

Appendix 12.11

Deer Vehicle Collision Study

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Executive Summary

Red deer and roe deer are common throughout areas traversed by the Central Section (Glen Garry to Dalraddy). Numerous deer road casualties and related DVCs (deer-vehicle collisions) on the A9 are reported annually to the Trunk Road Operating Company (OC) and Police Scotland.

An initial desk-based review was undertaken of baseline information on reported deer and deer vehicle collisions to assess relative collision frequency along the route corridor and identify any hot spots where closer investigation may be required.

Review of 964 records of DVCs on the A9 between Perth to Inverness for the period January 2000 to June 2015 obtained from the Scottish Natural Heritage (SNH) Scotland-wide DVC monitoring project included 162 located within the Central Section (Glen Garry to Kincaig).

Heat maps produced to assess the relative distribution of DVCs indicate overall highest past occurrence within Central Section near Dalnaspidal and Drumochter Pass. Other sections of heightened DVC levels occur near Dalwhinnie, Crubenmore, Newtonmore, Inverton and north of River Spey crossing. At these locations, consideration has been given to the design of dual-use structures and installation of deer-fencing to provide improved safety for deer and road users.

1 Introduction

1.1 Project Overview

1.1.1 Road schemes can present a physical barrier to the free movement of many species of wildlife, restrict habitat connectivity at a landscape level, and lead to animal injuries and road mortality through collision with vehicles. In the case of deer, in view of their large size compared to other wild animals, such deer-vehicle collisions (DVCs)¹ pose a heightened risk of serious traffic accidents that may result in significant damage to vehicles, traffic delays and, in some cases, human injuries or fatalities.

1.1.2 Red deer *Cervus elaphus* and roe deer *Capreolus capreolus* are widespread throughout the areas traversed by the Central Section (Glen Garry to Dalraddy), and numerous DVCs are reported annually to the relevant Trunk Road Operating Company (OC) and Police Scotland. Therefore, there is a need to evaluate the risk of DVCs throughout the Central Section so that road safety and animal welfare concerns associated with the A9 Dualling can be addressed through appropriate design.

1.2 Objectives for Initial Desktop Study

1.2.1 Within the 200m wide online route corridor, comprising 100m either side of the existing A9 (hereafter referred to as the 'study area'), the following objectives have been identified:

- a) Complete desk-based review of baseline information on DVCs to identify collision 'hotspots'.
- b) Undertake desk-based review of existing A9 structures to identify those with potential to form part of deer mitigation.

¹ Any collisions of road vehicles with deer or accidents occurring through swerving to avoid deer, including reported deer road casualties indicative of a collision with a vehicle having taken place.

2 Methodology

2.1 DVC Data

2.1.1 Data gathered by Scottish Natural Heritage (SNH) as part of their ongoing Scotland-wide DVC monitoring research, form the most extensive and consistent source of information for past deer road casualties and related traffic accidents along the A9 dualling corridor. The following has been collated:

- Langbein Wildlife Associates (LWA) carried out a review of reported DVCs available from the SNH for incidents along the A9 from 2008 to 2011. LWA collates the Scotland-wide DVC data annually on behalf SNH, giving fullest insight to the background and updates of these data
- All DVC reports relating to the A9 between Perth and Inverness were analysed using a Geographic Information System (GIS) to determine numbers of incidents by year for each of the different project sections falling within the bounds of the Central Section between Glen Garry to Kincaig. For context, information was also compared to numbers of reported DVCs per kilometre (km) over the other A9 sections to the south and north over the same period
- Those incidents falling within the Glen Garry to Kincaig area were then further analysed to produce a 'Heat Map' based on the recorded frequency of DVC per 500m sub-section along the A9 route corridor.

2.2 Deer-Train Collisions

2.2.1 The Highland Main Line (HML) railway runs broadly parallel to the existing A9 between Glen Garry and Kincaig, mostly within just 200 metres to 1km to either side. In view of the proximity of the railway, information obtained from Network Rail on any known deer-train collisions logged by them from January 2008 to June 2014 were also obtained by LWA and reviewed in relation to information for the A9 obtained from the SNH DVC database. A further update of more recent data up to the end of 2015 was acquired from Network Rail.

3 Results

3.1 Ecological Context

- 3.1.1 The Central Section is located within an upland area and within the Cairngorms National Park. The single carriageways of the A9 between Glen Garry and Kincaig lie at an altitude of between 450m at the Drumochter Pass to 222m at Kincaig.
- 3.1.2 Review of National Biodiversity Network (NBN) gateway data and SNH deer interactive maps show the most prominent deer species present with the Cairngorm National Park to be the two native species, red deer and the much smaller roe . Introduced non-native Sika *Cervus nippon* may also occur more occasionally towards the southern end of the central section. The two native species form an important part of the regional fauna highly valued by the public as well as of importance to the rural economy through, for example, income from deer stalking. Red and roe are abundant throughout most of Scotland and do not have ‘protected species’ status, and landowners are permitted to control their numbers provided they adhere to regulations laid down in the Deer (Scotland) Act 1996.
- 3.1.3 The need to consider deer with respect to the Central Section is therefore foremost to minimise the risks posed to public safety where deer cross over the live carriageways. Public safety is considered as well as animal welfare, as over 25% of deer that are hit in collisions with vehicles are not killed outright, and implications for traffic hold-ups where live animals or carcasses present a hazard and need to be removed from the trunk road.

3.2 DVC Distribution and Frequency

Data Sources

- 3.2.2 A total of 964 records of reported DVCs relating to incidents on the A9 between Perth and Inverness are currently available from the SNH DVC database for the period January 2000 to June 2015 (14.5 years). This overall total includes reports from a wide range of different contributors, only some of which have contributed data regularly to the national project in all years.
- 3.2.3 Since 2008, the SNH project has focussed primarily on recording from a sub-set of ‘core sources’ that provide the most consistently available sample of records to the project every year across the same areas. In the case of the A9 within the Highland region since 2008, these core DVC records are primarily (>85%) those provided by
- the Trunk Road OC, and supplemented by
 - Scottish Society for the Prevention of Cruelty to Animals (SSPCA) call-out records to deal with deer injured in road traffic collisions, c) similar Forestry Commission (FC) Ranger reports
 - records of human injury accidents with known deer involvement (and some damage only accidents where sufficient detail is known) attended by police as collated by The Highland Council.
- 3.2.4 Prior to 2008, DVC data were gathered from a much wider range of sources but provide less consistent input across areas and years. The data from core sources, in particular since 2008, therefore provide the most useful information for comparisons between different sections of the A9 and across years.

DVCs Within Central Section in Context of Other Parts of A9 Perth to Inverness

- 3.2.5 An overview of available DVC data for the 8 years pre- and 7.5 year post- 2008 for differing sections of the A9 is provided in **Table 12.11.1**. In each case numbers of DVCs are shown separately for the ‘core’ sources and ‘others’. Also shown is the rate of recorded DVCs per km, calculated based on the core data alone, for the 7.5 years from January 2008 (or 8 years for the earlier period). The data for the remainder of 2015 will be available early during 2016 to complete information also for all of the current year (see **section 6** of this report for updated information).
- 3.2.6 **Table 12.11.1** shows that the overall highest incidence of DVCs along the A9 tends to be recorded in road sections closest to the cities of Perth and Inverness (Perth to Luncarty and Moy to Inverness), and reflect the substantially higher traffic volumes and hence risk to deer being hit when crossing roads close to major conurbations. Within the more rural sections comparatively high rates since 2008 (> 3 per km over 6.5 years) have also been recorded between Luncarty to Pitlochry. Within the Central Section area, for Glen Garry to Kincaig, and also Kincaig to Dalraddy, rates of ~1.5 per km have been recorded, which are slightly lower but close to the average rate recorded among the remaining sections of the A9.
- 3.2.7 While the above rates per km assessed over the last 7.5 years may not seem very high, it should be noted that being based primarily on records from the Trunk Road OC, past roadside deer carcass search research by SNH has shown that on average such TO reports alone are unlikely to represent more than 50% of all actual DVCs for a given trunk road. The true rate of DVCs is therefore likely to exceed double those shown based on the ‘core data’ samples. On that basis, actual numbers of DVCs for the Glen Garry to Kincaig section are likely to have exceeded 3.0 per km over the past 7.5 years, or 0.40 per km per year.

Table 12.11.1: A9 DVC Data Overview

| Number of records from: | Core regular data sources | Other sporadic data sources | Total | Approx. length km | Core DVC reports/km |
|--|---------------------------|-----------------------------|------------|-------------------|---------------------|
| Part A – January 2008 to June 2015 | | | | | |
| Luncarty to Pitlochry | 110 | 26 | 136 | 33 | 3.33 |
| Pitlochry to Glen Garry | 66 | 6 | 72 | 36 | 1.83 |
| Glen Garry to Kincaig | 75 | 10 | 85 | 49 | 1.53 |
| Kincaig to Dalraddy | 11 | | 11 | 7.5 | 1.47 |
| Dalraddy to Slochd | 54 | 2 | 56 | 24 | 2.25 |
| Slochd to Moy | 36 | 1 | 37 | 13 | 2.77 |
| Total | 352 | 45 | 397 | 162.5 | 2.17 |
| Part B – January 2000 to December 2007 | | | | | |
| Luncarty to Pitlochry | 43 | 174 | 217 | 33 | 1.30 |
| Pitlochry to Glen Garry | 18 | 37 | 55 | 36 | 0.50 |
| Glen Garry to Kincaig | 38 | 39 | 77 | 49 | 0.78 |
| Kincaig to Dalraddy | 9 | 3 | 12 | 7.5 | 1.20 |
| Dalraddy to Slochd | 19 | 4 | 23 | 24 | 0.79 |
| Slochd to Moy | 14 | 2 | 16 | 13 | 1.08 |
| Total | 141 | 259 | 400 | 162.5 | 0.87 |
| Part C - Existing Dual sections N & S (Perth to Luncarty plus Moy to Inverness) | | | | | |
| January 2008 to June 2015 | 94 | 9 | 103 | 22 | 4.27 |

| Number of records from: | Core regular data sources | Other sporadic data sources | Total | Approx. length km | Core DVC reports/km |
|-------------------------------|---------------------------|-----------------------------|------------|-------------------|---------------------|
| January 2000 to December 2007 | 30 | 34 | 64 | 22 | 1.36 |
| Total | 124 | 43 | 167 | | |
| Grand Total | 617 | 347 | 964 | | |

DVCs by CFJV Central Section Project Areas

- 3.2.8 Data for the A9 Glen Garry to Kincaig from **Table 12.11.1** is broken down further in **Table 12.11.2** into the Project 7, Project 8, and Project 9 areas; as well as adjoining existing sections of dual carriageway.
- 3.2.9 The highest total numbers of DVCs and rates per km have consistently been recorded within the Project 7 section of the A9, and significantly lower rates within Project 9 although the number here has also increased over recent years. DVCs on the section of existing dual carriageway at Etteridge remain of a similar scale to Project 8 adjoining to the south.

Table 12.11.2: A9 Glen Garry to Kincaig - Deer Vehicle Collision Records

| | Number of records from | | Total records | ~Section length (km) | Core DVC reports/ km |
|--|---------------------------|-----------------------------|---------------|----------------------|----------------------|
| | Core regular data sources | Other sporadic data sources | | | |
| January 2008 to June 2015 | | | | | |
| Existing dual south of Project 7 start | 3 | 4 | 7 | 6.2 | 0.48 |
| Project 7* | 34 | 5 | 39 | 12.2 | 2.79 |
| Project 8* | 15 | 0 | 15 | 7.7 | 1.95 |
| Existing dual south of Project 9 start | 7 | 0 | 7 | 4.5 | 1.56 |
| Project 9* | 16 | 1 | 17 | 18.4 | 0.87 |
| Total | 75 | 10 | 85 | 49 | 1.53 |
| January 2000 to December 2007 | | | | | |
| Existing dual south of Project 7 start | 1 | 7 | 8 | 6.2 | 0.16 |
| Project 7* | 27 | 30 | 57 | 12.2 | 2.21 |
| Project 8* | 4 | 0 | 4 | 7.7 | 0.52 |
| Existing dual south of Project 9 start | 1 | 0 | 1 | 4.5 | 0.22 |
| Project 9* | 5 | 2 | 7 | 18.4 | 0.27 |
| Total | 38 | 39 | 77 | 49 | 0.78 |

* Project 7: Glen Garry to Dalwhinnie; Project 8: Dalwhinnie to Crubenmore; Project 9: Crubenmore to Kincaig

Reported DVCs Leading to Human Injury

- 3.2.10 The majority of the 162 DVC reports for Central Section summarised in **Table 12.11.2** relate to reports of deer road casualties along the A9. The numbers of reported DVC known to have led to human injuries is much lower. For the period January 2000 to June 2015, road accident records highlighted 13 human injury collisions for the A9 within the Highland region, in which deer are believed to have been implicated in some way. Of these, only one occurred within the Central Section.

DVC Heat Mapping

- 3.2.11 The locations of the majority of DVCs are reported to only a quite low level of accuracy, tending to be influenced by reference to landmarks, junctions or other ready reference points used repeatedly in reports. As such, multiple incidents may often be mapped closely together, whereas incidents may have been located over several hundred metres to either side. To help with initial determination of smaller subsections in each Central Section project area most regularly affected by DVCs in the past, the route corridor was divided into 500m long grid cells to prepare a 'heat map' of relative DVC frequency by sub-section. The grid superimposed on the A9 was aligned with the centre line of the road and encompassed a buffer of 250m to either side, to enable systematic allocation within GIS of all relevant incidents along the A9 including any mapped imprecisely some way off the road.
- 3.2.12 Separate overview heat maps are shown in **Figure 12.11.1** (post 2008) and **Figure 12.11.2** (pre-2008). As discussed previously (**see 3.1**), the more recent data in **Figure 12.11.1** will be the most reliable in terms of direct comparability of recording between different sub-sections.

Project 7 Glen Garry to Dalwhinnie

- 3.2.13 **Figure 12.11.1** shows Project 7 to contain the two overall most prominent DVC hot spots within the Central Section:
- Near Dalnaspidal Lodge just north of where the existing dual carriageway ends, and leads into a 1km section where woodland abuts close to the east of the road
 - A section of ~2km through the Pass of Drumochter (also including some woodland close to the southbound verge)
 - Both the above also show up prominently in data for earlier years
 - In addition, a less prominent cluster of incidents stretches from Drumochter Lodge to 1km south.

Project 8: Dalwhinnie to Crubenmore

- 3.2.14 Within Project 8 main clusters of DVCs are as follows:
- Foremost around Dalwhinnie A9/ A889 junction but also heading for 4km north along the A9
 - The final 1km of Project 8 near Crubenmore where it joins with existing dual carriageway.

Project 9: Crubenmore to Kincaig

3.2.15 Within Project 9 main clusters of DVCs are as follows:

- At the A9/ B9150 Newtonmore junction (closely abutted by woodland to north)
- For 1.5km between Milton of Nuide to Inverton
- For 1km north from Spey Crossing at Kingussie.



Figure 12.11.1: Heat map of relative DVC density by 500m sections of A9 Glen Garry to Kinraig 2008 to 2015



Figure 12.11.2: Heat map of relative DVC density by 500m sections of A9 Glen Garry to Kincaig 2000 to 2007

3.3 Seasonal Pattern of DVCs

- 3.3.1 To enable assessment of seasonal patterns of DVC within the Central Section and comparison with patterns found in other parts of the A9, all available records from 2000 to 2015 are shown graphed per month in **Figure 12.11.3**. The overall pattern based on all records available for the A9 shows pronounced peaks in DVCs during May and June, and a secondary peak from October to November. These peaks in late spring/ early summer and late autumn are typical of patterns found on trunk roads across much of Scotland (Langbein 2011). The spring peak is associated particularly with deer born the previous year dispersing from their natal ranges in search of new territories, as well as adult females searching for secluded areas to give birth. The late autumn peak is thought to be associated primarily with overall increased movement of deer across roads associated with the autumn mating season of the large deer species (red, sika, fallow), as well as increasing coincidence between peak activity of deer at twilight with peak daily traffic flows.
- 3.3.2 **Figure 12.11.4** shows that the pattern for incidents recorded in the Glen Garry to Kincaig area closely reflects that for the A9 as a whole. The significance of these patterns with regard to the Central Section, is that there is likely to be some merit for seasonal measures to form part of deer mitigation proposals.

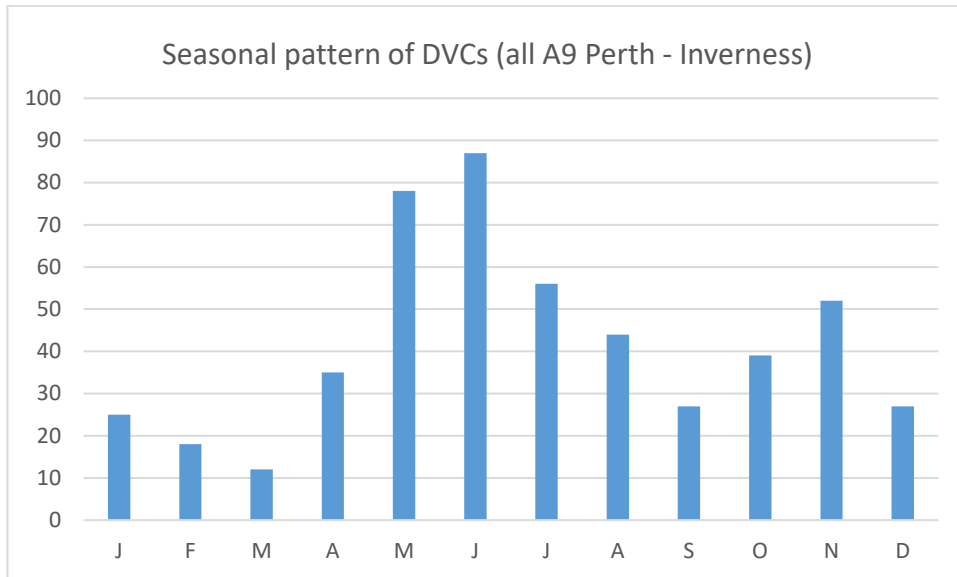


Figure 12.11.3: Seasonal occurrence of DVCs for A9 Perth to Inverness (2000 to 2015 data)

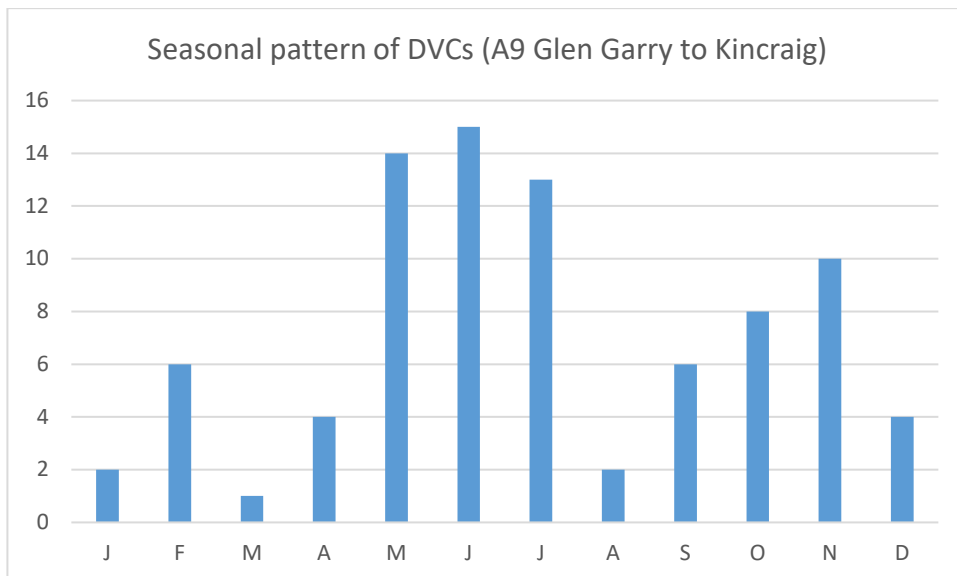


Figure 12.11.4: Seasonal occurrence of DVCs for A9 Glen Garry to Kincaig (2000 to 2015 data)

3.4 Train Collisions

- 3.4.1 The Network Rail track of the Highland Main Line (HML) railway runs almost parallel to the existing A9 mostly within just 200m to 1km to either side. Although not part of the SNH DVC project, a file of ~500 records of (unmapped) train-deer collisions from across Scotland had previously been obtained by us from Network Rail covering the 5.5 year period from January 2008 to June 2014. In view of the proximity of the HML railway, a preliminary review of these records has been undertaken to extract clearly any that fall within the Central Section. A total of 20 records of train-deer collisions were identified for the HML railway between Glen Garry to Kincaig, which in many cases led to temporary disablement of the trains concerned. Further detail would be required from Network Rail to map the precise locations of these incidents by signal box references and mileage markers. However, of the 20 train-deer collisions identified:

- 11 are reported as having occurred near Dalnacardoch
- Six near Dalwhinnie
- Three near Kincaig.

3.5 NMU (Non-Motorised User) Strategy

- 3.5.1 DVC data was reviewed against emerging NMU provisions for the Central Section where the design dual-use structures could provide safe deer crossing opportunities. Within the Project 9 extents, this includes:
- Potential needs for estate access at southern end of Project 9, plus a proposed new crossing 1km north of Raliabeg
 - Four potential NMU crossings between Milton of Nuide and Inverton
 - A crossing near Kingussie on southern side of Spey, and possible new crossing(s) just north of Kingussie
 - Three potential locations for further NMU crossings with 1km north of Lynchat
 - Likely NMU crossing near the Wildlife Park at northern end of the project area.
- 3.5.2 Although in the ideal scenario it is generally thought desirable to keep crossings intended for wildlife passages separated from NMU use, in case of deer it has increasingly been shown that they will readily adopt joint use passages, not least for movement at night (Langbein, 2010). With regard to the above crossings, many may offer good opportunities to mitigate risk of DVC where they can be made accessible to deer and possibly be enhanced by guide fencing for some distance to either side. While in the ideal scenario wildlife passages aimed at maximising use by deer will tend to have greater dimensions than required for human NMU purposes (see e.g. Iuell *et al.* 2003; Natural England 2015), in general most underpasses suitable for NMU will have high potential for some uptake also by deer and in turn to reduce deer crossings over the live trunk dual carriageways.
- 3.5.3 The extent of use by deer of joint use underpasses has, to date, not been widely documented in the UK, but a number of recent published and unpublished projects have highlighted that small as well as large species of deer are increasingly making use of a wide variety of structures beneath trunk roads (Langbein, 2010; Muttock 2013, Langbein 2015). Two examples among many structures that are now known to be used by deer as safe passages on trunk roads in England are shown in **Figure 12.11.5** and **Figure 12.11.6**; including even a culvert with a diameter of less than 2.5m that extends for more than 100m beneath a six-lane wide section of the M25.



Figure 12.11.5: Fallow deer at slip road underpass beneath dual A38 trunk, Devon



Figure 12.11.6: Fallow deer crossing box culvert underpass beneath 6-lane M25 Essex

4 References

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5 Addendum 15 January 2016

- 5.1.1 Deer-vehicle collision records available for collation and mapping at the time of submission of the above report covered the 15.5 year period (January 2000 to June 2015). While records for the complete 2015 calendar year to 31 December were not possible to include at the time of the above study, further records of deer road casualties logged over the last six months by the Trunk Road OC within Central Section have now been received by LWA. For completeness these additional records now been added to the DVC data file for Central Section accompanying this report.
- 5.1.2 In brief, nine additional deer casualty reports were logged within Central Section by the Trunk Road OC from June to December 2015, in addition to 15 others reported in the first half of 2015. The higher number of reports during the first half of 2015 is in line with seasonal variation in based on data for previous years (see **Figure 12.11.4**).
- 5.1.3 The nine additional DVC reports received (July to December 2015) included:
- 1 – near Dalnaspidal
 - 3 – near Drumochter Lodge
 - 2 – near Crubenmore Bridge (existing dualled section)
 - 2 – near Ralia Junction
 - 1 – near Kincaig.
- 5.1.4 In each case (with exception of the single extra report at Kincaig) these further recent incidents fall within localised sections of heightened deer risk also already identified in **Figure 12.11.1** based on earlier data, and further support the relative distribution of past incidents as discussed in the report.

