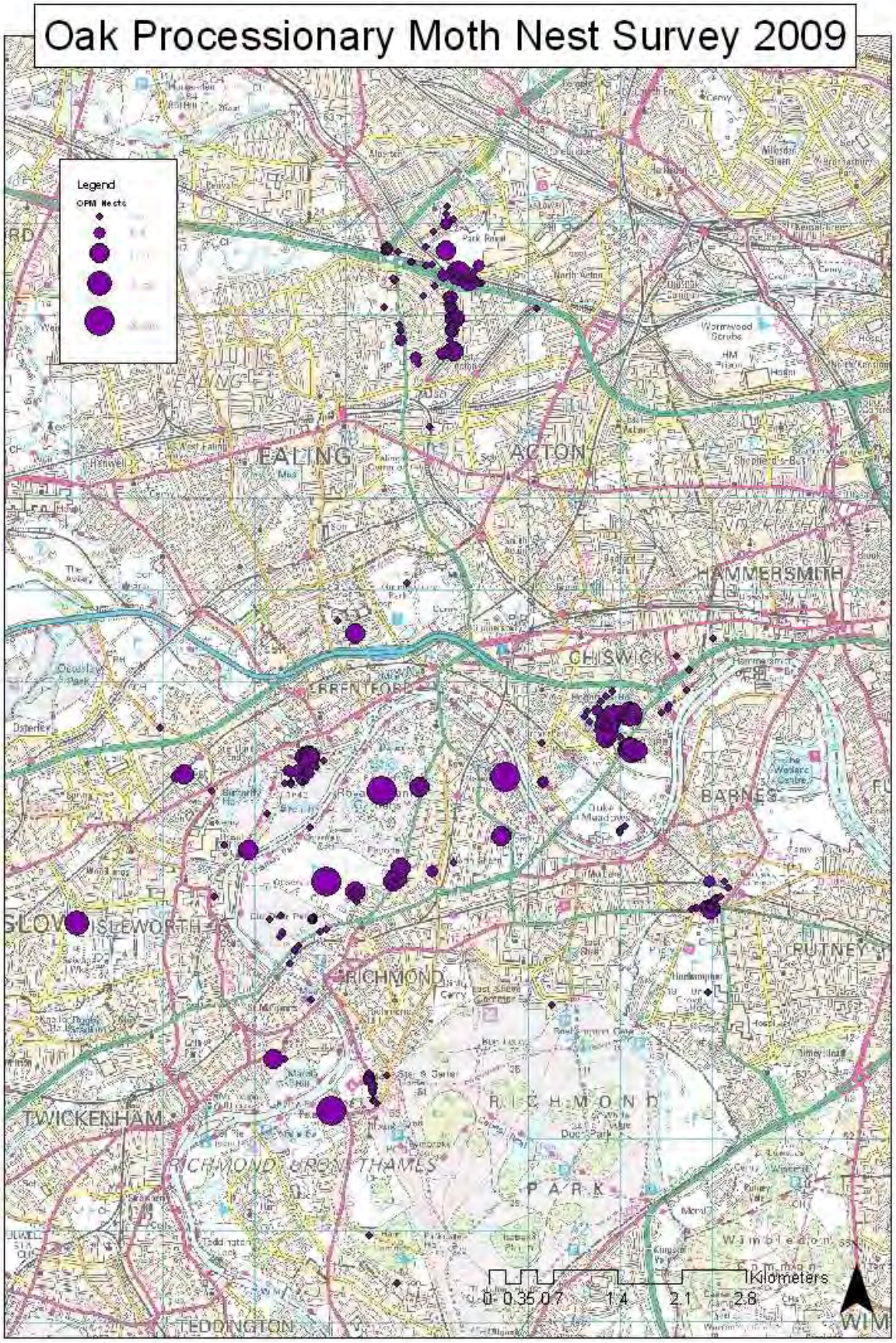


Figure 5: Distribution and density of OPM infestations in 2008. (Map courtesy of the Forestry Commission).

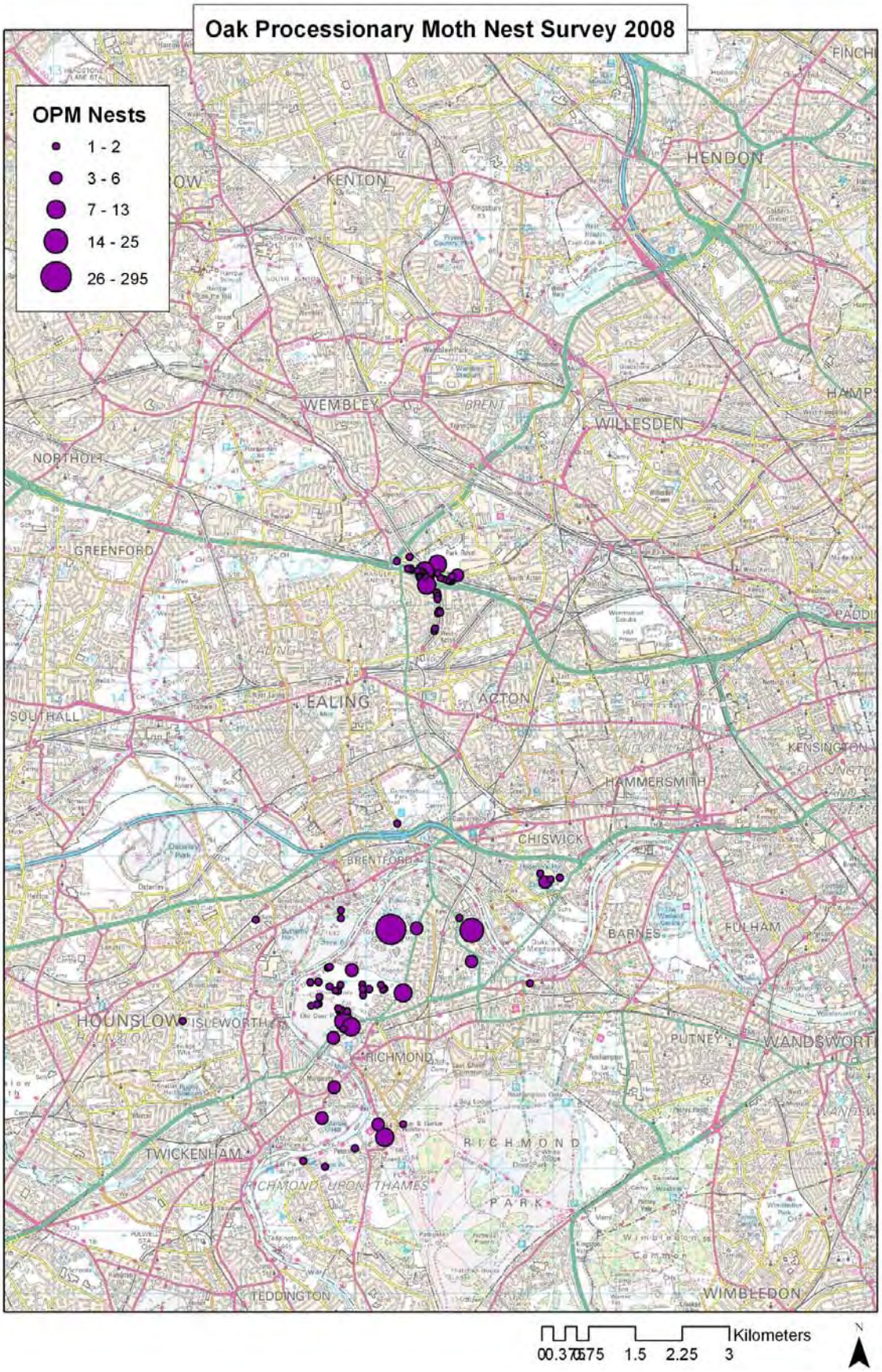
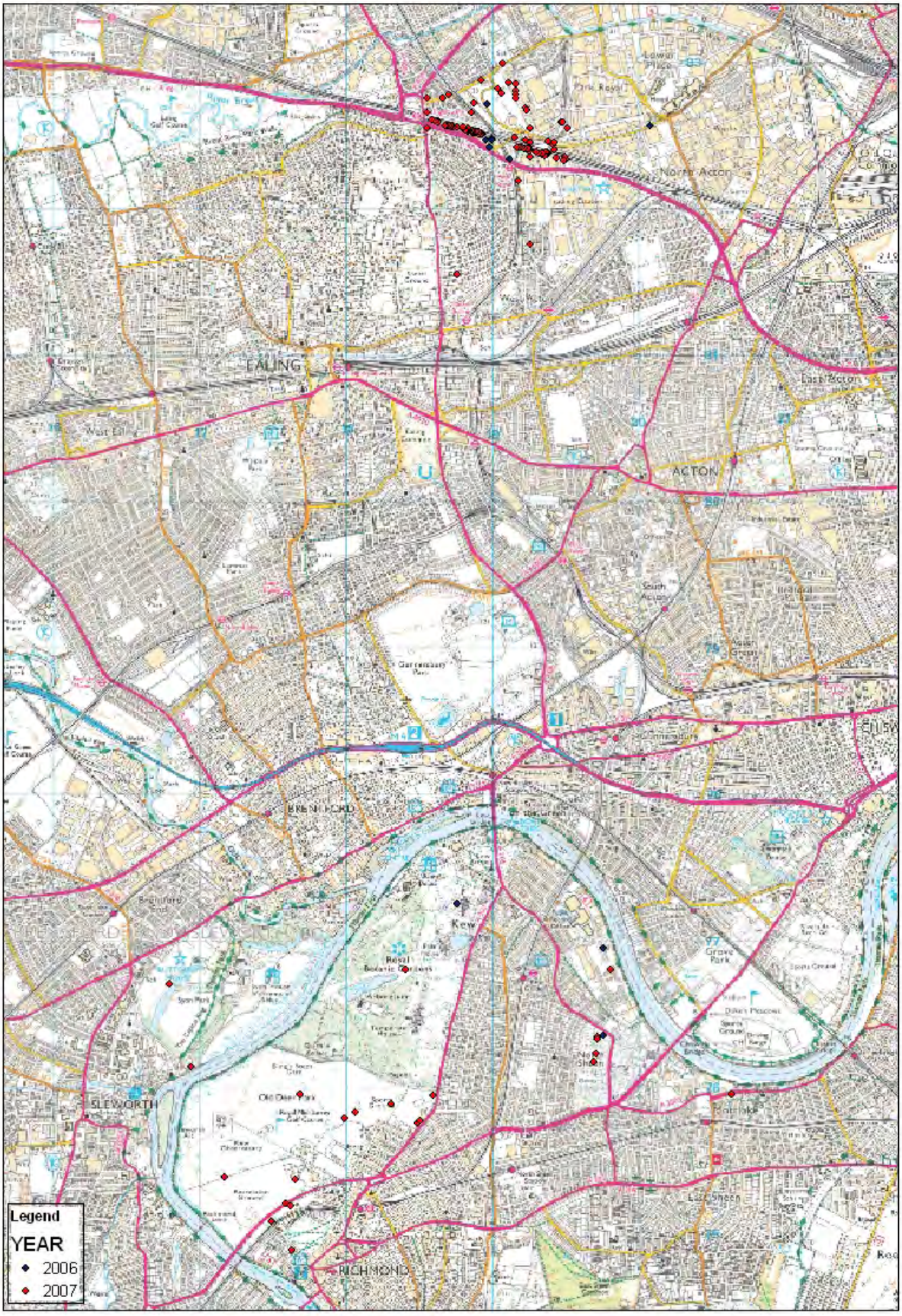


Figure 6: Distribution and density of OPM infestations in 2006 and 2007 (Map courtesy of the Forestry Commission).



Appendix I: Site-specific details

Site number	1	**Borough**	Brent
Local Authority owned?	no	**Grid square**	TQ 1982
Date found	16/06/10	**Finder**	FC
Number of clusters / nests	12	**Trees infested**	6
Nests from 2009 or before	0	**Nests present 26/07/10?**	Not known
Notice number	50	**Compliance by**	23/07/10
Compliance with notice?	attempted	**Date treated**	not known
Notes	Information not received from contractor		

Site number	2	**Borough**	Brent
Local Authority owned?	no	**Grid square**	TQ 1982
Date found	11/08/10	**Finder**	FC
Number of clusters / nests	13	**Trees infested**	2
Nests from 2009 or before	0	**Nests present 26/07/10?**	yes
Notice number	72	**Compliance by**	31/08/10
Compliance with notice?	attempted	**Date treated**	not known
Notes	Information not obtained from contractor		

Site number	3	**Borough**	Brent
Local Authority owned?	yes	**Grid square**	TQ 1982
Date found	03/06/10	**Finder**	FC
Number of clusters / nests	2	**Trees infested**	2
Nests from 2009 or before	0	**Nests present 26/07/10?**	no
Notice number	N/A	**Compliance by**	N/A
Compliance with notice?	N/A	**Date treated**	not known
Notes			

Site number	4	**Borough**	Brent
Local Authority owned?	no	**Grid square**	TQ 1983
Date found	13/05/10	**Finder**	FC
Number of clusters / nests	6	**Trees infested**	3
Nests from 2009 or before	4	**Nests present 26/07/10?**	yes
Notice number	64	**Compliance by**	14/08/10
Compliance with notice?	no	**Date treated**	Still in situ
Notes	Despite repeated contact by phone, email and notice sent by post, there has been no response by the managing agent believed to have responsibility		

Site number	5	**Borough**	Ealing
Local Authority owned?	yes	**Grid square**	TQ 1778
Date found	12/07/10	**Finder**	FC
Number of clusters / nests	1	**Trees infested**	1
Nests from 2009 or before	0	**Nests present 26/07/10?**	no
Notice number	N/A	**Compliance by**	N/A
Compliance with notice?	N/A	**Date treated**	20/07/10
Notes			

Site number	6	**Borough**	Ealing
Local Authority owned?	no	**Grid square**	TQ 1881
Date found	23/05/10	**Finder**	FC
Number of clusters / nests	3	**Trees infested**	1
Nests from 2009 or before	3	**Nests present 26/07/10?**	yes
Notice number	23	**Compliance by**	16/07/10
Compliance with notice?	no	**Date treated**	Still in situ
Notes	Extreme difficulty in contacting the owner via the tenants. The owner was eventually in contact, but it is not believed by inspectors that removal work has been undertaken		

Site number	7	**Borough**	Ealing
Local Authority owned?	no	**Grid square**	TQ 1881
Date found	23/05/10	**Finder**	FC
Number of clusters / nests	6	**Trees infested**	9
Nests from 2009 or before	4	**Nests present 26/07/10?**	no
Notice number	24	**Compliance by**	16/07/10
Compliance with notice?	yes	**Date treated**	09/07/10
Notes			

Site number	8	**Borough**	Ealing
Local Authority owned?	no	**Grid square**	TQ 1881
Date found	23/05/10	**Finder**	FC
Number of clusters / nests	4	**Trees infested**	1
Nests from 2009 or before	3	**Nests present 26/07/10?**	no
Notice number	25	**Compliance by**	16/07/10
Compliance with notice?	yes	**Date treated**	16/07/10
Notes			

Site number	9	**Borough**	Ealing
Local Authority owned?	no	**Grid square**	TQ 1881
Date found	19/07/10	**Finder**	FC
Number of clusters / nests	7	**Trees infested**	1
Nests from 2009 or before	0	**Nests present 26/07/10?**	yes
Notice number	56	**Compliance by**	06/08/10
Compliance with notice?	yes	**Date treated**	06/08/10
Notes			

Site number	10	**Borough**	Ealing
Local Authority owned?	no	**Grid square**	TQ 1881
Date found	17/06/10	**Finder**	FC
Number of clusters / nests	1	**Trees infested**	1
Nests from 2009 or before	0	**Nests present 26/07/10?**	yes
Notice number	58	**Compliance by**	12/08/10
Compliance with notice?	attempted	**Date treated**	Still in situ
Notes	Contractor engaged with no experience in OPM. Nests still found to be present on re-inspection, despite guidance given by telephone		

Site number	11	**Borough**	Ealing
Local Authority owned?	no	**Grid square**	TQ 1881
Date found	17/06/10	**Finder**	FC
Number of clusters / nests	1	**Trees infested**	1
Nests from 2009 or before	0	**Nests present 26/07/10?**	yes
Notice number	59	**Compliance by**	12/08/10
Compliance with notice?	yes	**Date treated**	06/08/10
Notes			

Site number	12	**Borough**	Ealing
Local Authority owned?	no	**Grid square**	TQ 1881
Date found	19/07/10	**Finder**	FC
Number of clusters / nests	1	**Trees infested**	1
Nests from 2009 or before	1	**Nests present 26/07/10?**	yes
Notice number	61	**Compliance by**	13/08/10
Compliance with notice?	yes	**Date treated**	06/08/10
Notes			

Site number	13	**Borough**	Ealing
Local Authority owned?	no	**Grid square**	TQ 1881
Date found	23/06/10	**Finder**	FC
Number of clusters / nests	2	**Trees infested**	1
Nests from 2009 or before	0	**Nests present 26/07/10?**	yes
Notice number	66	**Compliance by**	14/08/10
Compliance with notice?		**Date treated**	Still in situ
Notes	Owner contacted inspection team to state that he was in ill health and could not afford the work. Subsequently stated in an email that his son had removed the nests. Re-inspection from outside the property found the nests still present		

Site number	14	**Borough**	Ealing
Local Authority owned?	yes	**Grid square**	TQ 1881
Date found	23/05/10	**Finder**	FC
Number of clusters / nests	4	**Trees infested**	7
Nests from 2009 or before	6	**Nests present 26/07/10?**	no
Notice number	N/A	**Compliance by**	N/A
Compliance with notice?	N/A	**Date treated**	pesticide
Notes	Use of BT and later Deltamethrin		

Site number	15	**Borough**	Ealing
Local Authority owned?	yes	**Grid square**	TQ 1881
Date found	Not known	**Finder**	LB Ealing
Number of clusters / nests	1	**Trees infested**	1
Nests from 2009 or before	Not known	**Nests present 26/07/10?**	no
Notice number	N/A	**Compliance by**	N/A
Compliance with notice?	N/A	**Date treated**	24/07/10
Notes			

Site number	16	**Borough**	Ealing
Local Authority owned?	no	**Grid square**	TQ 1882
Date found	22/06/10	**Finder**	FC
Number of clusters / nests	16	**Trees infested**	13
Nests from 2009 or before	?	**Nests present 26/07/10?**	no
Notice number	14	**Compliance by**	16/07/10
Compliance with notice?	yes	**Date treated**	13/07/10
Notes			

Site number	17	**Borough**	Ealing
Local Authority owned?	no	**Grid square**	TQ 1882
Date found	19/07/10	**Finder**	FC
Number of clusters / nests	22	**Trees infested**	9
Nests from 2009 or before	0	**Nests present 26/07/10?**	yes
Notice number	60	**Compliance by**	13/08/10
Compliance with notice?	yes	**Date treated**	12/08/10
Notes			

Site number	18	**Borough**	Ealing
Local Authority owned?	no	**Grid square**	TQ 1882
Date found	06/07/10	**Finder**	FC
Number of clusters / nests	4	**Trees infested**	4
Nests from 2009 or before	1	**Nests present 26/07/10?**	yes
Notice number	62	**Compliance by**	13/08/10
Compliance with notice?	yes	**Date treated**	18/08/10
Notes			

Site number	19	**Borough**	Ealing
Local Authority owned?	no	**Grid square**	TQ 1882
Date found	06/07/10	**Finder**	FC
Number of clusters / nests	1	**Trees infested**	1
Nests from 2009 or before	1	**Nests present 26/07/10?**	yes
Notice number	63	**Compliance by**	14/08/10
Compliance with notice?	?	**Date treated**	not known
Notes	Access problems have prevented full re-inspection		

Site number	20	**Borough**	Ealing
Local Authority owned?	yes	**Grid square**	TQ 1882
Date found	Not known	**Finder**	FC
Number of clusters / nests	2	**Trees infested**	2
Nests from 2009 or before	?	**Nests present 26/07/10?**	no
Notice number	N/A	**Compliance by**	N/A
Compliance with notice?	N/A	**Date treated**	13/07/10
Notes			

Site number	21	**Borough**	Ealing
Local Authority owned?	yes	**Grid square**	TQ 1882
Date found	Not known	**Finder**	LB Ealing
Number of clusters / nests	30	**Trees infested**	8
Nests from 2009 or before	?	**Nests present 26/07/10?**	no
Notice number	N/A	**Compliance by**	N/A
Compliance with notice?	N/A	**Date treated**	not known
Notes	Treatment at this site required a London "red-route" lane closure. This was obtained following FC intervention		

Site number	22	**Borough**	Ealing
Local Authority owned?	no	**Grid square**	TQ 1981
Date found	21/07/10	**Finder**	FC
Number of clusters / nests	2	**Trees infested**	1
Nests from 2009 or before	0	**Nests present 26/07/10?**	yes
Notice number	54	**Compliance by**	06/08/10
Compliance with notice?	yes	**Date treated**	29/07/10
Notes			

Site number	23	**Borough**	Ealing
Local Authority owned?	no	**Grid square**	TQ 1981
Date found	21/07/10	**Finder**	FC
Number of clusters / nests	8	**Trees infested**	1
Nests from 2009 or before	0	**Nests present 26/07/10?**	yes
Notice number	55	**Compliance by**	06/08/10
Compliance with notice?	yes	**Date treated**	29/07/10
Notes			

Site number	24	**Borough**	Ealing
Local Authority owned?	yes	**Grid square**	TQ 1981
Date found	25/05/10	**Finder**	FC
Number of clusters / nests	2	**Trees infested**	2
Nests from 2009 or before	1	**Nests present 26/07/10?**	yes
Notice number	N/A	**Compliance by**	N/A
Compliance with notice?	N/A	**Date treated**	30/08/10
Notes	Street trees in close proximity		

Site number	25	**Borough**	Ealing
Local Authority owned?	no	**Grid square**	TQ 1982
Date found	10/05/10	**Finder**	FC
Number of clusters / nests	18	**Trees infested**	17
Nests from 2009 or before	3	**Nests present 26/07/10?**	no
Notice number	12	**Compliance by**	16/07/10
Compliance with notice?	yes	**Date treated**	12/07/10
Notes	First infested 2009		

Site number	26	**Borough**	Ealing
Local Authority owned?	no	**Grid square**	TQ 1982
Date found	25/05/10	**Finder**	FC
Number of clusters / nests	144	**Trees infested**	70
Nests from 2009 or before	4	**Nests present 26/07/10?**	no
Notice number	12	**Compliance by**	16/07/10
Compliance with notice?	yes	**Date treated**	09/07/10
Notes	Detailed information has not been forthcoming despite repeated requests. The total for nest removed is believed to be accurate, but the number of infested trees is estimated		

Site number	27	**Borough**	Ealing
Local Authority owned?	no	**Grid square**	TQ 1982
Date found	15/06/10	**Finder**	FC
Number of clusters / nests	6	**Trees infested**	2
Nests from 2009 or before	2	**Nests present 26/07/10?**	yes
Notice number	17	**Compliance by**	16/07/10
Compliance with notice?	attempted	**Date treated**	11/08/10
Notes	A verbal promise from a neighbouring landowner to remove these nests was not fulfilled. Therefore the owner, acting in good faith, had to make alternative arrangements after compliance date had passed		

Site number	28	**Borough**	Ealing
Local Authority owned?	no	**Grid square**	TQ 1983
Date found	13/05/10	**Finder**	FC
Number of clusters / nests	2	**Trees infested**	2
Nests from 2009 or before	1	**Nests present 26/07/10?**	yes
Notice number	65	**Compliance by**	14/08/10
Compliance with notice?	yes	**Date treated**	18/08/10
Notes	Delay in determining the identity of the owner or occupier		

Site number	29	**Borough**	Ealing
Local Authority owned?	no	**Grid square**	TQ 2082
Date found	28/06/10	**Finder**	FC
Number of clusters / nests	5	**Trees infested**	4
Nests from 2009 or before	0	**Nests present 26/07/10?**	no
Notice number	12	**Compliance by**	16/07/10
Compliance with notice?	yes	**Date treated**	20/07/10
Notes			

Site number	30	**Borough**	Hounslow
Local Authority owned?	no	**Grid square**	TQ 1478
Date found	19/06/10	**Finder**	FC
Number of clusters / nests	1	**Trees infested**	1
Nests from 2009 or before	0	**Nests present 26/07/10?**	no
Notice number	35	**Compliance by**	16/07/10
Compliance with notice?	yes	**Date treated**	21/06/10
Notes	Outlier at the north-west of the outbreak zone		

Site number	31	**Borough**	Hounslow
Local Authority owned?	no?	**Grid square**	TQ 1575
Date found	24/06/10	**Finder**	FC
Number of clusters / nests	2	**Trees infested**	1
Nests from 2009 or before	0	**Nests present 26/07/10?**	no
Notice number	13	**Compliance by**	16/07/10
Compliance with notice?	yes	**Date treated**	Prior to August
Notes	This tree is not on the Local Authority's database, and because it is close to a watercourse it is possible that another landowner has responsibility for it. Notwithstanding this doubt, the Local Authority arranged for the nest to be removed, without accepting liability.		

Site number	32	**Borough**	Hounslow
Local Authority owned?	no	**Grid square**	TQ 1575
Date found	24/06/10	**Finder**	FC
Number of clusters / nests	1	**Trees infested**	1
Nests from 2009 or before	0	**Nests present 26/07/10?**	no
Notice number	N/A	**Compliance by**	N/A
Compliance with notice?	N/A	**Date treated**	24/06/10
Notes	Small and potentially non-viable nest removed for investigation and then destroyed in situ by FC inspector. Landowner not traced, therefore notice not served		

Site number	33	**Borough**	Hounslow
Local Authority owned?	no	**Grid square**	TQ 1576
Date found	06/08/10	**Finder**	FC
Number of clusters / nests	1	**Trees infested**	1
Nests from 2009 or before	0	**Nests present 26/07/10?**	yes
Notice number	70	**Compliance by**	23/08/10
Compliance with notice?	yes	**Date treated**	23/08/10
Notes	Outlier in south-west Hounslow		

Site number	34	**Borough**	Hounslow
Local Authority owned?	no	**Grid square**	TQ 1577
Date found	29/07/10	**Finder**	FC
Number of clusters / nests	1	**Trees infested**	1
Nests from 2009 or before	0	**Nests present 26/07/10?**	yes
Notice number	57	**Compliance by**	12/08/10
Compliance with notice?	yes	**Date treated**	02/08/10
Notes	Contractor attended site, but couldn't find the nest. An inspector attended site to point out the nest, re-inspect and confirm compliance		
Site number	35	**Borough**	Hounslow
Local Authority owned?	no	**Grid square**	TQ 1577
Date found	18/08/10	**Finder**	FC
Number of clusters / nests	1	**Trees infested**	1
Nests from 2009 or before	0	**Nests present 26/07/10?**	yes
Notice number	73	**Compliance by**	02/09/10
Compliance with notice?	no	**Date treated**	Still in situ
Notes	Difficulty in finding the owner of this potential development site. Having served notice, there has been no contact from the owner and the nest was still in situ on 03/11/10		

Site number	36	**Borough**	Hounslow
Local Authority owned?	yes	**Grid square**	TQ 1578
Date found	20/06/10	**Finder**	FC
Number of clusters / nests	4	**Trees infested**	2
Nests from 2009 or before	0	**Nests present 26/07/10?**	no
Notice number	13	**Compliance by**	16/07/10
Compliance with notice?	yes	**Date treated**	prior to 26/07/10
Notes	Contractor missed a nest at this site and had to re-visit		

Site number	37	**Borough**	Hounslow
Local Authority owned?	no	**Grid square**	TQ 1578
Date found	18/06/10	**Finder**	FC
Number of clusters / nests	26	**Trees infested**	20
Nests from 2009 or before	2	**Nests present 26/07/10?**	yes
Notice number	31	**Compliance by**	16/07/10
Compliance with notice?	attempted	**Date treated**	July/August 2010
Notes	First infested in 2009, but not discovered by FC inspectors until December 2009. Multiple infestation resulting in late-forming nests being found during the adult flight period		

Site number	38	**Borough**	Hounslow
Local Authority owned?	no	**Grid square**	TQ 1578
Date found	17/07/10	**Finder**	FC
Number of clusters / nests	1	**Trees infested**	1
Nests from 2009 or before	0	**Nests present 26/07/10?**	no
Notice number	68	**Compliance by**	14/08/10
Compliance with notice?	yes	**Date treated**	19/07/10
Notes	Notice served after the nest had already been removed by the pro-active management. Notice was served to address the potential issue of transport of infested material		
Site number	39	**Borough**	Hounslow
Local Authority owned?	no	**Grid square**	TQ 1578
Date found	22/07/10	**Finder**	FC
Number of clusters / nests	1	**Trees infested**	1
Nests from 2009 or before	0	**Nests present 26/07/10?**	yes
Notice number	69	**Compliance by**	23/08/10
Compliance with notice?	not known	**Date treated**	not known
Notes	No contact from notice recipient. At the time of serving notice by hand, there was discussion concerning liability between landowner and business tenant		

Site number	40	**Borough**	Hounslow
Local Authority owned?	no	**Grid square**	TQ 1674
Date found	14/06/10	**Finder**	FC
Number of clusters / nests	1	**Trees infested**	1
Nests from 2009 or before	0	**Nests present 26/07/10?**	no
Notice number	30	**Compliance by**	16/07/10
Compliance with notice?	yes	**Date treated**	13/07/10
Notes			

Site number	41	**Borough**	Hounslow
Local Authority owned?	no	**Grid square**	TQ 1674
Date found	21/06/10	**Finder**	FC
Number of clusters / nests	1	**Trees infested**	1
Nests from 2009 or before	0	**Nests present 26/07/10?**	no
Notice number	33	**Compliance by**	16/07/10
Compliance with notice?	yes	**Date treated**	13/07/10
Notes			

Site number	42	**Borough**	Hounslow
Local Authority owned?	no	**Grid square**	TQ 1675
Date found	06/06/10	**Finder**	FC
Number of clusters / nests	3	**Trees infested**	1
Nests from 2009 or before	0	**Nests present 26/07/10?**	no
Notice number	1	**Compliance by**	16/07/10
Compliance with notice?	yes	**Date treated**	09/07/10
Notes	Nests removed as part of the FC trial of vacuum nest removal		

Site number	43	**Borough**	Hounslow
Local Authority owned?	no	**Grid square**	TQ 1675
Date found	06/06/10	**Finder**	FC
Number of clusters / nests	4	**Trees infested**	1
Nests from 2009 or before	0	**Nests present 26/07/10?**	no
Notice number	26	**Compliance by**	16/07/10
Compliance with notice?	yes	**Date treated**	09/07/10
Notes	Nests removed as part of the FC trial of vacuum nest removal		

Site number	44	**Borough**	Hounslow
Local Authority owned?	no	**Grid square**	TQ 1676
Date found	11/05/10	**Finder**	FC
Number of clusters / nests	6	**Trees infested**	2
Nests from 2009 or before	0	**Nests present 26/07/10?**	no
Notice number	3	**Compliance by**	16/07/10
Compliance with notice?	yes	**Date treated**	24/06/10
Notes	First infested 2009		

Site number	45	**Borough**	Hounslow
Local Authority owned?	no	**Grid square**	TQ 1676
Date found	19/05/10	**Finder**	FC
Number of clusters / nests	21	**Trees infested**	15
Nests from 2009 or before	2	**Nests present 26/07/10?**	no
Notice number	5	**Compliance by**	16/07/10
Compliance with notice?	yes	**Date treated**	13/07/10
Notes	Pro-active management at this site involving a mixture of treatments with BT, Deltamethrin and manual nest removal		

Site number	46	**Borough**	Hounslow
Local Authority owned?	yes	**Grid square**	TQ 1676
Date found	28/06/10	**Finder**	FC
Number of clusters / nests	3	**Trees infested**	2
Nests from 2009 or before	0	**Nests present 26/07/10?**	no
Notice number	13	**Compliance by**	16/07/10
Compliance with notice?	yes	**Date treated**	25/07/10
Notes	Contractor missed one nest, so a second visit was necessary		

Site number	47	**Borough**	Hounslow
Local Authority owned?	yes	**Grid square**	TQ 1676
Date found	20/05/10	**Finder**	FC
Number of clusters / nests	3	**Trees infested**	2
Nests from 2009 or before	0	**Nests present 26/07/10?**	yes
Notice number	13	**Compliance by**	16/07/10
Compliance with notice?	attempted	**Date treated**	29/07/10
Notes	Two trees infested, but one nest missed by contractor in mid-July. Second contractor engaged late July, due to the correct cost centre being identified. After a site meeting with FC inspectors, the remaining nest was removed without delay.		

Site number	48	**Borough**	Hounslow
Local Authority owned?	yes	**Grid square**	TQ 1676
Date found	22/05/10	**Finder**	FC
Number of clusters / nests	5	**Trees infested**	1
Nests from 2009 or before	0	**Nests present 26/07/10?**	no
Notice number	13	**Compliance by**	16/07/10
Compliance with notice?	yes	**Date treated**	07/06/10
Notes	Multiple infestation on a tree first infested in 2008. Contractor could not initially find one of the larval clusters. FC inspector located the cluster within one metre of ground level at a site frequented by young children		

Site number	49	**Borough**	Hounslow
Local Authority owned?	yes	**Grid square**	TQ 1676
Date found	21/06/10	**Finder**	FC
Number of clusters / nests	2	**Trees infested**	1
Nests from 2009 or before	0	**Nests present 26/07/10?**	no
Notice number	13	**Compliance by**	16/07/10
Compliance with notice?	yes	**Date treated**	25/07/10
Notes	One nest removed prior to 16/07/10, but second nest missed by contractor. Second nest removed following FC guidance		

Site number	50	**Borough**	Hounslow
Local Authority owned?	yes	**Grid square**	TQ 1676
Date found	21/05/10	**Finder**	FC
Number of clusters / nests	12	**Trees infested**	1
Nests from 2009 or before	0	**Nests present 26/07/10?**	no
Notice number	13	**Compliance by**	16/07/10
Compliance with notice?	yes	**Date treated**	12/06/10
Notes	Multiple infestation requiring repeat visits. Possibility of late-forming nests missed at this site due to demands on inspector resource.		

Site number	51	**Borough**	Hounslow
Local Authority owned?	yes	**Grid square**	TQ 1677
Date found	02/06/10	**Finder**	FC
Number of clusters / nests	6	**Trees infested**	1
Nests from 2009 or before	0	**Nests present 26/07/10?**	no
Notice number	13	**Compliance by**	16/07/10
Compliance with notice?	yes	**Date treated**	09/07/10
Notes	Multiple nests and multiple visits required as contractor missed nests on two occasions		

Site number	52	**Borough**	Hounslow
Local Authority owned?	no	**Grid square**	TQ 1677
Date found	05/06/10	**Finder**	FC
Number of clusters / nests	2	**Trees infested**	2
Nests from 2009 or before	0	**Nests present 26/07/10?**	no
Notice number	19	**Compliance by**	16/07/10
Compliance with notice?	yes	**Date treated**	23/07/10
Notes	Initial problems with finding landowner and then FC contractor credibility. Once validity of legislation confirmed, action authorised by managing agent		

Site number	53	**Borough**	Hounslow
Local Authority owned?	no	**Grid square**	TQ 1773
Date found	11/07/10	**Finder**	FC
Number of clusters / nests	35	**Trees infested**	5
Nests from 2009 or before	2	**Nests present 26/07/10?**	yes
Notice number	67	**Compliance by**	14/08/10
Compliance with notice?	yes	**Date treated**	10/08/10
Notes	Multiple infestations, contractor missing nests on first visit. Re-inspection required contractor to re-visit site.		

Site number	54	**Borough**	Hounslow
Local Authority owned?	no	**Grid square**	TQ 1777
Date found	09/06/10	**Finder**	FC
Number of clusters / nests	2	**Trees infested**	1
Nests from 2009 or before	0	**Nests present 26/07/10?**	no
Notice number	2	**Compliance by**	16/07/10
Compliance with notice?	yes	**Date treated**	09/07/10
Notes	First infested 2009		

Site number	55	**Borough**	Hounslow
Local Authority owned?	no	**Grid square**	TQ 1777
Date found	21/05/10	**Finder**	contractor
Number of clusters / nests	0	**Trees infested**	1
Nests from 2009 or before	1	**Nests present 26/07/10?**	no
Notice number	38	**Compliance by**	16/07/10
Compliance with notice?	yes	**Date treated**	13/07/10
Notes	Old nest found by neighbouring landowner		

Site number	56	**Borough**	Hounslow
Local Authority owned?	yes	**Grid square**	TQ 1878
Date found	26/05/10	**Finder**	FC
Number of clusters / nests	1	**Trees infested**	1
Nests from 2009 or before	0	**Nests present 26/07/10?**	no
Notice number	13	**Compliance by**	16/07/10
Compliance with notice?	yes	**Date treated**	27/05/10
Notes	Third year of infestation on an outlier		

Site number	57	**Borough**	Hounslow
Local Authority owned?	no	**Grid square**	TQ 1977
Date found	05/06/10	**Finder**	FC
Number of clusters / nests	1	**Trees infested**	1
Nests from 2009 or before	0	**Nests present 26/07/10?**	yes
Notice number	14	**Compliance by**	16/07/10
Compliance with notice?	yes	**Date treated**	13/07/10
Notes	Difficulties in arranging the necessary safety-critical access delayed access and treatment		

Site number	58	**Borough**	Hounslow
Local Authority owned?	no	**Grid square**	TQ 1977
Date found	02/06/10	**Finder**	FC
Number of clusters / nests	3	**Trees infested**	3
Nests from 2009 or before	0	**Nests present 26/07/10?**	no
Notice number	14	**Compliance by**	16/07/10
Compliance with notice?	attempted	**Date treated**	23/07/10
Notes	Difficulties in arranging the necessary safety-critical access delayed access and treatment		

Site number	59	**Borough**	Hounslow
Local Authority owned?	no	**Grid square**	TQ 1977
Date found	27/05/10	**Finder**	FC
Number of clusters / nests	1	**Trees infested**	1
Nests from 2009 or before	0	**Nests present 26/07/10?**	yes
Notice number	14	**Compliance by**	16/07/10
Compliance with notice?	attempted	**Date treated**	29/07/10
Notes	Difficulties in arranging the necessary safety-critical access delayed access and treatment		

Site number	60	**Borough**	Hounslow
Local Authority owned?	yes	**Grid square**	TQ 1978
Date found	27/05/10	**Finder**	FC
Number of clusters / nests	4	**Trees infested**	3
Nests from 2009 or before	0	**Nests present 26/07/10?**	no
Notice number	13	**Compliance by**	16/07/10
Compliance with notice?	yes	**Date treated**	08/07/10
Notes			

Site number	61	**Borough**	Hounslow
Local Authority owned?	yes	**Grid square**	TQ 1978
Date found	05/06/10	**Finder**	FC
Number of clusters / nests	1	**Trees infested**	1
Nests from 2009 or before	1	**Nests present 26/07/10?**	no
Notice number	13	**Compliance by**	16/07/10
Compliance with notice?	yes	**Date treated**	08/07/10
Notes			

Site number	62	**Borough**	Hounslow
Local Authority owned?	no	**Grid square**	TQ 1978
Date found	06/06/10	**Finder**	FC
Number of clusters / nests	4	**Trees infested**	1
Nests from 2009 or before	0	**Nests present 26/07/10?**	no
Notice number	22	**Compliance by**	16/07/10
Compliance with notice?	yes	**Date treated**	09/07/10
Notes	Nests removed as part of Forestry Commission Standard Operating Procedure trial for vacuum nest removal		

Site number	63	**Borough**	Hounslow
Local Authority owned?	no	**Grid square**	TQ 1978
Date found	04/07/10	**Finder**	FC
Number of clusters / nests	4	**Trees infested**	1
Nests from 2009 or before	no	**Nests present 26/07/10?**	yes
Notice number	49	**Compliance by**	23/07/10
Compliance with notice?	no	**Date treated**	10/09/10
Notes	Managing agent did not believe the FC inspector's validity and was abusive to an inspector on the telephone. The time and date of this call is recorded in writing. On re-assurance that the FC inspector was lawfully empowered, the agent instructed his own "expert" to attend site. The "expert" contacted an FC inspector for guidance, but was unable to find the infestation. Managing agent then attempted to recover the costs of the "expert's" visit from the FC. Once photographic evidence was supplied to the managing agent, the matter was finally forwarded to the property owner. The property owner contacted the FC to confirm the situation and a contractor was finally engaged in September. The contractor commented that the client "was not very polite".		

Site number	64	**Borough**	Hounslow
Local Authority owned?	no	**Grid square**	TQ 1978
Date found	05/06/10	**Finder**	FC
clusters / nests	1	**Trees infested**	1
Nests from 2009 or before		**Nests present 26/07/10?**	no
Notice number	51	**Compliance by**	23/07/10
Compliance with notice?	yes	**Date treated**	09/07/10
Notes			

Site number	65	**Borough**	Hounslow
Local Authority owned?	no	**Grid square**	TQ 2076
Date found	04/06/10	**Finder**	FC
Number of clusters / nests	4	**Trees infested**	1
Nests from 2009 or before	4	**Nests present 26/07/10?**	no
Notice number	6	**Compliance by**	16/07/10
Compliance with notice?	yes	**Date treated**	09/07/10
Notes	First infested 2009 or before		

Site number	66	**Borough**	Hounslow
Local Authority owned?	no	**Grid square**	TQ 2076
Date found	02/07/10	**Finder**	FC
Number of clusters / nests	1	**Trees infested**	1
Nests from 2009 or before	0	**Nests present 26/07/10?**	no
Notice number	42	**Compliance by**	23/07/10
Compliance with notice?	yes	**Date treated**	13/07/10
Notes			

Site number	67	**Borough**	Hounslow
Local Authority owned?	no	**Grid square**	TQ 2076
Date found	04/07/10	**Finder**	FC
Number of clusters / nests	1	**Trees infested**	1
Nests from 2009 or before	0	**Nests present 26/07/10?**	no
Notice number	52	**Compliance by**	23/07/10
Compliance with notice?	yes	**Date treated**	16/07/10
Notes			

Site number	68	**Borough**	Hounslow
Local Authority owned?	no	**Grid square**	TQ 2077
Date found	11/06/10	**Finder**	FC
Number of clusters / nests	2	**Trees infested**	1
Nests from 2009 or before		**Nests present 26/07/10?**	no
Notice number	7	**Compliance by**	16/07/10
Compliance with notice?	yes	**Date treated**	16/07/10
Notes	First infested 2009		

Site number	69	**Borough**	Hounslow
Local Authority owned?	yes	**Grid square**	TQ 2077
Date found	18/05/10	**Finder**	FC
Number of clusters / nests	127	**Trees infested**	31
Nests from 2009 or before	7	**Nests present 26/07/10?**	yes
Notice number	13	**Compliance by**	16/07/10
Compliance with notice?	attempted	**Date treated**	01/08/10
Notes	Complex site first infested in 2008 or earlier. Multiple infestation and larval development stagger coupled with lack of contractor resource resulted in many nests emerging during the adult flight period		

Site number	70	**Borough**	Hounslow
Local Authority owned?	yes	**Grid square**	TQ 2077
Date found	11/06/10	**Finder**	FC
Number of clusters / nests	4	**Trees infested**	1
Nests from 2009 or before	0	**Nests present 26/07/10?**	no
Notice number	13	**Compliance by**	16/07/10
Compliance with notice?	yes	**Date treated**	06/07/10
Notes			

Site number	71	**Borough**	Hounslow
Local Authority owned?	no	**Grid square**	TQ 2077
Date found	11/06/10	**Finder**	FC
Number of clusters / nests	2	**Trees infested**	1
Nests from 2009 or before	0	**Nests present 26/07/10?**	no
Notice number	32	**Compliance by**	16/07/10
Compliance with notice?	yes	**Date treated**	06/07/10
Notes			

Site number	72	**Borough**	Hounslow
Local Authority owned?	no	**Grid square**	TQ 2077
Date found	04/07/10	**Finder**	FC
Number of clusters / nests	1	**Trees infested**	1
Nests from 2009 or before	0	**Nests present 26/07/10?**	no
Notice number	47	**Compliance by**	23/07/10
Compliance with notice?	yes	**Date treated**	19/07/10
Notes			

Site number	73	**Borough**	Hounslow
Local Authority owned?	no	**Grid square**	TQ 2077
Date found	04/07/10	**Finder**	FC
Number of clusters / nests	2	**Trees infested**	1
Nests from 2009 or before	0	**Nests present 26/07/10?**	no
Notice number	48	**Compliance by**	23/07/10
Compliance with notice?	yes	**Date treated**	19/07/10
Notes			

Site number	74	**Borough**	Hounslow
Local Authority owned?	no	**Grid square**	TQ 2078
Date found	03/08/10	**Finder**	FC
Number of clusters / nests	1	**Trees infested**	2
Nests from 2009 or before	1	**Nests present 26/07/10?**	yes
Notice number	71	**Compliance by**	23/08/10
Compliance with notice?	yes	**Date treated**	07/08/10
Notes			

Site number	75	**Borough**	Hounslow
Local Authority owned?	yes	**Grid square**	TQ 2176
Date found	04/07/10	**Finder**	FC
Number of clusters / nests	3	**Trees infested**	2
Nests from 2009 or before	1	**Nests present 26/07/10?**	no
Notice number	13	**Compliance by**	16/07/10
Compliance with notice?	yes	**Date treated**	22/07/10
Notes			

Site number	76	**Borough**	Hounslow
Local Authority owned?	yes	**Grid square**	TQ 2177
Date found	03/06/10	**Finder**	FC
Number of clusters / nests	56	**Trees infested**	3
Nests from 2009 or before	0	**Nests present 26/07/10?**	yes
Notice number	13	**Compliance by**	16/07/10
Compliance with notice?	attempted	**Date treated**	Prior to August
Notes	Staggered larval emergence, requiring multiple visits from inspectors and contractors		

Site number	77	**Borough**	Hounslow
Local Authority owned?	yes	**Grid square**	TQ 2177
Date found	03/06/10	**Finder**	FC
Number of clusters / nests	5	**Trees infested**	1
Nests from 2009 or before	0	**Nests present 26/07/10?**	no
Notice number	13	**Compliance by**	16/07/10
Compliance with notice?	yes	**Date treated**	16/07/10
Notes			

Site number	78	**Borough**	Hounslow
Local Authority owned?	yes	**Grid square**	TQ 2177
Date found	03/06/10	**Finder**	FC
Number of clusters / nests	24	**Trees infested**	1
Nests from 2009 or before	4	**Nests present 26/07/10?**	yes
Notice number	13	**Compliance by**	16/07/10
Compliance with notice?	attempted	**Date treated**	Prior to August
Notes	Staggered larval emergence, requiring multiple visits from inspectors and contractors		

Site number	79	**Borough**	Hounslow
Local Authority owned?	no	**Grid square**	TQ 2177
Date found	10/06/10	**Finder**	FC
Number of clusters / nests	2	**Trees infested**	1
Nests from 2009 or before	0	**Nests present 26/07/10?**	no
Notice number	37	**Compliance by**	16/07/10
Compliance with notice?	yes	**Date treated**	17/06/10
Notes	Site owned by LB Hounslow, but lease transferred liability to lessee.		

Site number	80	**Borough**	Hounslow
Local Authority owned?	yes	**Grid square**	TQ 2178
Date found	02/06/10	**Finder**	FC
Number of clusters / nests	3	**Trees infested**	1
Nests from 2009 or before	1	**Nests present 26/07/10?**	no
Notice number	13	**Compliance by**	16/07/10
Compliance with notice?	yes	**Date treated**	22/07/10
Notes	Repeat visit needed as contractor missed the nest from 2009		

Site number	81	**Borough**	Richmond
Local Authority owned?	yes	**Grid square**	TQ ?
Date found	Not known	**Finder**	LB Richmond
Number of clusters / nests	6	**Trees infested**	5
Nests from 2009 or before	0	**Nests present 26/07/10?**	?
Notice number	N/A	**Compliance by**	N/A
Compliance with notice?		**Date treated**	not known
Notes	No detailed information available		

Site number	82	**Borough**	Richmond
Local Authority owned?	no	**Grid square**	TQ 1570
Date found	20/10/10	**Finder**	FC
Number of clusters / nests	3	**Trees infested**	3
Nests from 2009 or before	0	**Nests present 26/07/10?**	yes
Notice number	N/A	**Compliance by**	N/A
Compliance with notice?		**Date treated**	Still in situ
Notes	Nests recently discovered and removal in progress. Probable that nests will have been removed prior to report publication		

Site number	83	**Borough**	Richmond
Local Authority owned?	no	**Grid square**	TQ 1574
Date found	21/07/10	**Finder**	FC
Number of clusters / nests	2	**Trees infested**	1
Nests from 2009 or before	0	**Nests present 26/07/10?**	yes
Notice number	53	**Compliance by**	06/08/10
Compliance with notice?	no	**Date treated**	Still in situ
Notes	Owner/occupier supplied with details of several contractors. No action taken		

Site number	84	**Borough**	Richmond
Local Authority owned?	no	**Grid square**	TQ 1674
Date found	08/06/10	**Finder**	FC
Number of clusters / nests	2	**Trees infested**	1
Nests from 2009 or before	0	**Nests present 26/07/10?**	no
Notice number	27	**Compliance by**	16/07/10
Compliance with notice?	yes	**Date treated**	12/06/10
Notes			

Site number	85	**Borough**	Richmond
Local Authority owned?	no	**Grid square**	TQ 1674
Date found	14/06/10	**Finder**	FC
Number of clusters / nests	17	**Trees infested**	4
Nests from 2009 or before	0	**Nests present 26/07/10?**	no
Notice number	29	**Compliance by**	16/07/10
Compliance with notice?	yes	**Date treated**	24/06/10
Notes			

Site number	86	**Borough**	Richmond
Local Authority owned?	no	**Grid square**	TQ 1675
Date found	12/06/10	**Finder**	FC
Number of clusters / nests	1	**Trees infested**	1
Nests from 2009 or before	0	**Nests present 26/07/10?**	no
Notice number	28	**Compliance by**	16/07/10
Compliance with notice?	yes	**Date treated**	13/07/10
Notes			

Site number	87	**Borough**	Richmond
Local Authority owned?	no	**Grid square**	TQ 1675
Date found	15/06/10	**Finder**	FC
Number of clusters / nests	4	**Trees infested**	5
Nests from 2009 or before	1	**Nests present 26/07/10?**	?
Notice number	N/A	**Compliance by**	N/A
Compliance with notice?	N/A	**Date treated**	not known
Notes	Uncertainty concerning ownership, whether Local Authority or River Authority. Nests removed by LB Richmond		

Site number	88	**Borough**	Richmond
Local Authority owned?	no	**Grid square**	TQ 1768
Date found	25/09/10	**Finder**	Contractor
Number of clusters / nests	53	**Trees infested**	14
Nests from 2009 or before	5	**Nests present 26/07/10?**	yes
Notice number	74	**Compliance by**	05/11/10
Compliance with notice?	yes	**Date treated**	01/10/10
Notes	Infestation discovered by contractor in October 2010. Site survey by FC in September 2010, multiple nests having emerged		

Site number	89	**Borough**	Richmond
Local Authority owned?	yes	**Grid square**	TQ 1772
Date found	30/06/10	**Finder**	FC
Number of clusters / nests	3	**Trees infested**	2
Nests from 2009 or before	0	**Nests present 26/07/10?**	no
Notice number	N/A	**Compliance by**	N/A
Compliance with notice?	N/A	**Date treated**	20/07/10
Notes			

Site number	90	**Borough**	Richmond
Local Authority owned?	yes	**Grid square**	TQ 1772
Date found	29/06/10	**Finder**	FC
Number of clusters / nests	2	**Trees infested**	2
Nests from 2009 or before	0	**Nests present 26/07/10?**	yes
Notice number	N/A	**Compliance by**	N/A
Compliance with notice?	N/A	**Date treated**	13/08/10
Notes	Local Authority site, not treated before emergence due to lack of contractor resource		

Site number	91	**Borough**	Richmond
Local Authority owned?	no	**Grid square**	TQ 1773
Date found	18/06/10	**Finder**	FC
Number of clusters / nests	1	**Trees infested**	1
Nests from 2009 or before	0	**Nests present 26/07/10?**	no
Notice number	35	**Compliance by**	16/07/10
Compliance with notice?	yes	**Date treated**	prior to 16/07/10
Notes			

Site number	92	**Borough**	Richmond
Local Authority owned?	no	**Grid square**	TQ 1773
Date found	16/06/10	**Finder**	FC
Number of clusters / nests	30	**Trees infested**	3
Nests from 2009 or before	0	**Nests present 26/07/10?**	no
Notice number	41	**Compliance by**	16/07/10
Compliance with notice?	yes	**Date treated**	20/07/10
Notes			

Site number	93	**Borough**	Richmond
Local Authority owned?	no	**Grid square**	TQ 1775
Date found	03/07/10	**Finder**	FC
Number of clusters / nests	7	**Trees infested**	2
Nests from 2009 or before	430	**Nests present 26/07/10?**	no
Notice number	8	**Compliance by**	16/07/10
Compliance with notice?		**Date treated**	pesticide
Notes	Significant infestation on this complex site in 2009, with nest removal continuing into 2010. Site subsequently blanket treated with BT and Deltamethrin in May 2010		

Site number	94	**Borough**	Richmond
Local Authority owned?	no	**Grid square**	TQ 1775
Date found	15/06/10	**Finder**	FC
Number of clusters / nests	2	**Trees infested**	2
Nests from 2009 or before	2	**Nests present 26/07/10?**	yes
Notice number	14	**Compliance by**	16/07/10
Compliance with notice?	yes	**Date treated**	13/07/10
Notes			

Site number	95	**Borough**	Richmond
Local Authority owned?	yes	**Grid square**	TQ 1775
Date found	15/06/10	**Finder**	FC
Number of clusters / nests	2	**Trees infested**	2
Nests from 2009 or before	1	**Nests present 26/07/10?**	yes
Notice number	N/A	**Compliance by**	N/A
Compliance with notice?	N/A	**Date treated**	not known
Notes	Timings not supplied by contractor		

Site number	96	**Borough**	Richmond
Local Authority owned?	yes	**Grid square**	TQ 1775
Date found	15/06/10	**Finder**	FC
Number of clusters / nests	7	**Trees infested**	2
Nests from 2009 or before	8	**Nests present 26/07/10?**	yes
Notice number	N/A	**Compliance by**	N/A
Compliance with notice?	N/A	**Date treated**	not known
Notes	Timings not supplied by contractor		

Site number	97	**Borough**	Richmond
Local Authority owned?	yes	**Grid square**	TQ 1871
Date found	10/07/10	**Finder**	FC
Number of clusters / nests	21	**Trees infested**	17
Nests from 2009 or before	5	**Nests present 26/07/10?**	yes
Notice number	N/A	**Compliance by**	N/A
Compliance with notice?	N/A	**Date treated**	01/08/10
Notes	Local Authority site that was not cleared before the flight period due to insufficient resources		

Site number	98	**Borough**	Richmond
Local Authority owned?	no	**Grid square**	TQ 1872
Date found	01/07/10	**Finder**	FC
Number of clusters / nests	244	**Trees infested**	99
Nests from 2009 or before	12	**Nests present 26/07/10?**	yes
Notice number	39	**Compliance by**	16/07/10
Compliance with notice?	attempted	**Date treated**	July/August 2010
Notes	Significant site of infestation, which was not discovered prior to 2010. Landowner instructed contractors and local staff to deal with infestation. However, nests were missed and required treatment on and after 26/07/10		

Site number	99	**Borough**	Richmond
Local Authority owned?	no	**Grid square**	TQ 1872
Date found	29/06/10	**Finder**	FC
Number of clusters / nests	1	**Trees infested**	1
Nests from 2009 or before	0	**Nests present 26/07/10?**	no
Notice number	44	**Compliance by**	23/07/10
Compliance with notice?	yes	**Date treated**	16/07/10
Notes			

Site number	100	**Borough**	Richmond
Local Authority owned?	no	**Grid square**	TQ 1872
Date found	29/06/10	**Finder**	FC
Number of clusters / nests	1	**Trees infested**	1
Nests from 2009 or before	0	**Nests present 26/07/10?**	yes
Notice number	45	**Compliance by**	23/07/10
Compliance with notice?	no	**Date treated**	Still in situ
Notes	No known attempt at compliance with notice		

Site number	101	**Borough**	Richmond
Local Authority owned?	no	**Grid square**	TQ 1872
Date found	29/06/10	**Finder**	FC
Number of clusters / nests	3	**Trees infested**	1
Nests from 2009 or before	0	**Nests present 26/07/10?**	no
Notice number	46	**Compliance by**	23/07/10
Compliance with notice?	yes	**Date treated**	14/07/10
Notes			

Site number	102	**Borough**	Richmond
Local Authority owned?	no	**Grid square**	TQ 1873
Date found	06/05/10	**Finder**	FC
Number of clusters / nests	58	**Trees infested**	1
Nests from 2009 or before	2	**Nests present 26/07/10?**	yes
Notice number	11	**Compliance by**	16/07/10
Compliance with notice?		**Date treated**	July/August 2010
Notes	Site with many trees which needed multiple visits from the contractor. The stagger in life cycle required repeat visits		

Site number	103	**Borough**	Richmond
Local Authority owned?	no	**Grid square**	TQ 1873
Date found	06/05/10	**Finder**	FC
Number of clusters / nests	107	**Trees infested**	9
Nests from 2009 or before	8	**Nests present 26/07/10?**	yes
Notice number	35	**Compliance by**	16/07/10
Compliance with notice?		**Date treated**	July/August 2010
Notes	Site with many trees which needed multiple visits from the contractor. The stagger in life cycle required repeat visits		

Site number	104	**Borough**	Richmond
Local Authority owned?	no	**Grid square**	TQ 1873
Date found	28/06/10	**Finder**	FC
Number of clusters / nests	1	**Trees infested**	1
Nests from 2009 or before	0	**Nests present 26/07/10?**	no
Notice number	43	**Compliance by**	23/07/10
Compliance with notice?	yes	**Date treated**	13/07/10
Notes			

Site number	105	**Borough**	Richmond
Local Authority owned?	yes	**Grid square**	TQ 1873
Date found	28/06/10	**Finder**	FC
Number of clusters / nests	187	**Trees infested**	72
Nests from 2009 or before	0	**Nests present 26/07/10?**	yes
Notice number	N/A	**Compliance by**	N/A
Compliance with notice?		**Date treated**	01/08/10
Notes	Local Authority site, not treated before the start of the flight season due to lack of resources		

Site number	106	**Borough**	Richmond
Local Authority owned?	yes	**Grid square**	TQ 1874
Date found	11/07/10	**Finder**	FC
Number of clusters / nests	7	**Trees infested**	4
Nests from 2009 or before	0	**Nests present 26/07/10?**	yes
Notice number	N/A	**Compliance by**	N/A
Compliance with notice?		**Date treated**	01/08/10
Notes	Local Authority site, not treated before the start of the flight season due to lack of resources		

Site number	107	**Borough**	Richmond
Local Authority owned?	no	**Grid square**	TQ 1875
Date found	12/05/10	**Finder**	FC
Number of clusters / nests	0	**Trees infested**	1
Nests from 2009 or before	1	**Nests present 26/07/10?**	no
Notice number	9	**Compliance by**	16/07/10
Compliance with notice?		**Date treated**	pesticide
Notes	Blanket treated with Deltamethrin		

Site number	108	**Borough**	Richmond
Local Authority owned?	no	**Grid square**	TQ 1875
Date found	06/05/10	**Finder**	FC
Number of clusters / nests	19	**Trees infested**	16
Nests from 2009 or before	0	**Nests present 26/07/10?**	no
Notice number	10	**Compliance by**	16/07/10
Compliance with notice?	yes	**Date treated**	pesticide
Notes	Blanket treated with Deltamethrin		

Site number	109	**Borough**	Richmond
Local Authority owned?	no	**Grid square**	TQ 1876
Date found	18/06/10	**Finder**	Internal staff
Number of clusters / nests	10	**Trees infested**	?
Nests from 2009 or before	86	**Nests present 26/07/10?**	no
Notice number	34	**Compliance by**	16/07/10
Compliance with notice?	yes	**Date treated**	pesticide
Notes	Site blanket treated with BT or Deltamethrin, dependent on the LERAP		

Site number	110	**Borough**	Richmond
Local Authority owned?	yes	**Grid square**	TQ 1876
Date found	09/06/10	**Finder**	FC
Number of clusters / nests	1	**Trees infested**	1
Nests from 2009 or before	0	**Nests present 26/07/10?**	no
Notice number	N/A	**Compliance by**	N/A
Compliance with notice?	N/A	**Date treated**	prior to 16/07/10
Notes			

Site number	111	**Borough**	Richmond
Local Authority owned?	yes	**Grid square**	TQ 1877
Date found	27/05/10	**Finder**	FC
Number of clusters / nests	2	**Trees infested**	1
Nests from 2009 or before	0	**Nests present 26/07/10?**	no
Notice number	N/A	**Compliance by**	N/A
Compliance with notice?	N/A	**Date treated**	Prior to 16/07/10
Notes			

Site number	112	**Borough**	Richmond
Local Authority owned?	no	**Grid square**	TQ 1973
Date found	26/05/10	**Finder**	FC / Internal
Number of clusters / nests	326	**Trees infested**	154
Nests from 2009 or before	2	**Nests present 26/07/10?**	yes
Notice number	36	**Compliance by**	16/07/10
Compliance with notice?	attempted	**Date treated**	July/August 2010
Notes	Major site of establishment in 2010, many nests still in situ after 26/07/10 despite significant resource deployed		

Site number	113	**Borough**	Richmond
Local Authority owned?	yes	**Grid square**	TQ 1975
Date found	10/06/10	**Finder**	FC
Number of clusters / nests	2	**Trees infested**	1
Nests from 2009 or before	0	**Nests present 26/07/10?**	no
Notice number	N/A	**Compliance by**	N/A
Compliance with notice?	N/A	**Date treated**	16/07/10
Notes			

Site number	114	**Borough**	Richmond
Local Authority owned?	no	**Grid square**	TQ 1976
Date found	03/06/10	**Finder**	FC
Number of clusters / nests	9	**Trees infested**	2
Nests from 2009 or before	1	**Nests present 26/07/10?**	no
Notice number	4	**Compliance by**	16/07/10
Compliance with notice?	yes	**Date treated**	22/07/10
Notes			

Site number	115	**Borough**	Richmond
Local Authority owned?	no	**Grid square**	TQ 1976
Date found	10/06/10	**Finder**	FC
Number of clusters / nests	4	**Trees infested**	1
Nests from 2009 or before	0	**Nests present 26/07/10?**	no
Notice number	15	**Compliance by**	16/07/10
Compliance with notice?	yes	**Date treated**	16/06/10
Notes			

Site number	116	**Borough**	Richmond
Local Authority owned?	no	**Grid square**	TQ 1976
Date found	10/06/10	**Finder**	FC
Number of clusters / nests	6	**Trees infested**	1
Nests from 2009 or before	0	**Nests present 26/07/10?**	no
Notice number	16	**Compliance by**	16/07/10
Compliance with notice?	yes	**Date treated**	16/06/10
Notes			

Site number	117	**Borough**	Richmond
Local Authority owned?	no	**Grid square**	TQ 1976
Date found	06/05/10	**Finder**	FC
Number of clusters / nests	7	**Trees infested**	5
Nests from 2009 or before	0	**Nests present 26/07/10?**	no
Notice number	21	**Compliance by**	16/07/10
Compliance with notice?	yes	**Date treated**	pesticide
Notes			

Site number	118	**Borough**	Richmond
Local Authority owned?	yes	**Grid square**	TQ 1976
Date found	13/06/10	**Finder**	FC
Number of clusters / nests	19	**Trees infested**	17
Nests from 2009 or before	12	**Nests present 26/07/10?**	no
Notice number	N/A	**Compliance by**	N/A
Compliance with notice?	N/A	**Date treated**	13/07/10
Notes			

Site number	119	**Borough**	Richmond
Local Authority owned?	no	**Grid square**	TQ 1977
Date found	15/06/10	**Finder**	FC
Number of clusters / nests	5	**Trees infested**	2
Nests from 2009 or before	0	**Nests present 26/07/10?**	yes
Notice number	14	**Compliance by**	16/07/10
Compliance with notice?		**Date treated**	29/07/10
Notes			

Site number	120	**Borough**	Richmond
Local Authority owned?	no	**Grid square**	TQ 1977
Date found	12/06/10	**Finder**	FC
Number of clusters / nests	2	**Trees infested**	1
Nests from 2009 or before	3	**Nests present 26/07/10?**	no
Notice number	18	**Compliance by**	16/07/10
Compliance with notice?	yes	**Date treated**	16/06/10
Notes			

Site number	121	**Borough**	Richmond
Local Authority owned?	no	**Grid square**	TQ 1978
Date found	06/06/10	**Finder**	FC
Number of clusters / nests	1	**Trees infested**	1
Nests from 2009 or before	0	**Nests present 26/07/10?**	no
Notice number	20	**Compliance by**	16/07/10
Compliance with notice?	yes	**Date treated**	30/06/10
Notes			

Site number	122	**Borough**	Richmond
Local Authority owned?	yes	**Grid square**	TQ 2075
Date found	07/05/10	**Finder**	FC
Number of clusters / nests	4	**Trees infested**	2
Nests from 2009 or before	0	**Nests present 26/07/10?**	?
Notice number	N/A	**Compliance by**	N/A
Compliance with notice?	N/A	**Date treated**	not known
Notes			

Site number	123	**Borough**	Richmond
Local Authority owned?	no	**Grid square**	TQ 2076
Date found	02/07/10	**Finder**	FC
Number of clusters / nests	22	**Trees infested**	3
Nests from 2009 or before	10	**Nests present 26/07/10?**	no
Notice number	40	**Compliance by**	16/07/10
Compliance with notice?	yes	**Date treated**	13/07/10
Notes	First infested in 2008? One tree as this site had not been found during the course of previous year's fieldwork. This tree infested to plague, with almost total defoliation		

Site number	124	**Borough**	Richmond
Local Authority owned?	no	**Grid square**	TQ 2076
Date found	06/07/10	**Finder**	FC
Number of clusters / nests	6	**Trees infested**	1
Nests from 2009 or before	1	**Nests present 26/07/10?**	?
Notice number	?	**Compliance by**	N/A
Compliance with notice?		**Date treated**	??
Notes	Details not available		

Site number	125	**Borough**	Richmond
Local Authority owned?	yes	**Grid square**	TQ 2275
Date found	07/05/10	**Finder**	LB Richmond
Number of clusters / nests	120	**Trees infested**	22
Nests from 2009 or before	0	**Nests present 26/07/10?**	yes
Notice number	N/A	**Compliance by**	N/A
Compliance with notice?	N/A	**Date treated**	01/08/10
Notes			

Site number	126	**Borough**	Richmond
Local Authority owned?	yes	**Grid square**	TQ 2276
Date found	07/05/10	**Finder**	LB Richmond
Number of clusters / nests	2	**Trees infested**	2
Nests from 2009 or before	0	**Nests present 26/07/10?**	yes
Notice number	N/A	**Compliance by**	N/A
Compliance with notice?	N/A	**Date treated**	13/08/10
Notes			

Appendix II: Notes on the population dynamics of OPM.

The population dynamics of *Thaumetopoea processionea* are classified in four stages:

Colonisation: Female flies to a new location and lays egg plaques. [I found this rather confusing]

Establishment: After one season, multiple egg plaques are laid on the "mother" tree and those nearby. Gravid females are not believed to travel far at this stage.

Plague: After establishment, numbers build in subsequent years to the level where trees are completely defoliated. Starving larvae will then leave the tree in procession in search of other oaks. If there are no oaks nearby, other tree species may be utilised. This is the only time when non-*Quercus* species are utilised, because egg plates are not thought to be laid on other tree genera. It is possible that when the population is in plague, females may be triggered to fly further, thus colonising new areas.

Crash: Multiple factors including predation and food shortage cause the population to drop in one season to very low numbers.