



*Monitoring reported deer road
casualties and related accidents in
England to 2010*

December 2011

Executive Summary

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Report to The Highways Agency

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Key Messages

1. Our core data sources show a persistent increase in deer vehicle collisions (DVCs) from 2001 until 2007 and have begun to level off since (Fig. C-1). There is no obvious single reason for this identifiable from the data, but the coincident slight decline in national road traffic volumes since 2007 may have contributed to that trend. Distribution of DVCs across England is very uneven, with South East and East of England region together accounting for over 65% of DVCs per year across all road types, as well as over 50% of those recorded on the strategic trunk road network (Fig. M-6).
2. Localised districts where some of the clearest DVC reductions have occurred include a number of areas where increased landscape level deer management and awareness campaigns have been undertaken by the Deer Initiative (in particular at Dinmore Forest in Herefordshire and Ashridge Forest in the Chilterns).
3. Within the trunk road network the highest number of DVCs recorded since 2007 include several sections of the M3 and M27 in Hampshire, A12-M25 links, M40 east of Oxford, and M11 and A12-M25 in Essex (see overview Fig. M-3b). Overall DVCs on trunk roads contribute in the region of 11% to 13% of all DVCs occurring in England.
4. The incidence of recorded DVCs shows notable peaks in May and/or October in all areas. The seasonal patterns are however most apparent by far when considered separately by road class. In England over 52% of all DVCs on motorways and 48% of those on A-class Trunk roads were recorded in the three months from April to June (Fig. C-8). The very pronounced patterns found emphasise that a very high proportion of the risk of DVCs on English trunk roads may be addressed through short-term mitigation during mid-April to mid-June, for example by running targeted DeerAware campaigns.
5. The economic 'value of prevention' even for our low-end estimate of 350 human injury DVCs across all road types in England per year is calculated at £24 million; but lies near twice that level if accounting for the finding that fewer than 70% of non-fatal injury accidents tend to be reported in national road accident statistics. We estimate that over 11,500 vehicles in England (>14,000 in UK) will incur significant damage as a result of DVCs, imposing further costs in England near £16 million over and above the £24 million to £50 million incurred through human injury DVC accidents alone. Further substantial economic losses not included in the above estimates arise through traffic delays, dealing with injured and removal of dead deer from the roadside, as well as the extensive impact of DVCs in terms of animal welfare.
6. Since 1999 reported human injury road accidents overall have fallen by close to 30% across Britain, but no similarly significant decline is apparent among numbers of injury road accidents in which deer are implicated.
7. Recording the majority of all DVCs occurring annually in England is unlikely ever to be achievable. To monitor future changes at a countrywide and regional basis, the two core data sets which in combination would be likely to continue to provide at least an index based on large and widespread sampling but requiring only comparatively limited resources are:
 - deer road casualty reports and carcass uplifts requests on the trunk network reported to HA National Command and Control centres and/or trunk road managing agents.
 - requests received by RSPCA to arrange dispatch or treatment of live deer injured in traffic collisions

Summary

- i. The second half of the 20th century has been period of extensive proliferation of road networks, rising traffic volumes and speeds throughout Europe. At the same time deer densities have also increased in most European countries (Gill, 1990; Apollonio et al., 2010), as has the frequency of road traffic accidents involving deer and other wildlife. In many countries numbers of reported deer-vehicle collisions (DVCs) have increased by more than 50% since 1996 (Table 11) and most recent reviews indicate that near one million DVCs occur per annum in Europe (Langbein, et. al. 2011) and over 1.5 million in North America (IIHS, 2008). Aside from the inevitable cost in animal suffering and material damage, DVCS are the cause of several hundred human fatalities and tens of thousands of human injuries across Europe each year.
- ii. In Great Britain, following a short-term review commissioned by the Highway Agency (HA) in 1996 (SGS, 1998) the first comprehensive countrywide assessments of DVCs were set up by The Deer Initiative in 2003 with support of HA in England and Scottish Executive in Scotland. The aim of these projects was to develop a database based on substantial widely distributed sampling of known deer road casualties and related traffic collisions each year, as a baseline to enable long term trends in the scale and distribution of the problem to be monitored countrywide and local areas of particularly high incidence of DVCs to be identified.

Scope of database assembled

- iii. During the initial three-years from 2003 a database of over 30,500 DVC reports for the period 2000-2005 was accrued through a very wide range of source organisations and individual contributors, with over 80% of these incidents reported on trunk and non trunk roads in England. On basis of data to 2006, it was estimated that each year there were around 42,000 and possibly up to 74,000 DVCs in Britain, including between 400 to 700 resulting in human injuries.
- iv. In England DVC data collection from key sources was maintained to the end of December 2010 to enable national and regional trends to be monitored, as well as local areas of relatively high DVC occurrence to be identified. Data collection in Scotland also focussed on collection of information from a more limited set of data sources (Langbein, 2011) remains on-going. There has been no formal data collection in Wales, however incidental data has been collected and is available from the Deer Initiative.
- v. Despite the reduction in data sources over 36,000 further records for England from both truck and non trunk roads have been added to the data base since 2006. The full DVC database for 2001 to 2010 now contains >60,500 records for England and >12,500 from parallel studies in Scotland, of which over 83% have been ascribed to grid references for mapping and GIS analysis.

National trends

- vi. Total numbers of DVC records obtained from among our core data sources show a persistent increase from 2001 until 2007 and have begun to level off since (Fig. C-1). Numbers of records of deer casualties reported on the trunk road network have increased throughout that period, but here improved recording and abstraction of data may have contributed. Requests for RSPCA to attend injured deer at the roadside increased steadily until end 2007 but have declined significantly since, unexplained by any changes in recording (Fig.C-3). The timing of that decline coincides with the first recorded fall in total annual traffic volumes in Britain in over 50 years, which have continued to fall by 1% year on year since 2008 (DfT, 2011). A much greater decline (by on average over 25%) has occurred in reported personal injury road accidents overall in most local authorities, but our samples of deer-related PIAs do not show any clear evidence of such a general trend. Indeed compared to other contributory factors the proportion in which deer are believed implicated has thus actually increased (Figure C-7).

Variation between regions and DVC hotspots

- vii. Distribution of DVCs across England is very uneven, with South East and East of England region together accounting for over 65% of DVCs per year overall as well as over 50% of those recorded on trunk roads (Fig. M-6). This is only in part attributable to the fact that these regions also have greatest share of road traffic (40%). DVC rates calculated *per driven vehicle mile* to account for differences in traffic remain highest overall in East of England followed by Southeast and Southwest Region (Table 7), which is likely to reflect also higher average densities of deer in these regions rather than merely differences in traffic.
- viii. Comparison between regions over time show that any such reductions since 2007 (see vi. above) are largely confined to SE, SW, and East of England, where highest overall tolls of DVCs continue to be recorded. In North West England by contrast both RSPCA and trunk road agent reports show an increase over recent years (Fig. M-6), with most notable increases around Preston, Bolton and Bury including along the M6, M65, M61, as well as the M62 corridor from South Lancashire to the East Coast. Localised districts where some of the clearest DVC reductions have occurred include a number of areas where increased landscape level deer management and awareness campaigns have been undertaken by the Deer Initiative (in particular at Dinmore Forest in Herefordshire and Ashridge Forest in the Chilterns).
- ix. Within the trunk road network the highest number of DVCs recorded since 2007 include several sections of the M3 and M27 in Hampshire, A12-M25 links, M40 east of Oxford, and M11 and A12-M25 in Essex (see overview Fig. M-3b). However, in view of wide differences between network areas in road type and levels of traffic, consideration of priority locations for potential mitigation or further investigation is more appropriately confined to within separate HA Management Areas, where the manner of recording animal road kills will also be most directly comparable. Separate maps showing the relative distribution of DVCs for 2003-6 and/or 2007-2010 for each of the 12 HA Areas and 13 DBFO and PFI schemes are provided on the CD included with this report.

Human injuries

- x. Although differing types of wild animals involved in reported personal injury road accidents (PIAs) are not distinguished in national statistics, mean samples of 130 PIAs per year in which deer were implicated were obtained via individual police forces or local authority road safety teams, drawn from 38 different local authorities with six to twelve years data available for each (accounting for approximately 46% of any PIAs in England). Extrapolation of these data (see 5.2.5) indicate that around 350 deer related PIAs arising on trunk and non trunk roads will be reported per year to police for the whole of England, and a further 65 to 70 in Scotland. However as National Travel Survey data (DfT, 2011) indicate that only 26% to 32% of all injury road accidents are logged as such by police, the actual number of PIAs involving deer in England alone may well be as high as 1100 to 1350 per year. These figures are significantly higher than the upper bounds of estimates proposed in our 2007 report, but are not unrealistic in the context of other countries; for example 2200 PIAs annually with deer reported in Germany (DJV, 2010).

Road class and interaction with seasonal effects

- xi. Based on our sample of around 1800 human injury records, which of all our DVC data are likely to have least if any inherent reporting bias to particular road types, 12.2% occurred on trunk roads, 39.3% on non-trunk A-roads and 48.5% on minor roads (48.5%). These figures closely reflect the proportion by road type among all types of reported human injury accidents in England (Table-10). Among our wider DVC samples from RSPCA and other sources (but excluding trunk agent data to avoid sample bias) also close to 11% occurred on trunk roads, with a somewhat higher proportion (55%) on non-trunk A-class roads and fewer (34%) on minor roads. However, the earlier figures derived from PIA data alone are more likely to reflect the true breakdown by road class.

- xii. The incidence of recorded DVCs overall shows notable peaks in May and/or October in all areas. The seasonal patterns are however most apparent by far when considered separately by road class. In England over 52% of all DVCs on motorways and 48% of those on A-class Trunk roads were recorded in the three month from April to June (Fig. C-8), falling to less than 30% in case of non-trunk A-roads and minor roads. Additional seasonal variation occurs between species, with autumn peaks most pronounced where fallow, red or sika deer predominate. The very pronounced patterns found emphasise that a very high proportion of the risk of DVCs on English trunk roads may be addressed through short-term mitigation action during mid-April to mid-June (e.g. using seasonal VMS signage or other methods), whereas mitigation limited to that same period on non-trunk roads is less likely to be (cost) effective.

National toll and economic impacts

- xiii. The human costs of DVCs arising on trunk and non trunk roads vary widely between a low percentage that lead to human injuries and fatalities (est. <1.5% and 0.05% respectively), and the great majority of others that cause at least some minor damage, and in a quarter to a third of cases more significant material damage leading to insurance claims. The economic 'value of prevention' even for our low-end estimate of 350 human injury DVCs in England per year is calculated at £24 million (using government figures for assessing economic impact of road accidents, DfT 2011); but lies near twice that level if accounting for the finding that fewer than 70% of non-fatal injury accidents tend to be reported in national road accident statistics (DfT, 2011).
- xiv. Based on annual sample totals of insurance claims mentioning deer provided by AGEAS (formerly Fortis Group), we estimate that over 11,500 vehicles in England (>14,000 in UK) will incur significant damage (i.e. above common insurance claim excess of £250) as a result of DVCs, imposing further costs in England near £16M over and above the £24 million to £50 million incurred through human injury DVC accidents alone. Further substantial economic losses not included in the above estimates arise through traffic delays, dealing with injured and removal of dead deer from the roadside as well as the extensive impact of DVCs in terms of animal welfare.

Future monitoring and other further work

- xv. Complete or even near-complete recording of the majority of all DVCs occurring annually in England is unlikely ever to be achievable or maintain year on year countrywide. On the other hand, results from this study show that despite having focussed data collection on improved recording from a smaller number of main data source categories than in the previous 2003-2005 study, the total number of records obtained has been possible to maintain as high or higher in most years. More importantly the geographical coverage of records obtained now provides much more even sampling, less skewed by superior recording in some areas than others.
- xvi. To monitor future changes at a countrywide and regional basis, the two core data sets which in combination would be likely to continue to provide at least an index based on large and widespread sampling but requiring only comparatively limited resources are:
- deer road casualty reports and carcass uplifts requests on the trunk network reported to HA National Command and Control centres and/or trunk road managing agents.
 - requests received by RSPCA to arrange dispatch or treatment of live deer injured in traffic collisions.
- Ideally however the latter should be supplemented by a) records from wildlife rangers in the eight or so major (case study) forests where by contrast to the wider countryside RSPCA receive only a minority of known requests to deer injured in DVCs; b) records from several recently developed countywide police led DVC deer dispatch call-out schemes which may become relatively under-sampled in future by RSPCA data alone.

Selected Figures and Tables referred to in Executive Summary

[for complete set of figures see full version of report available via the Deer Initiative web-sites at www.thedeerinitiative and www.deercollisions.co.uk]

Figure C-1: Total number of DVC records collated from among the three 'Core' data categories combined (R, UT, ST) and 'Other' sources by year of occurrence.

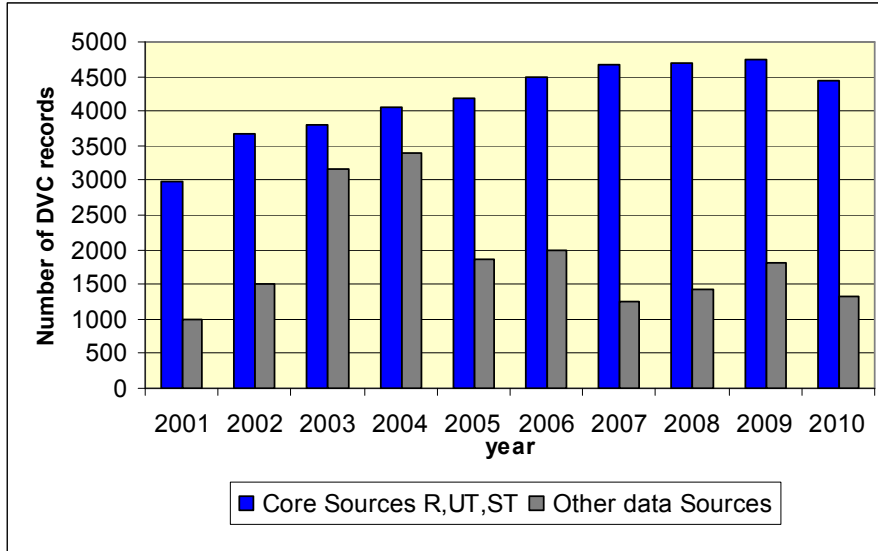


Figure C-3 Change in annual numbers of DVC related records from RSPCA 2001 to 2010 ('rescues' relate almost exclusively to live deer casualties requiring treatment or humane dispatch; advice calls may include other live or some dead casualties where no attendance for animal welfare needed).

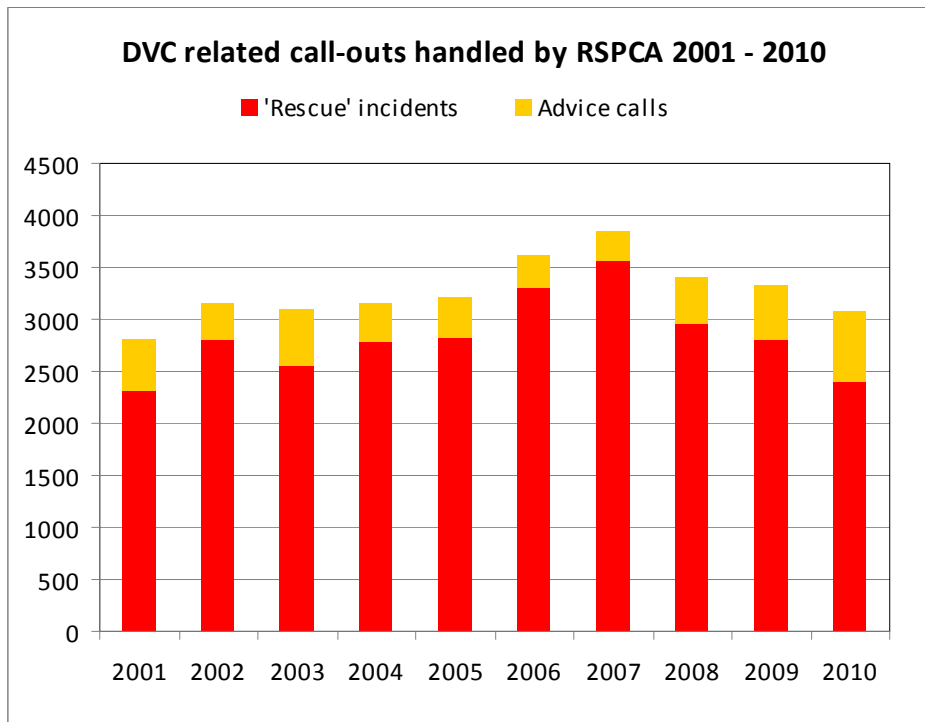


Figure C-7: Change in reported deer related personal injury road accidents in counties of Hampshire, Suffolk, Essex, Oxfordshire and Surrey 1999 to 2010.

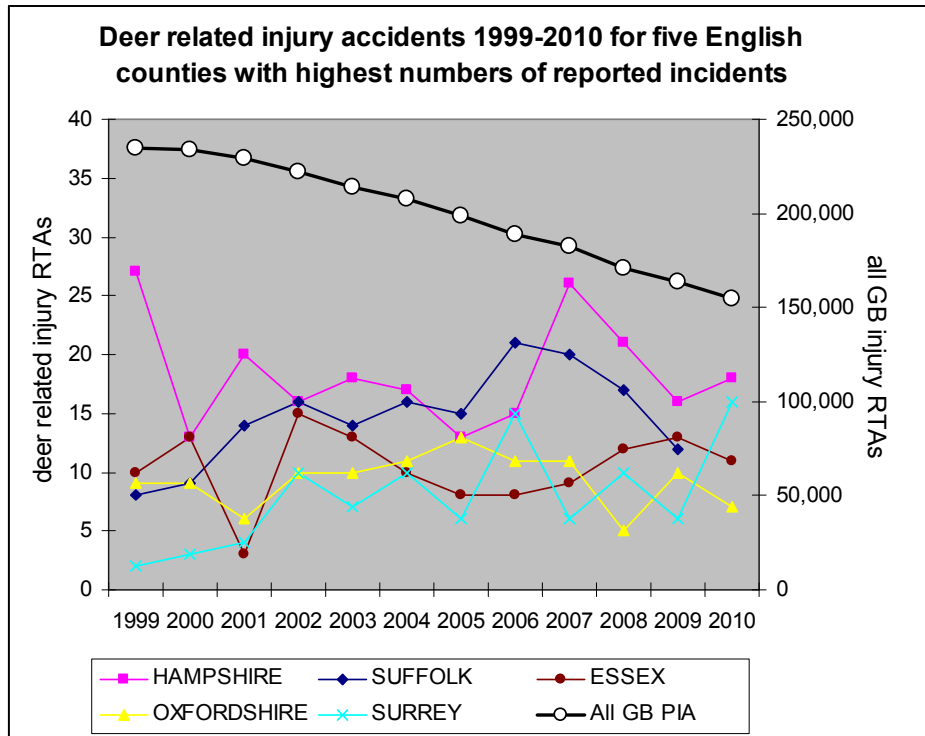


Figure C-8: Seasonal pattern of DVCs in England on trunk roads (motorways plus strategic A-roads) and non-trunk roads (other A-class roads and Minor roads).

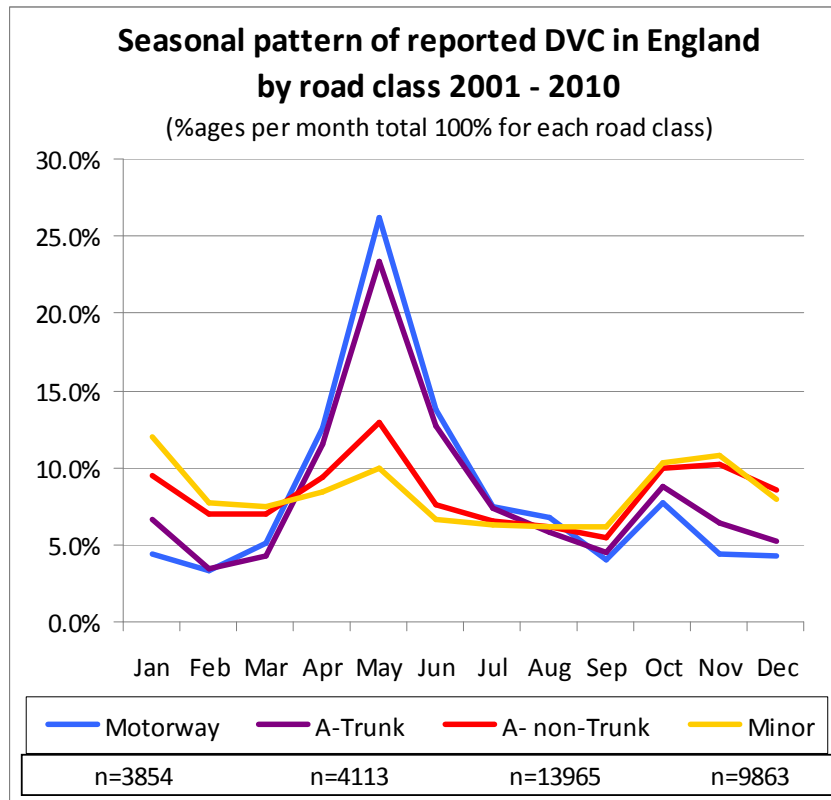


Table-7 : Number and percentage of RSPCA DVC reports and traffic by region

Region	Average 2003-2007	2008	2009	2010	Traffic Volume 2010	*Rate /traffic 2010
South East (inc.Lon.)	1277.8	1219	1169	1057	72.3	14.62
(% of England Total)	42.9%	41.6%	41.9%	40.6%	27.4%	
Eastern	732	734	751	660	34.0	19.41
(% of England Total)	24.6%	25.1%	26.9%	25.4%	12.9%	
South West	500.2	472	389	387	29.7	13.03
(% of England Total)	16.9%	16.1%	13.9%	14.9%	11.2%	
Yorks. & North East	177.4	201	165	183	38.0	4.82
(% of England Total)	5.9%	6.9%	5.9%	7.0%	14.4%	
West Midlands	126.4	121	117	124	30.3	4.09
(% of England Total)	4.2%	4.1%	4.2%	4.8%	11.5%	
East Midlands	112	117	127	125	25.1	4.98
(% of England Total)	3.8%	4.0%	4.6%	4.8%	9.5%	
North West	50.6	65	73	66	34.8	1.90
(% of England Total)	1.7%	2.2%	2.6%	2.5%	13.2%	
England	2976.4	2929	2791	2602	264.3	9.84
(% of England Total)	100.0%	100.0%	100.0%	100.0%	100.0%	

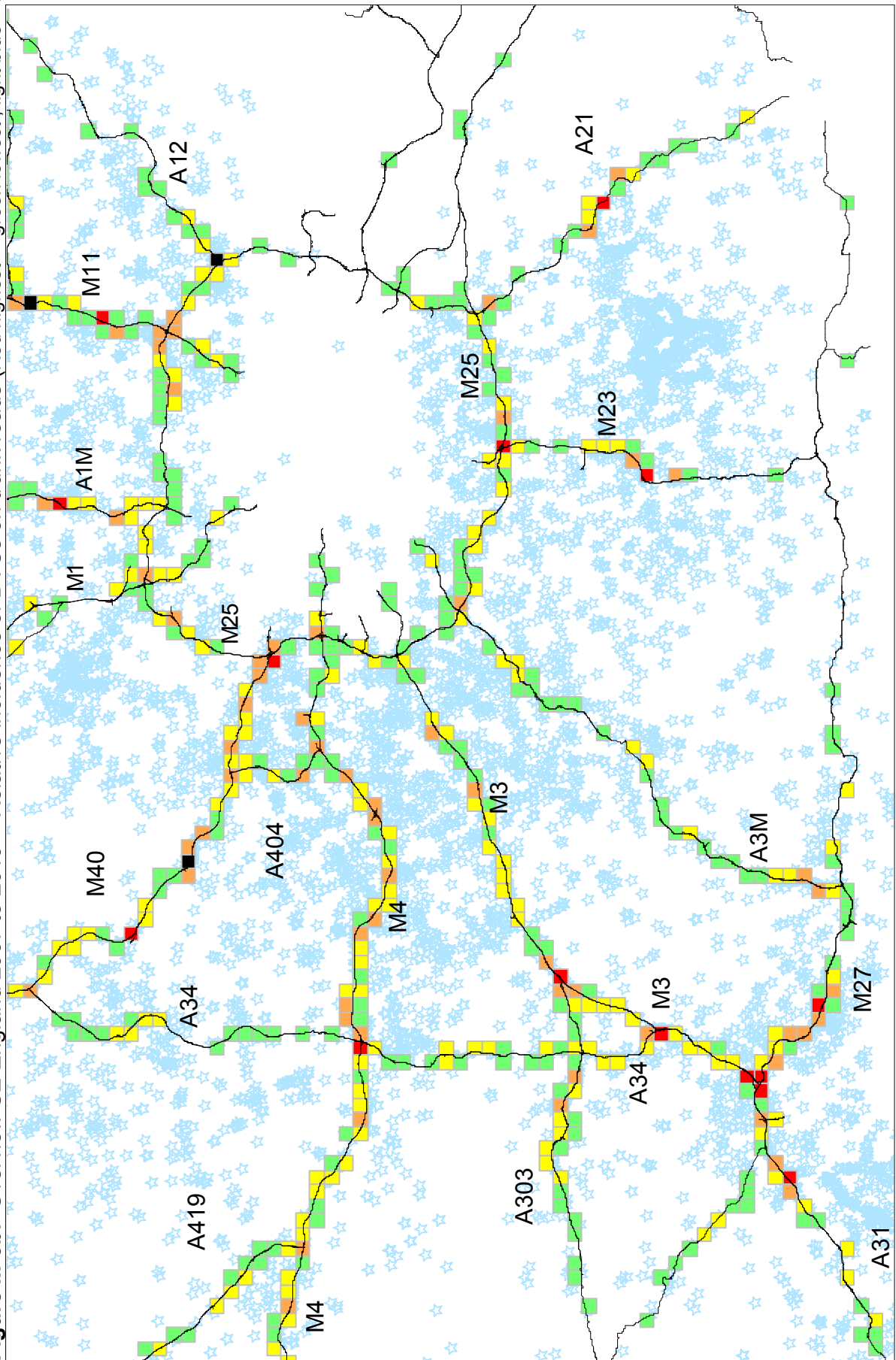
[Ann.Traffic measured in billion vehicle miles; *Rate= RSPCA DVC logs per 10⁹ vehicle miles]

Table-10 : Distribution of available sample of deer related PIA by road class

	Period	Motorway	A-Trunk	A-Principal	Minor	All roads
Available sample of deer related PIA	2003 - 2006	19	64	282	338	703
	%	2.7%	9.1%	40.1%	48.1%	100.0%
	2007 - 2010	17	52	206	265	540
	%	3.1%	9.6%	38.1%	49.1%	100.0%
	Tot 2003-10	36	116	488	603	1243
	%	2.9%	9.3%	39.3%	48.5%	100.0%
Traffic 2010	10 ⁹ veh.miles	55.0	28.7	85.3	95.3	264.3
	%	20.8%	10.9%	32.3%	36.1%	100.0%
*All reported PIA England 2010	n	5,940	5,578	57,194	68,551	137,263
	%	4.3%	4.1%	41.7%	49.9%	100.0%

[*Overall numbers of reported personal injury road accidents and traffic based on DfT, 2011]

Figure M-3b: Overview SE England 2007 to 2010 - Relative incidence of DVCs on trunk roads (Red highest : light blue = non-trunk)



Frequency of
*trunk DVC per
2km by 2km
grid cell

	21 to 50 (3)
	13 to 20 (9)
	7 to 12 (54)
	3 to 6 (275)
	1 or 2 (948)
	non-trunk DVC

*only those mapped on or with 150m of trunk carriageway counted per cell.

Contains Ordnance Survey data ©Crown and database right 2012

Figures M-6a & M-6b : Relative rates of *reported* DVC occurrence (per unit area) shown by District, Borough or Unitary councils (as Fig_ M-5, but here in addition to records provided by RSPCA and forest wildlife rangers, data from Trunk road maintenance teams are also incorporated).

