DVCs and Deer Management, Raehills June 2018

(A seminar by Lowland Deer Network Scotland with Scottish Land & Estates, Transport Scotland, and the Galloway Dumfriesshire Deer Group)

Deer-vehicle collisions in Scotland:

National data overview / Regional hotspots / Trends / Mitigation

Jochen Langbein

Majority of past ‘National Deer Collisions Project’
work by LWA undertaken on behalf of

Scottish Natural Heritage
Dualchas Nàdair na h-Alba
All of nature for all of Scotland
Nàdar air fad airson Alba air fad

In Scotland

TRANSPORT SCOTLAND
COMHDHAIL ALBA

the deer initiative
menter ceirw

In England &Wales

highways england

Llywodraeth Cymru
Welsh Government

Talk outline

- National Deer Collision Data Collation overview
- Frequency & spread of reported DVCs by Council, Trunk Network Region and Relationship with traffic volume
- Limitations of current (sample) data. How to improve?
- Mitigation – Do we know what methods do / do not work ?
- Need for robust trials & evaluation of most cost-effective DVC reduction strategy for differing road types and situations

Deer-Vehicle Collisions : DVC

Includes any incidents where apparent a collision of a road vehicle with a deer occurred

- as evident from dead or live injured deer casualty nr roadside

- **or** a reported human injury or damage-only RTA involving deer

The vast majority go unreported or not as DVC

National Deer-Vehicle Collisions (DVC) Assessments via The Deer Initiative & Scottish Natural Heritage

- **2003-2005** DI DVC Database Phase 1

  Lead funding England - Highways Agency / Scotland – Scottish Executive

  (wide range of all potential sources / but large gaps in availability / distribution)

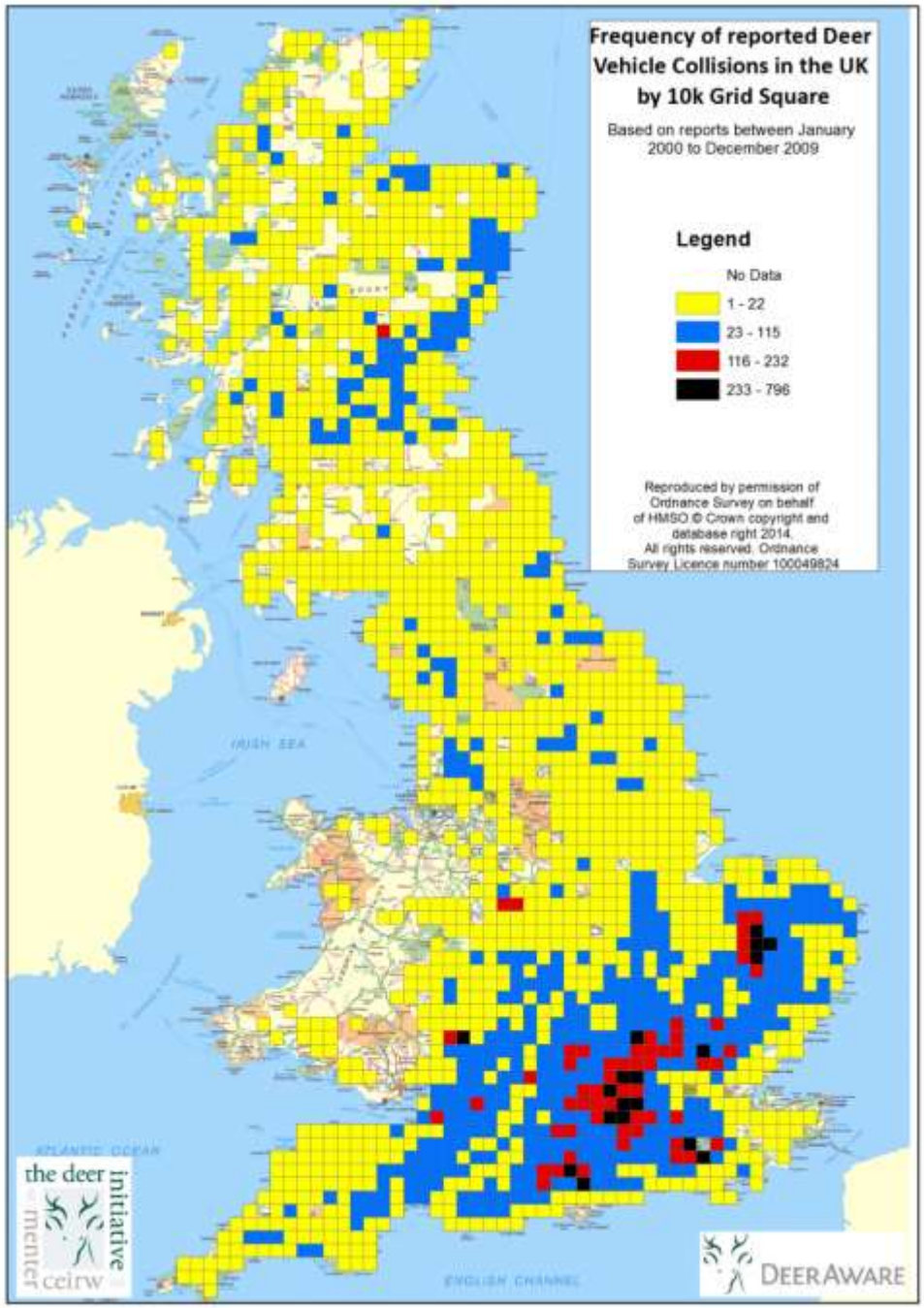
- 2006 – Continuation England only Monitoring -

  concluded 2010 / restarted 2014 – 2016 …….

2008 – 2019 DVC Scotland Monitoring – SNH - restart 2008

focussed down on far fewer but more consistent main data sources throughout past 10 years

Deer Vehicle Collisions



In brief – initial studies indicated across Great Britain **each year :**

- **>42,000** (poss. up to 74000) DVCs
- of which: 80% in England /
- **19% in Scotland** / < 1% Wales

- **Scotland** ~ 8,000 (up to 14,000)
- **but** Scotland only 9% GB road traffic; hence **higher** risk of DVCs per driven mile' than in England.

- >450 human injury DVCs (of which ~380 in England / ~ **70 Scotland**)
- 10 -20 human fatalities annually
- Economic impact GB wide est. **>45M** p.a. , of which c. **9M in Scotland**

Country	Annual DVC estimate by Period		Orig. source of latter estimate
	1991 - 1996[1]	2001 -2006[2]	
Germany	125000	227000	*Kerzel 2005 ; DJV 2006*
Sweden	55000	61000	*Seiler 2004*
Austria	35400	40500	*Austrian national statistics*
England[3]	>20,000	>34000	*Langbein 2007*
France	-	23500	*Maillard et al. 2010*
Scotland[3]	>4000	>8500	*Langbein & Putman 2006*
Switzerland	-	8000 - 10000	*Imesch-Bebie et al. 2010*
Norway	5500	8870	*Andersen et al. 2010*
Denmark	10100	6000	*Andersen & Madsen 2007*
Slovenia	-	6000	*Slovene Hunters Association*
Netherlands	2500	5400	*van Wieren and G-Bruinderink 2010*
Finland	-	5000	*Ruusila and Kojola 2010*
Spain	-	>4000	*Carranza 2010*
Hungary	-	3700	*Official Hungarian Hunting statistics*
Croatia	-	1000	*Official Croatian Statistics*

[1]based on Groot-Bruinderink & Hazebroek, 1996

[2] based Langbein, et al. 2011; orig. data sources and refs. see Appolonia et.al 2010

[3]to 1996 based on SGS, 1998; later estimate from present project

Scotland Deer Collision Data Collection & Collation

Main aims : 2008 – 2018

- Record a large and widely distributed annual **sample** of DVC reports to help:

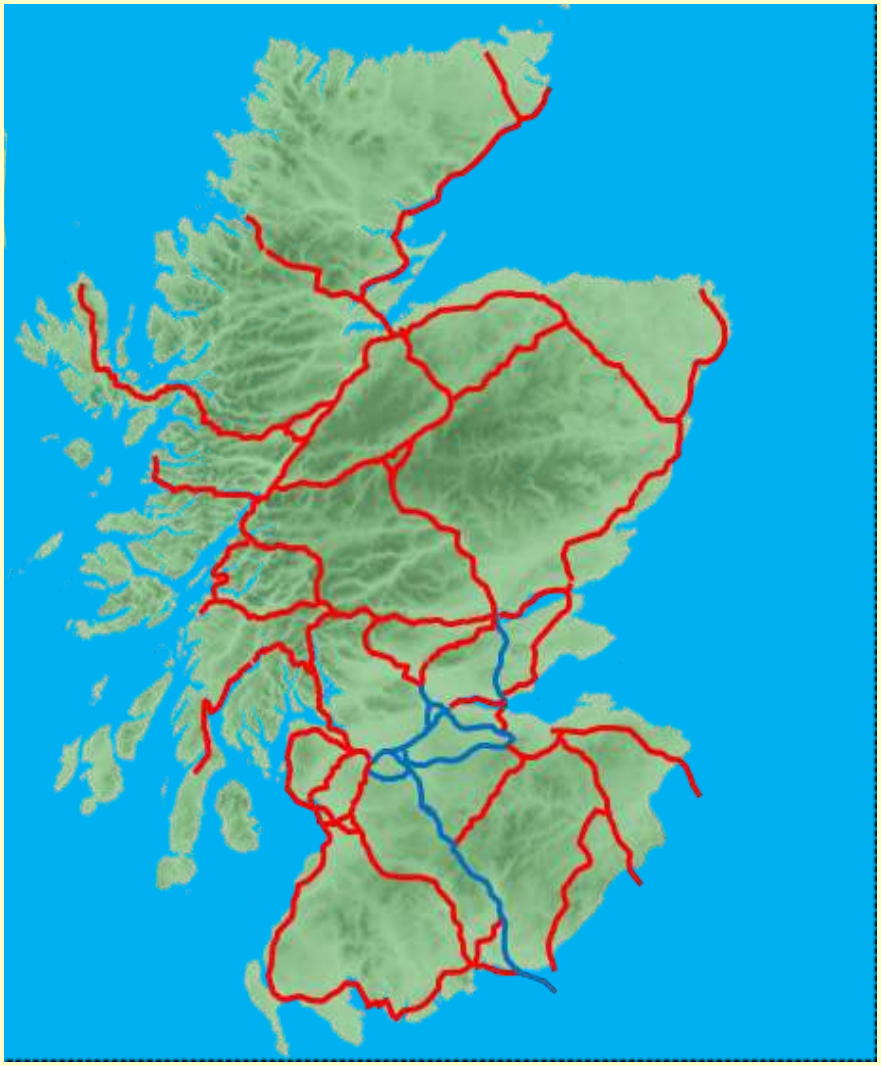
- Identify and monitor hot spots on
  - i) **Motorways and other Trunk Roads**,
  - ii) and as far as possible also for **non-trunk roads.**

- Provide an ‘index’ of DVC trends by region / council and new emerging local problem areas

The most consistently available and reliable sample data to assess relative abundance of reported DVCs chosen 2008 – 2018 were:

- **Trunk Operating Companies** logs of reports or requests to uplift dead deer casualties (Motorways and A-class Trunk roads only)
- ***Scottish SPCA*** call-logs to assist with mainly 'live' injured deer casualties (on any road type)
- **Forestry Commission** and some **Council** Wildlife Rangers from other '*case study*' community deer forests to deal with injured deer.
- **(plus Police human injury records … where obtainable)**

TS Strategic Trunk Road Network



Good sample as:

- Wide coverage
- just 6% of all roads BUT **38% of all traffic**

Of **45.4** billion veh/km p.a.

- **7.5 on Motorways**
- **9.9 on A-Trunk roads**
- **12.5 on A non-trunk**
- **15.5 on B & minor roads**

The 5 Councils with most traffic (Aberdeenshire, Edinburgh, Fife, Glasgow and N. Lanarkshire) together account for **34%** of all Scottish traffic volume

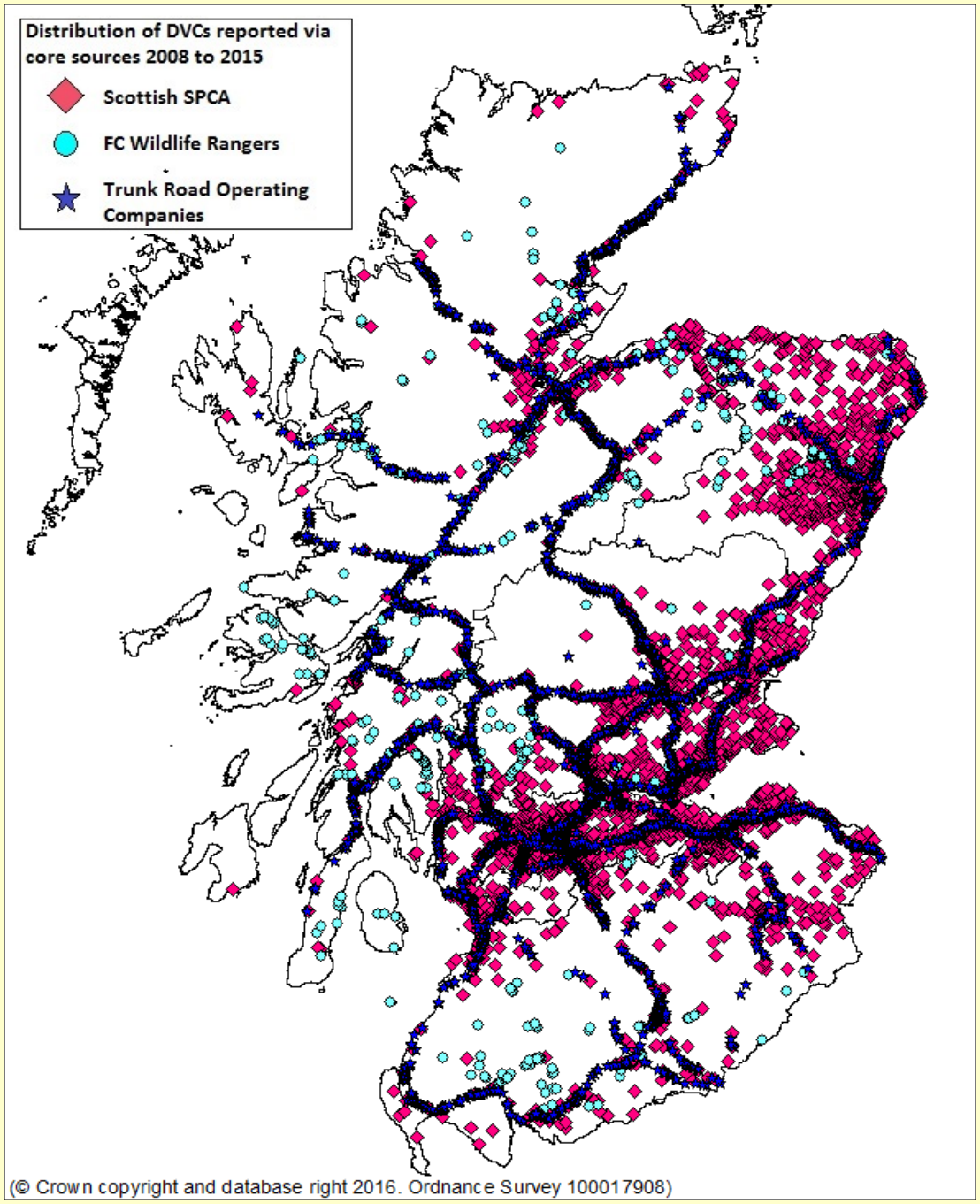
AND accounted also for **30%** of total DVCs reported (2012 - 2016)

Council	Average 2012-2016 Billion Veh miles /pa
Aberdeen City	0.809
Aberdeenshire	1.713
Angus	0.676
Argyll and Bute	0.552
Clackmannanshire	0.190
Dumfries and Galloway	1.236
Dundee City	0.531
East Ayrshire	0.640
East Dunbartonshire	0.329
East Lothian	0.526
East Renfrewshire	0.469
Edinburgh	1.799
Eilean Siar (formerly Western I	0.129
Falkirk	0.955
Fife	1.762
Glasgow City	2.184
Highland	1.618
Inverclyde	0.318
Midlothian	0.403
Moray	0.447
North Ayrshire	0.466
North Lanarkshire	1.953
Orkney Islands	0.084
Perth and Kinross	1.417
Renfrewshire	0.920
Scottish Borders	0.741
Shetland Islands	0.127
South Ayrshire	0.595
South Lanarkshire	1.563
Stirling	0.750
West Dunbartonshire	0.401
West Lothian	1.082

DVC spread

based on 8yrs combined Core Data Sources

- **Scottish SPCA**
- **FC rangers**
- **Trunk OCs**



Number of Deer casualty reports by year from 'Core data source' categories

Year	TR_OC	RS_RTC	SSPCA	D-FC	AllOthers	Total
2008	489	88	319	62	186	**1144**
2009	678	75	291	101	425	**1570**
2010	721	64	206	68	317	**1376**
2011	606	72	419	104	23	**1224**
2012	720	74	666	84	57	**1601**
Mean 2008-12	**642.8**	**74.6**	**380.2**	**83.8**	**201.6**	**1383**
2013	638	81	698	73	100	**1590**
2014	691	47	475	76	65	**1354**
2015	668	30	883	62	63	**1706**
2016	678	23	1001	36	39	**1777**
2017	622	17	1255	48	41	**1983**
Mean 2013-17	**659.4**	**39.6**	**862.4**	**59**	**61.6**	**1682**
Total	**6511**	**571**	**6213**	**714**	**1316**	**15325**

(combined core samples nevertheless <u>unlikely</u> to capture more than 10% to 20% countrywide toll

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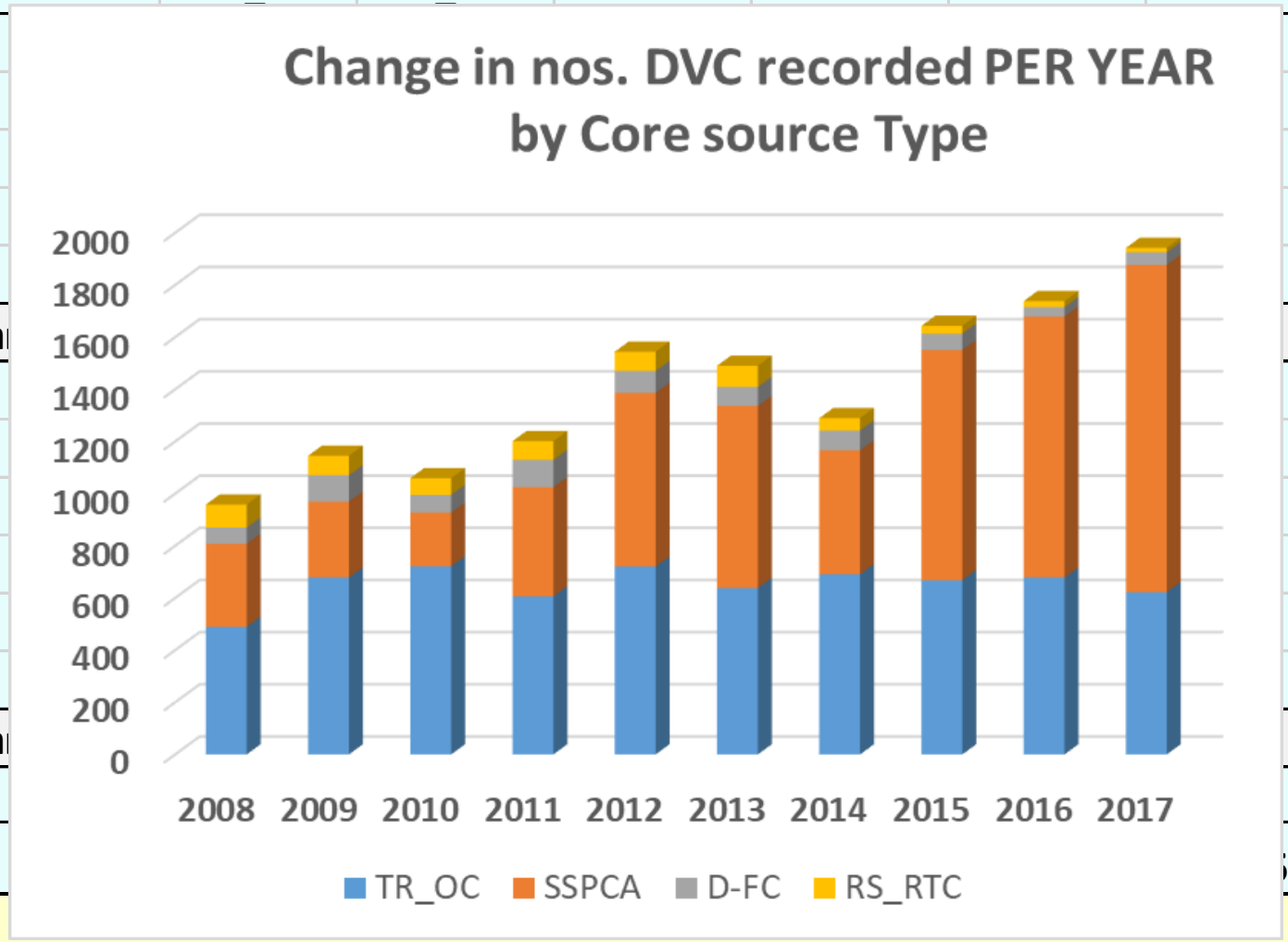


(combined core samples nevertheless <u>unlikely</u> to capture more than 10% to 20% countrywide toll

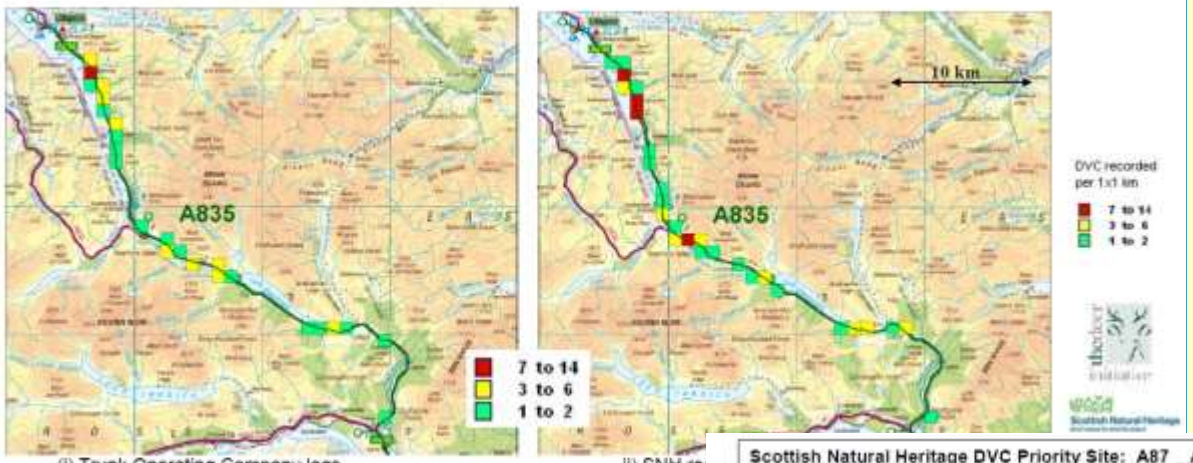
Data Limitations / likely sampling achieved

- **Scottish SPCA** - sample foremost (not solely) incidents leaving 'live' injured deer not killed outright at roadside.
- If were available countrywide requests logged by **Councils** road services to uplift dead deer (and other animals) from **non-trunk** roads likely be far more numerous - *but inconsistent coverage, often poor location detail*

Year	Council	Local Authority uplift reports	Scottish SPCA call-outs	SSPCA sampling
2009-2011	ABERDEENSHIRE	688	120	18%
2007-2010	ANGUS	501	32	7%
2007-2010	MORAY	344	28	8%
2006-2008	PERTH & KINROSS	374	63	17%
			Average:	**12%**

DCS (SNH) Carcass search study 2007-2010

Scottish Natural Heritage DVC Priority Site: A835 Garve to Ullapool
Comparative distribution of deer casualty reports logged 2007 – 2010 via i) Trunk operating companies (left) and ii) deer carcasses found during SNH annual (May -Oct) roadside carcass surveys (right). Coloured squares indicate numbers of records per 1km OS map square.



(i) Trunk Operating Company logs ii) SNH ro

[Based upon Ordnance Survey material with the permission of the Controller of HMSO © Cr

Scottish Natural Heritage DVC Priority Site: A87 _ A887 Shiel Bridge to Loch Ness
Comparative distribution of deer casualty reports logged 2007 – 2010 via i) Trunk operating companies and ii) deer carcasses found during SNH annual (May -Oct) roadside carcass surveys. Coloured squares indicate numbers of records per 1km OS map square.

(i) Trunk Operating Company logs

(ii) SNH road verge deer carcass surveys

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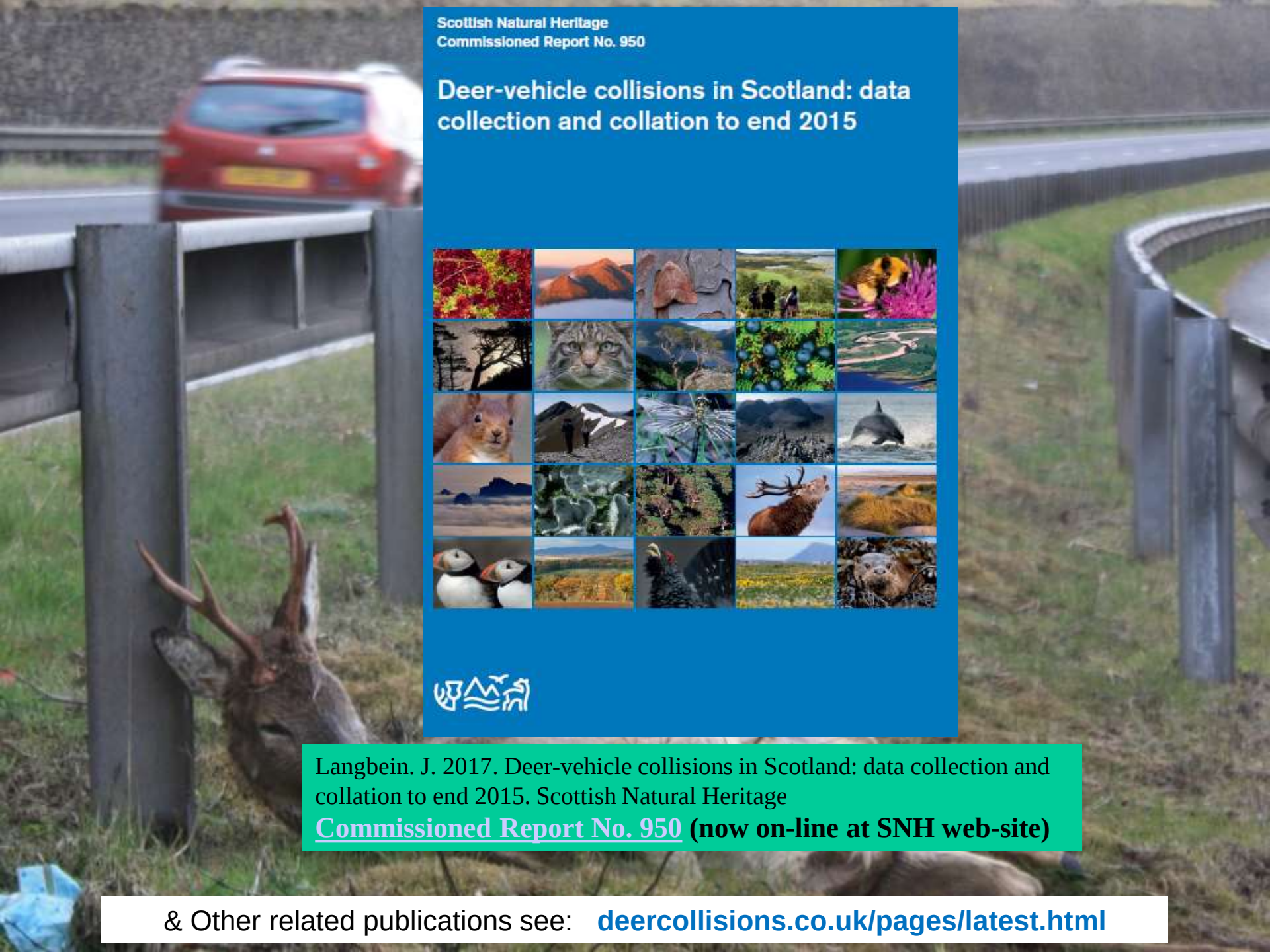
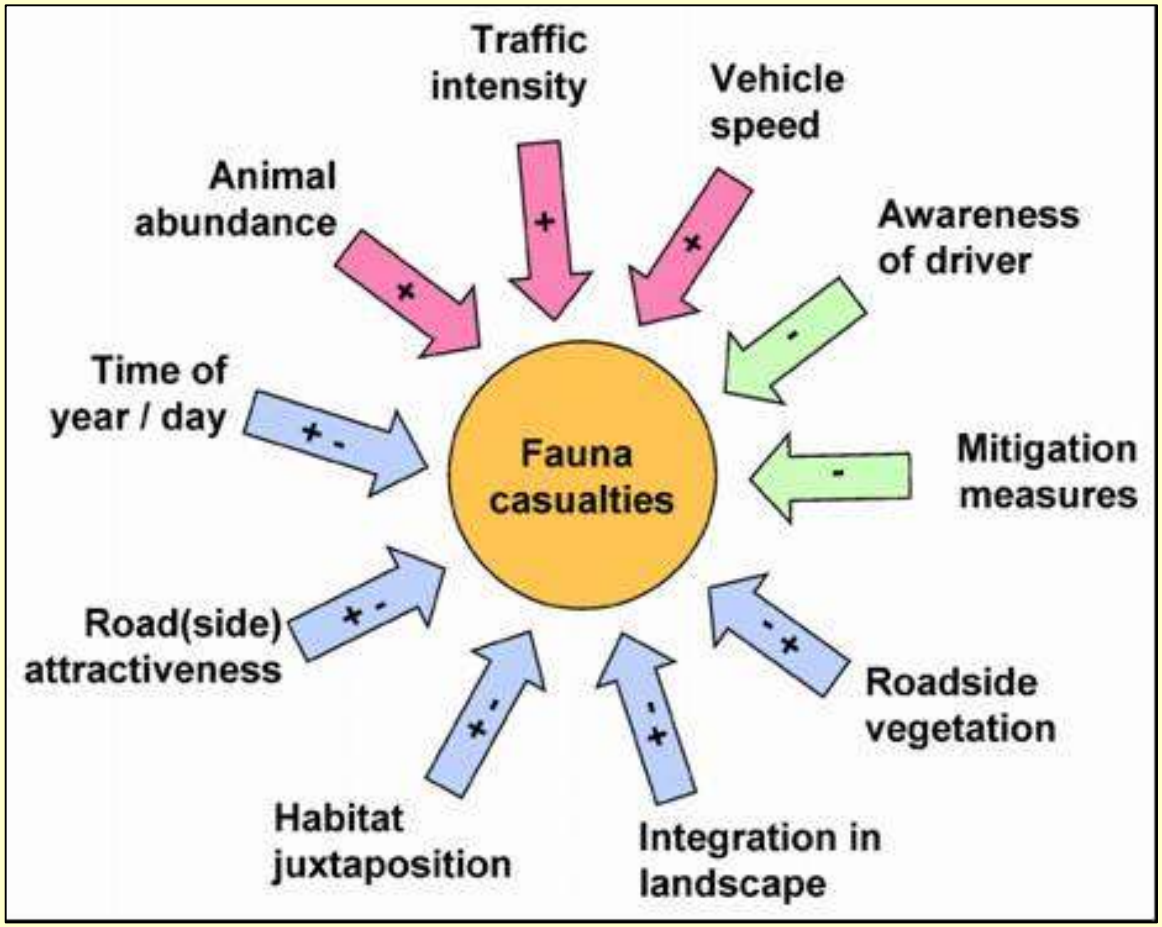
Showed Trunk-OC reports may

- **on average capture <50% of deer casualties left at road,**
- **but wide variation between routes (24 – 68%)**



Langbein. J. 2017. Deer-vehicle collisions in Scotland: data collection and collation to end 2015. Scottish Natural Heritage
Commissioned Report No. 950 (now on-line at SNH web-site)

& Other related publications see: **deercollisions.co.uk/pages/latest.html**



Diversity of Factors influence numbers of Wildlife - Traffic Collisions

SCOTLAND : Proportion of DVC where species reported

Roe Deer 57%

>

Red Deer 36%

Fallow Deer 5%

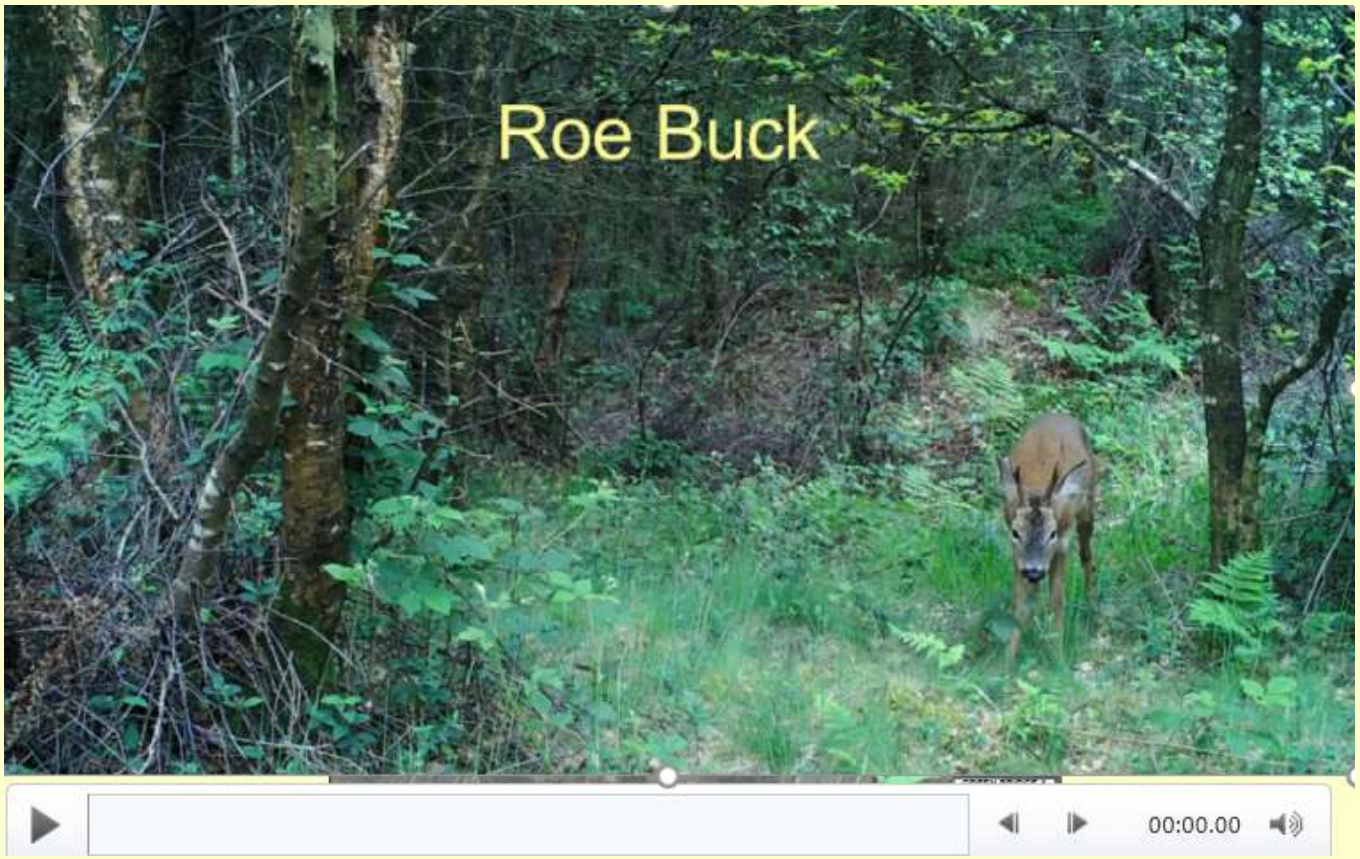
Sika 2%

BUT – need better info as <10% core records with species detail.

Deer Species differences in behaviour near and crossing roads

To view video clip shown visit youtube.com/jochenlangbein
Deer In the Headlights: https://youtu.be/G5EIcOMEnkw

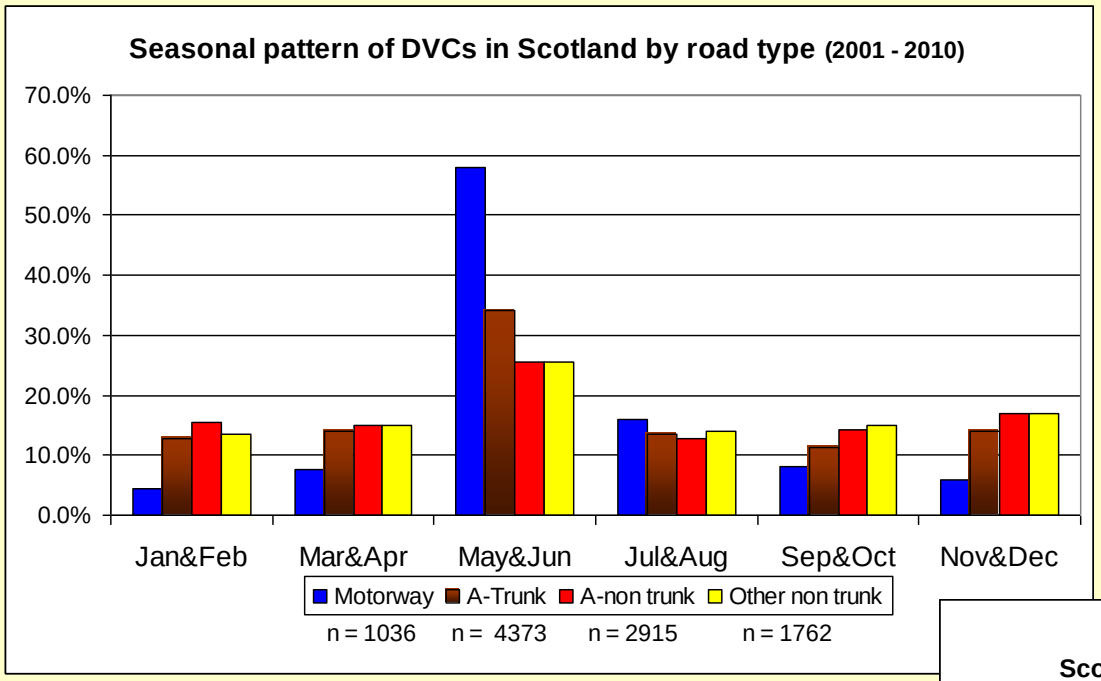
Deer increasingly settle in wide central reserves or slip road & roundabout ‘islands’



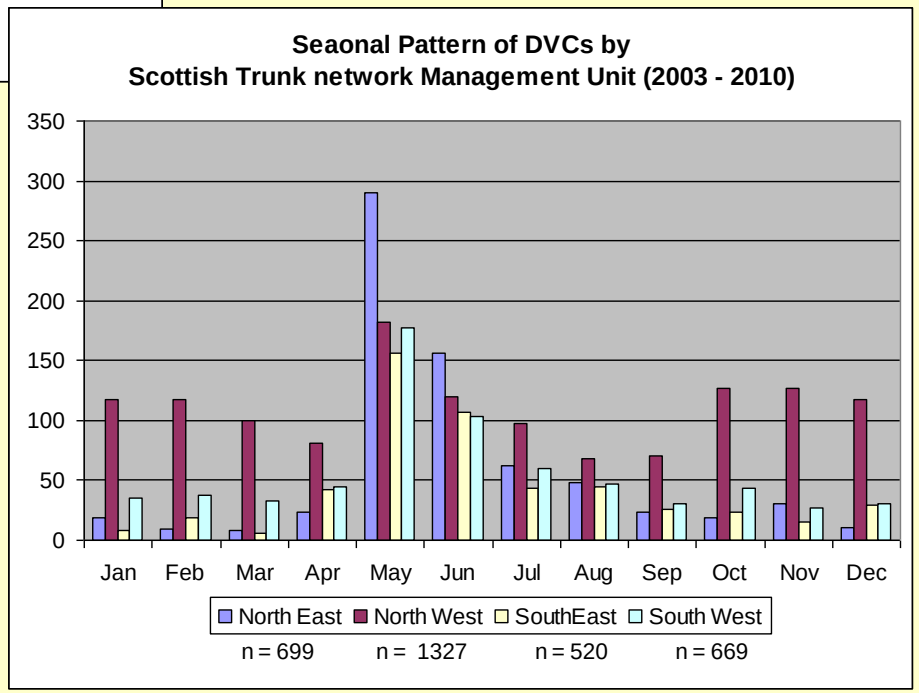
Roe buck and doe filmed during Wildlife video monitoring within central reservation habitat between dual carriageways

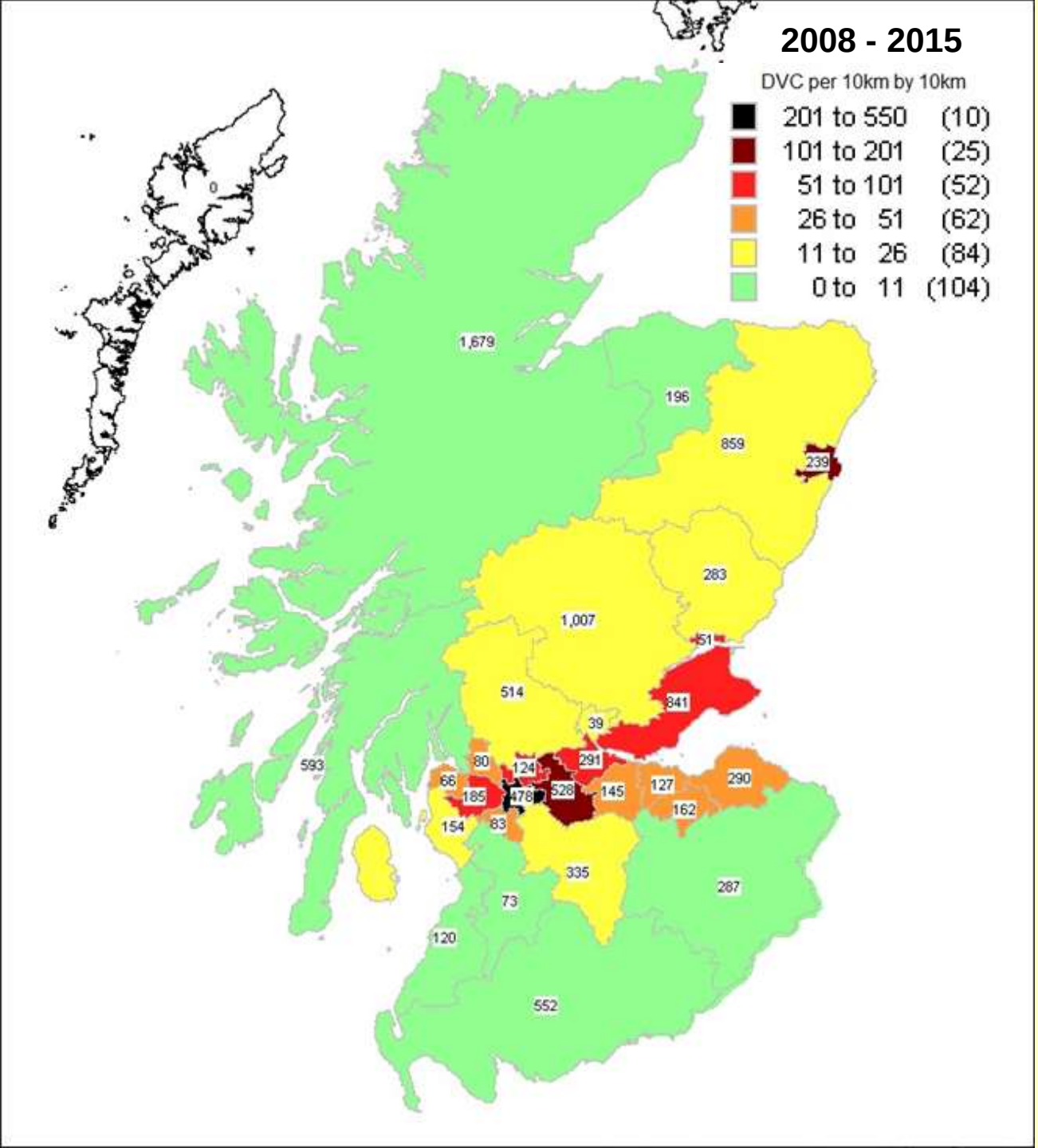
To view video clip shown visit youtube.com/jochenlangbein
Buck and doe visit Roe deer cam: https://youtu.be/an90JTWIn-Y

Seasonal variation



Used to help target seasonal VMS and other temporary signage campaigns





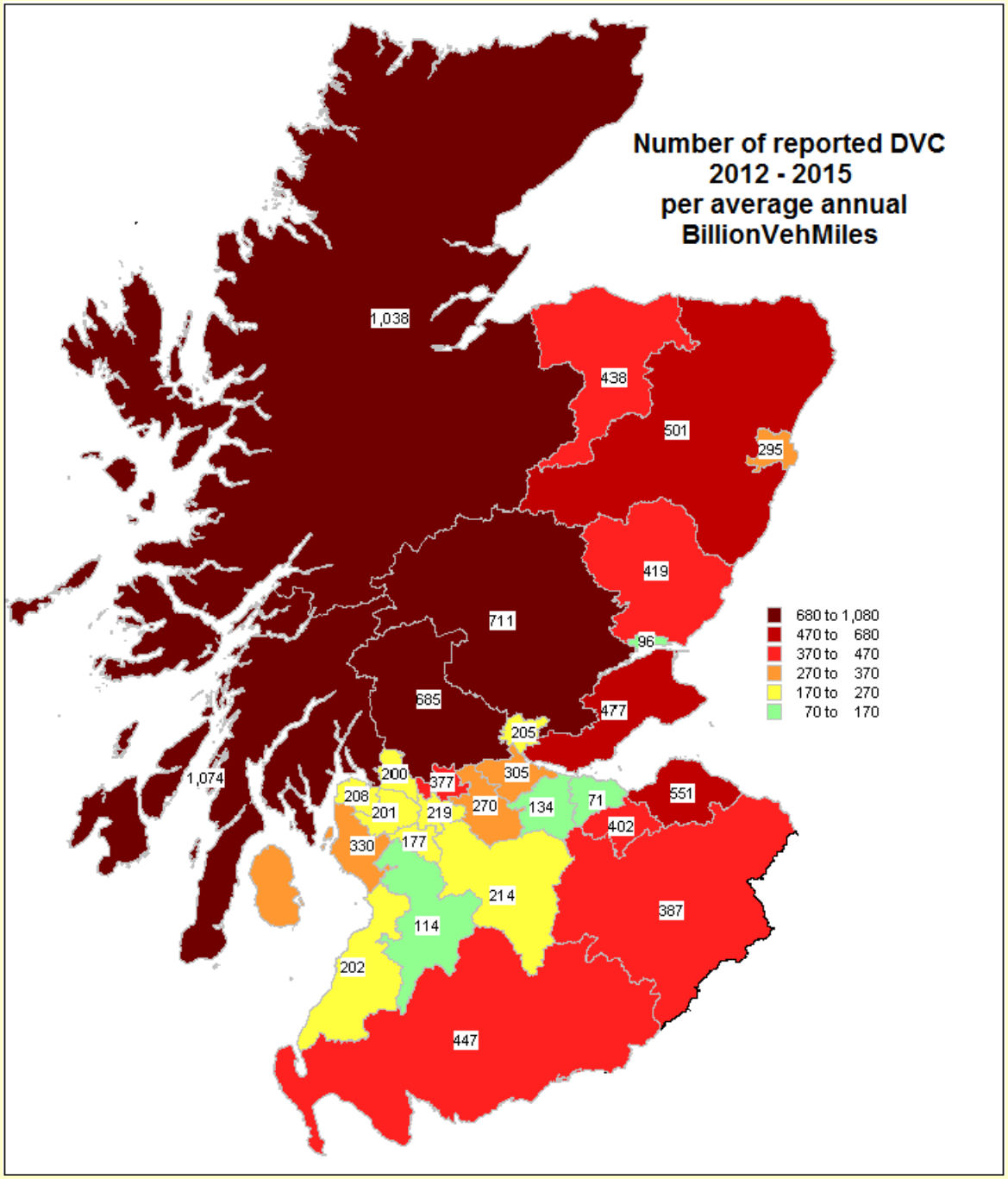
Rel. density of DVC

'Core data source' categories only

Shown by Council boundaries

(Adjusted by LA size: DVCs per 10km x 10km SQ

Provides reasonable estimate of relative risk to DEER !

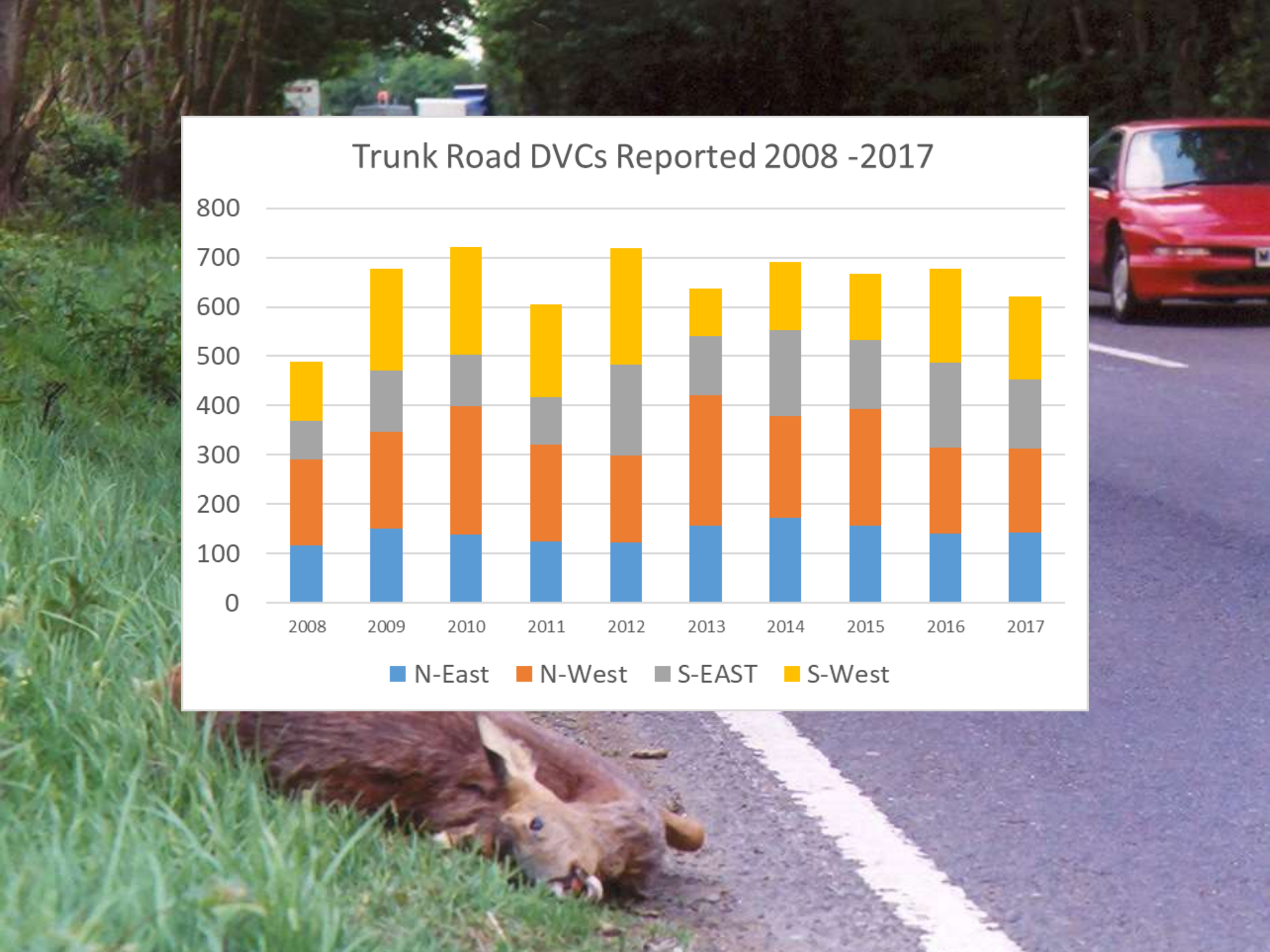


Number of Deer casualty reports from 'Core data source' categories only

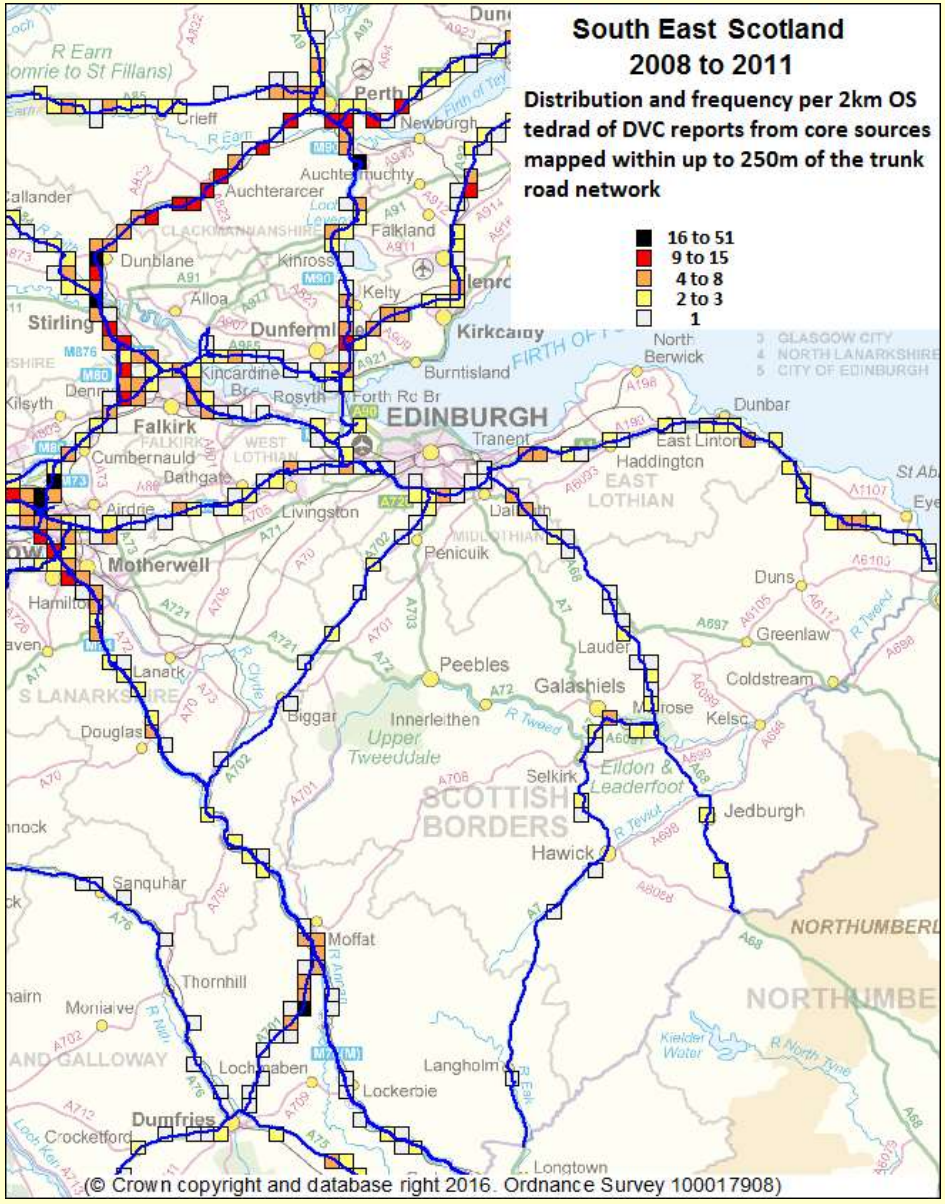
Shown by Local Authority boundaries

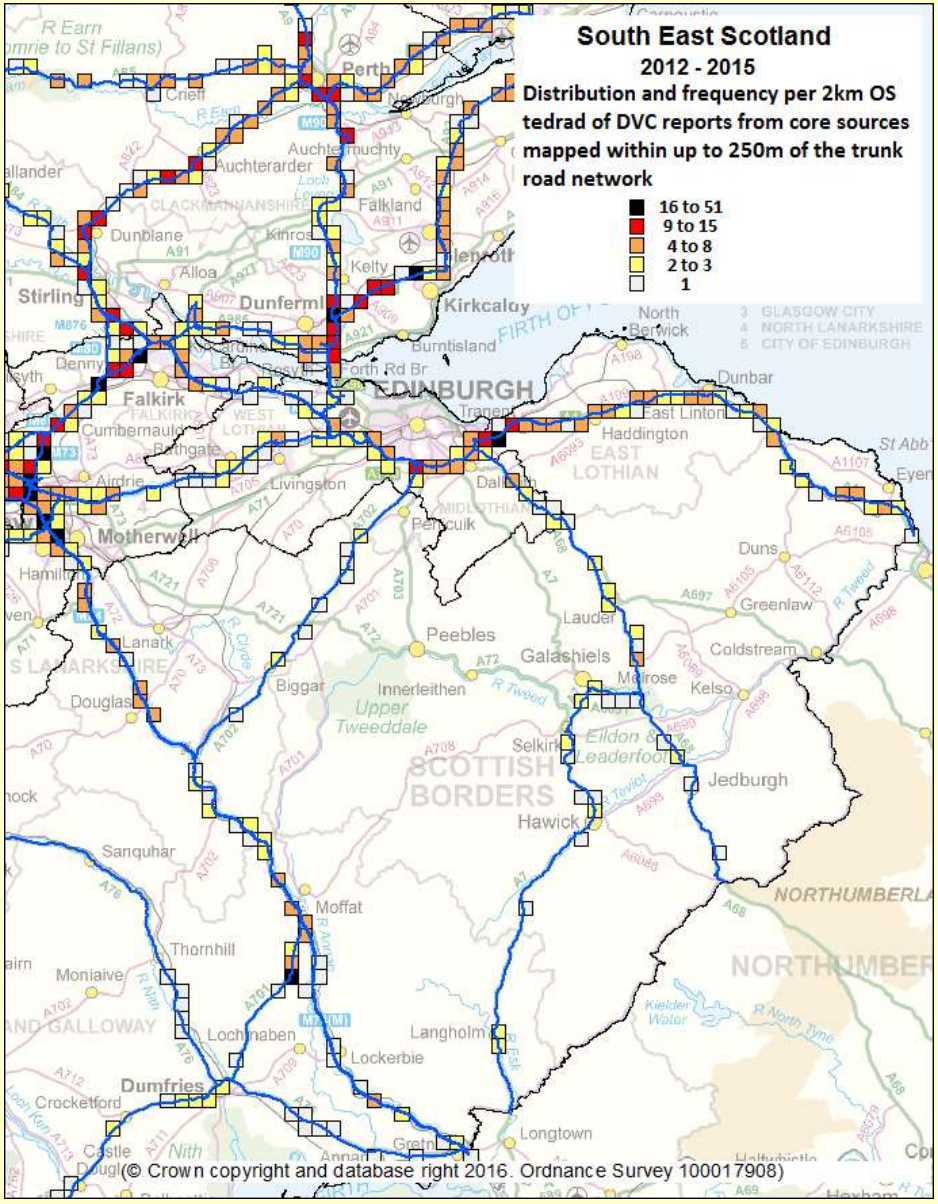
Adjusted by Average annual Motor vehicle traffic (vehicle miles) within Council)

Provides better guide to relative RISK to road users: per driven mile.

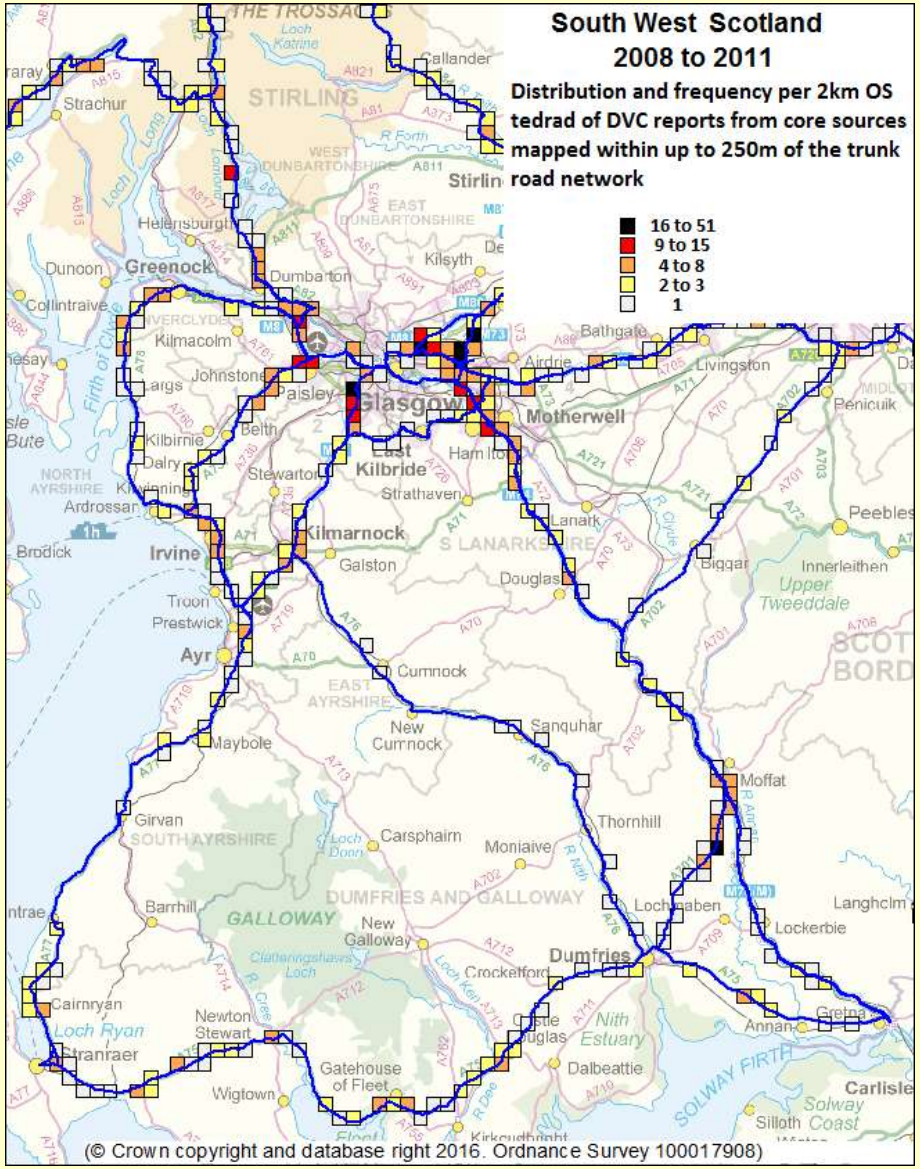

Trunk Road DVCs Reported 2008 -2017
800
700
600
500
400
300
200
100
0
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
N-East
N-West
S-EAST
S-West

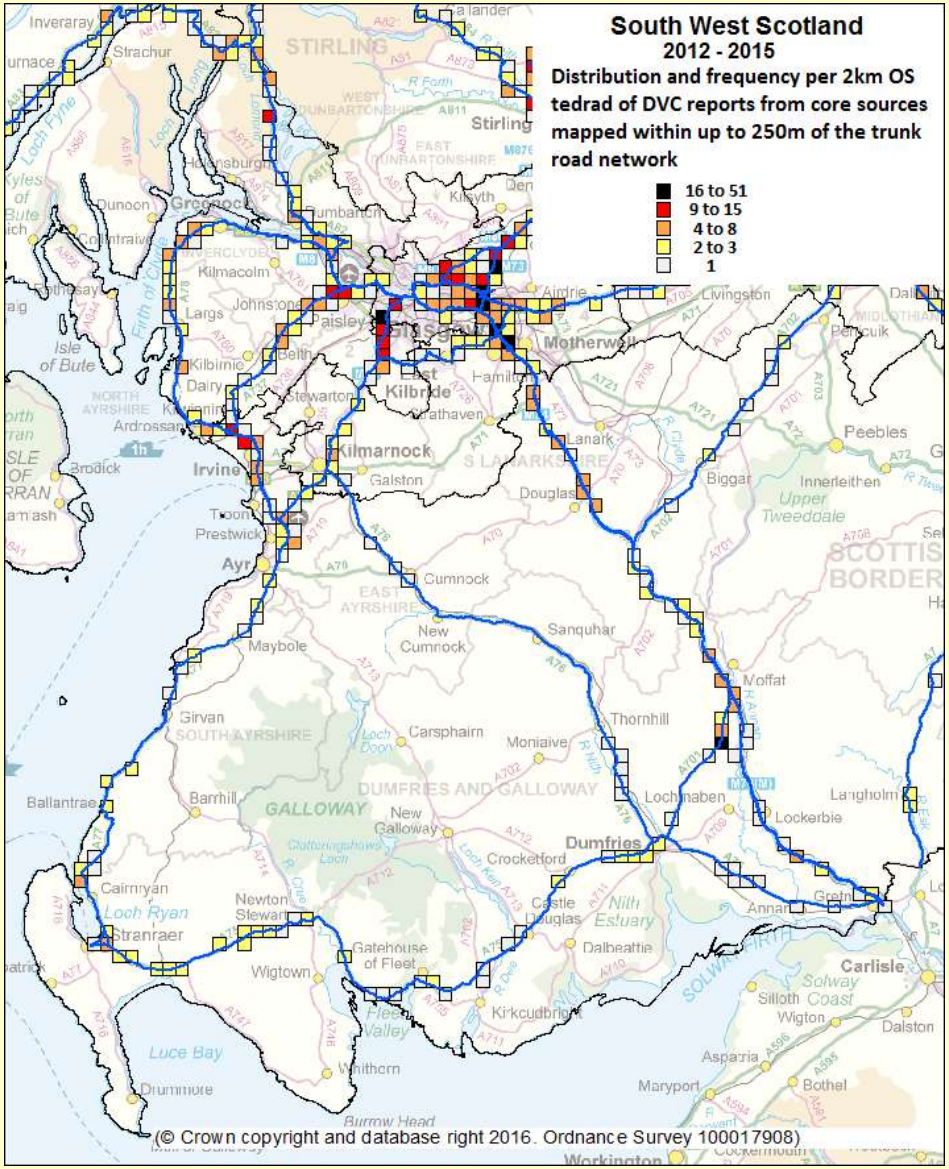
Distribution and hotspots based on of Trunk Road DVC reports South East Scotland





Distribution and hotspots based on of Trunk Road DVC reports South West Scotland

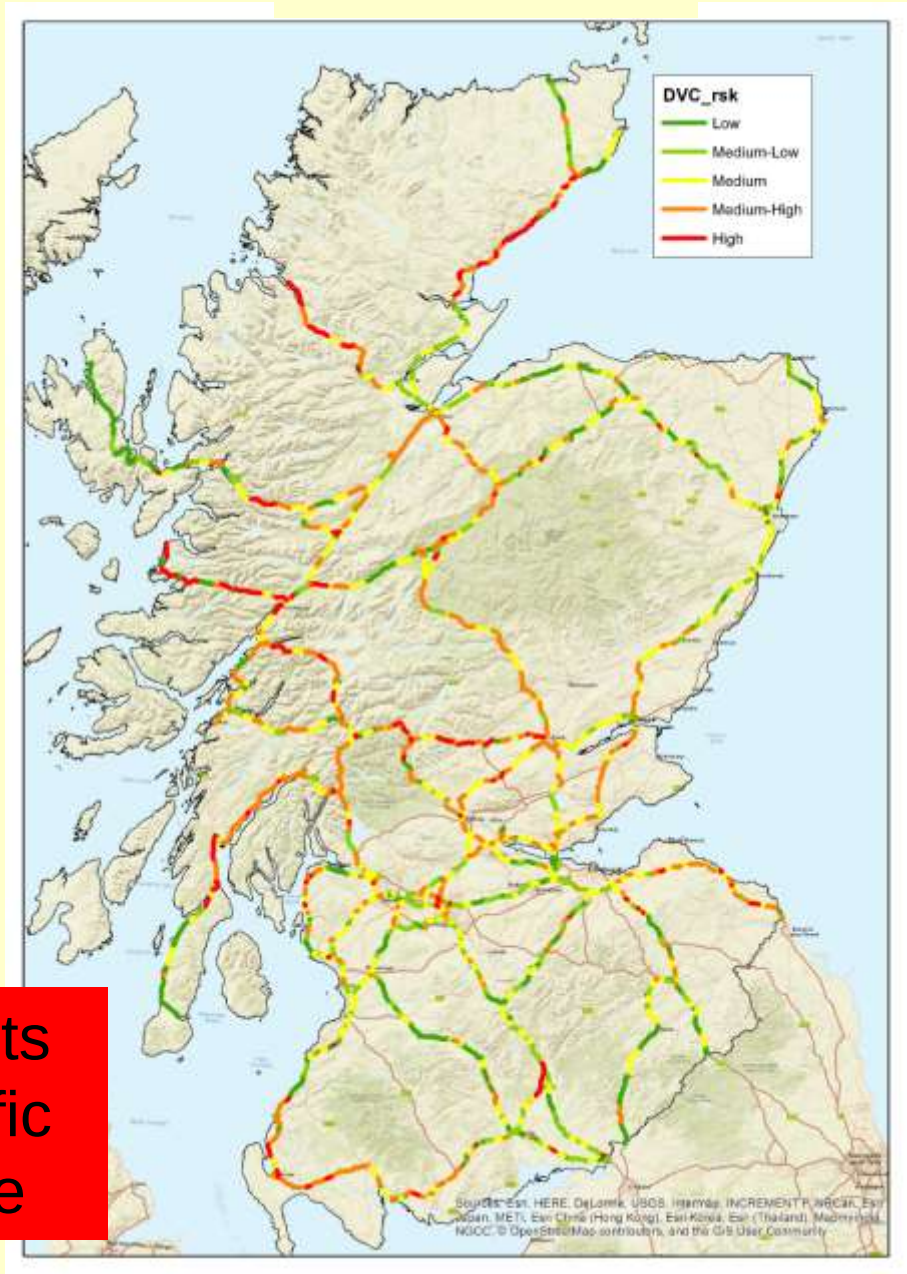




Others areas see Langbein 2017 - SNH Commissioned Report No. 950 (now on SNH web-site)

DVC data modelling of relative risk for different trunk road ‘sections’.

2009 – 2016 data

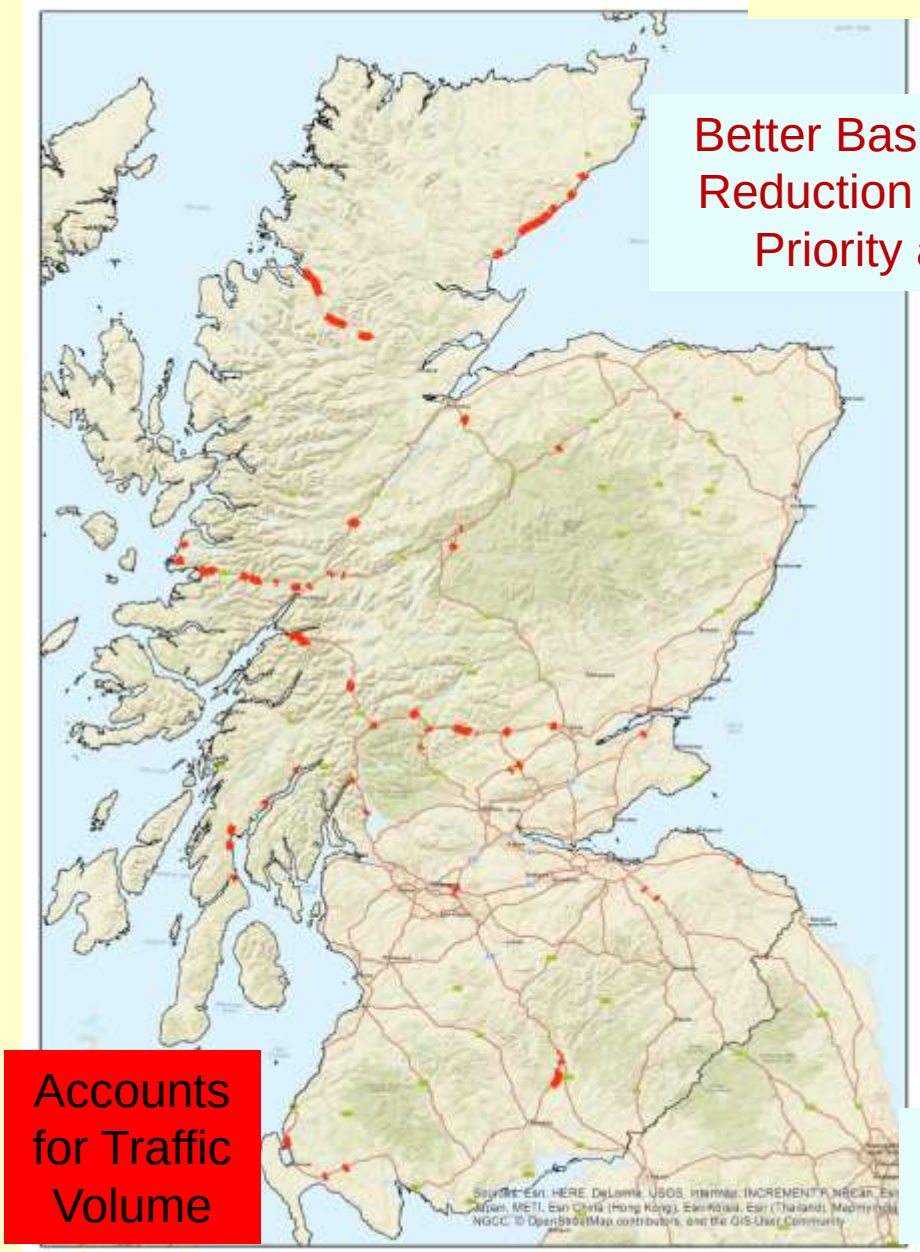


Accounts for Traffic Volume

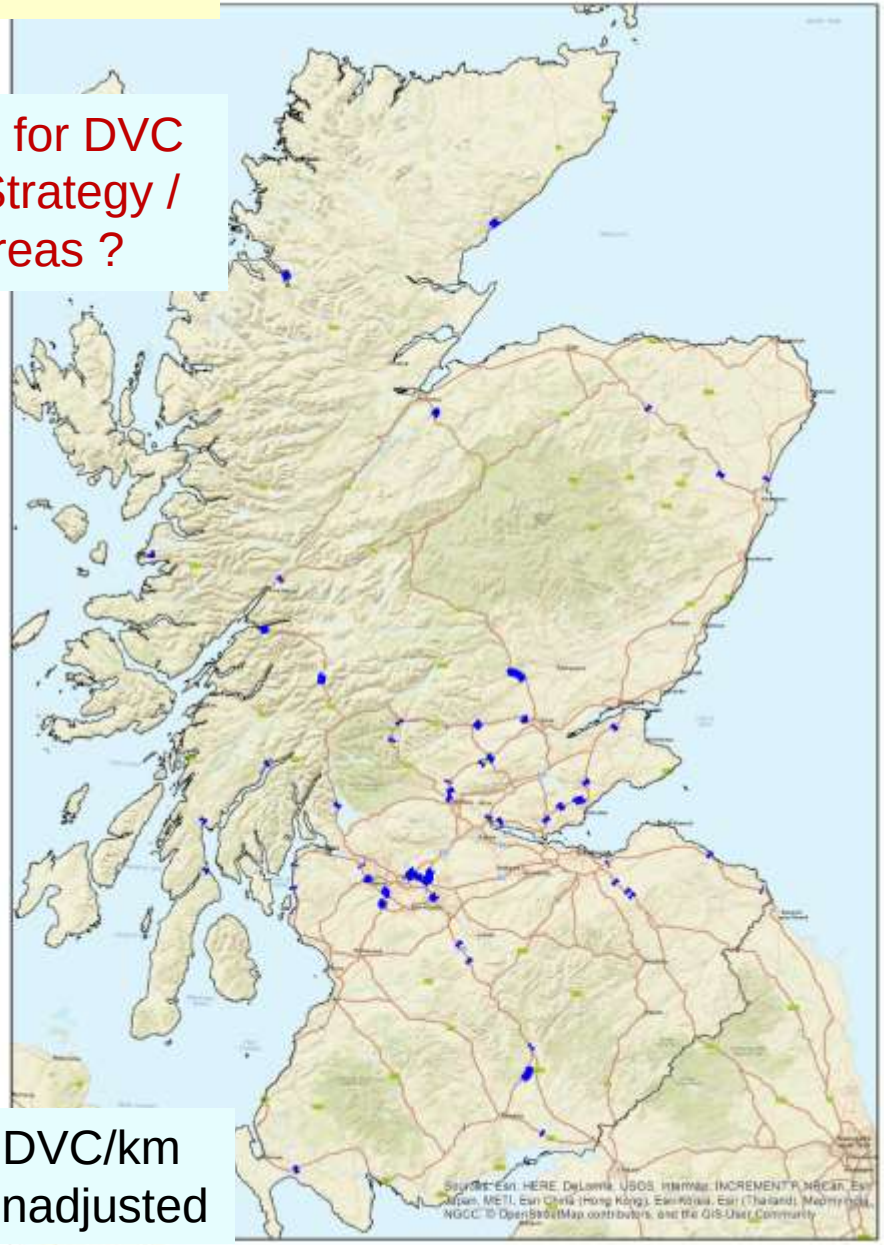
Top 100 road section based on DVC 'RISK' or raw DVC/km

2009 – 2016 data

Better Basis for DVC Reduction Strategy / Priority areas ?



Accounts for Traffic Volume

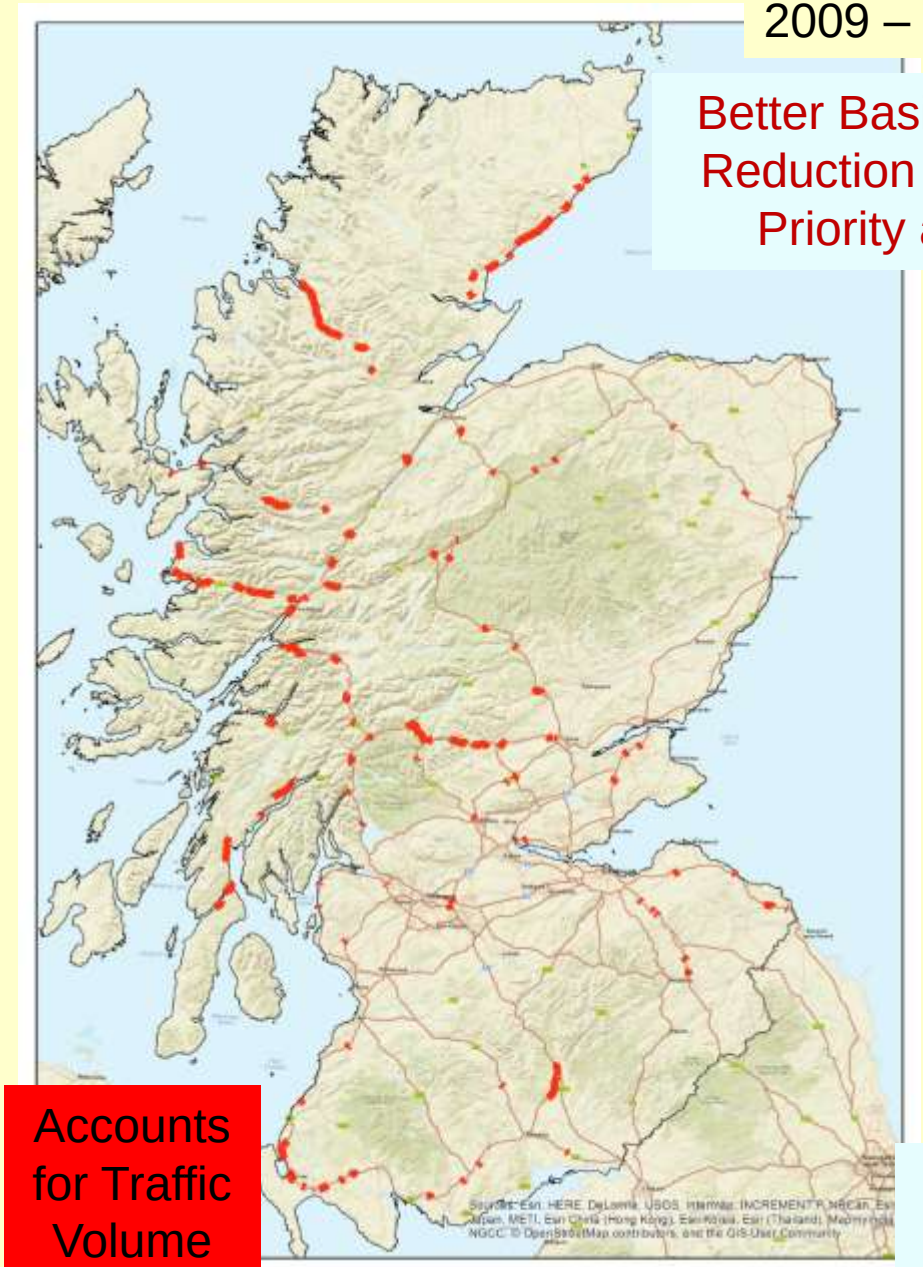


DVC/km unadjusted

Top 200 road sections based on DVC 'RISK' or raw DVC/km

2009 – 2016 data

Better Basis for DVC Reduction Strategy / Priority areas ?



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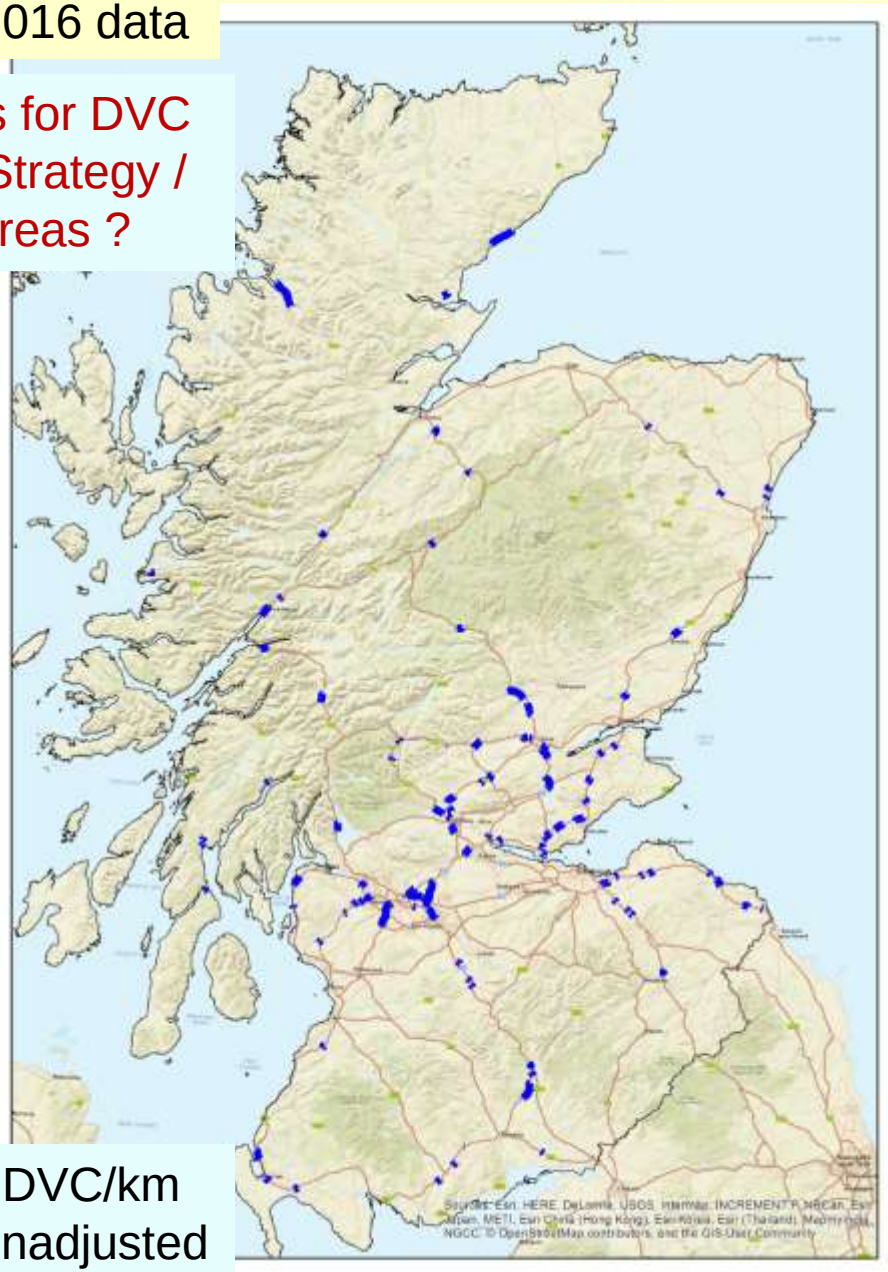
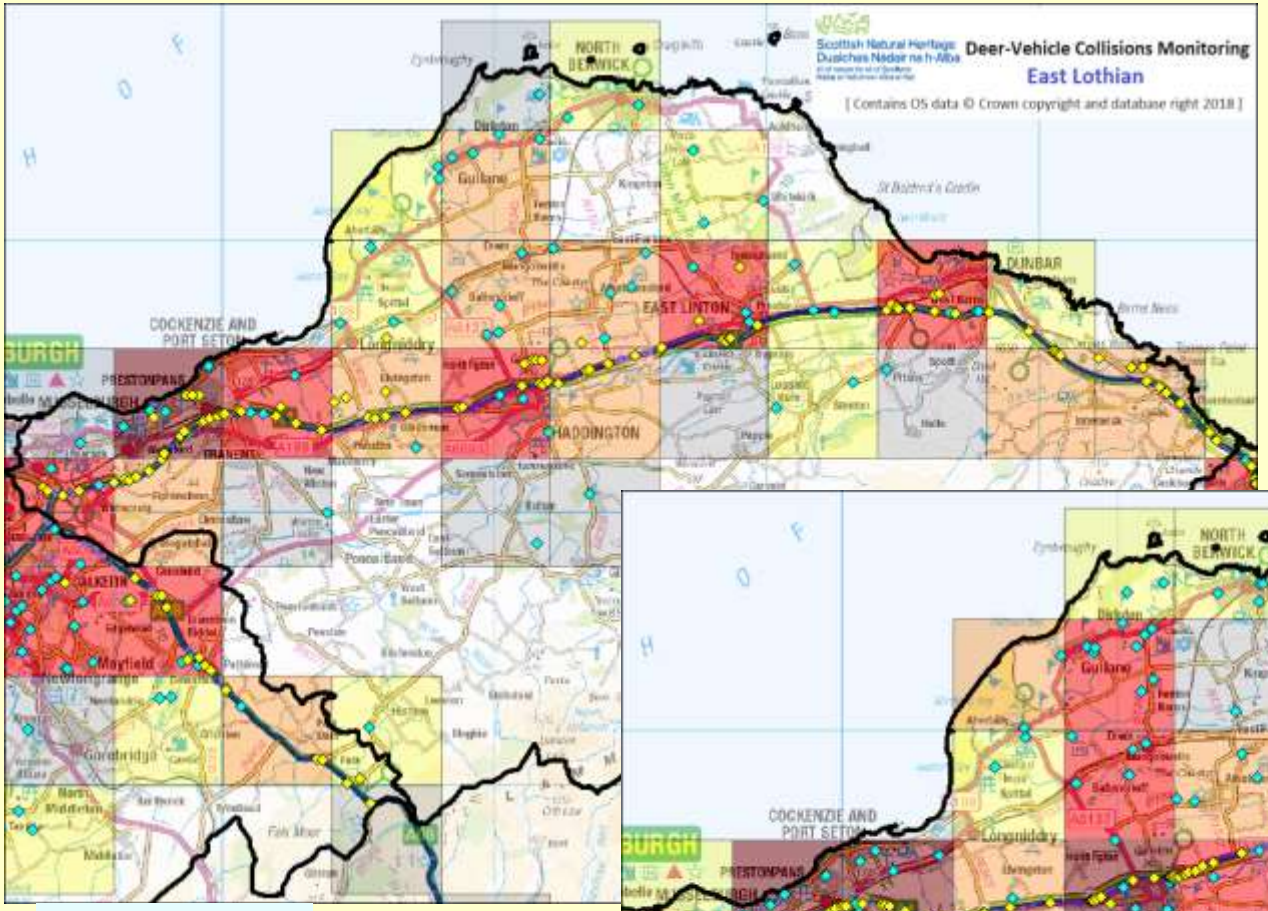
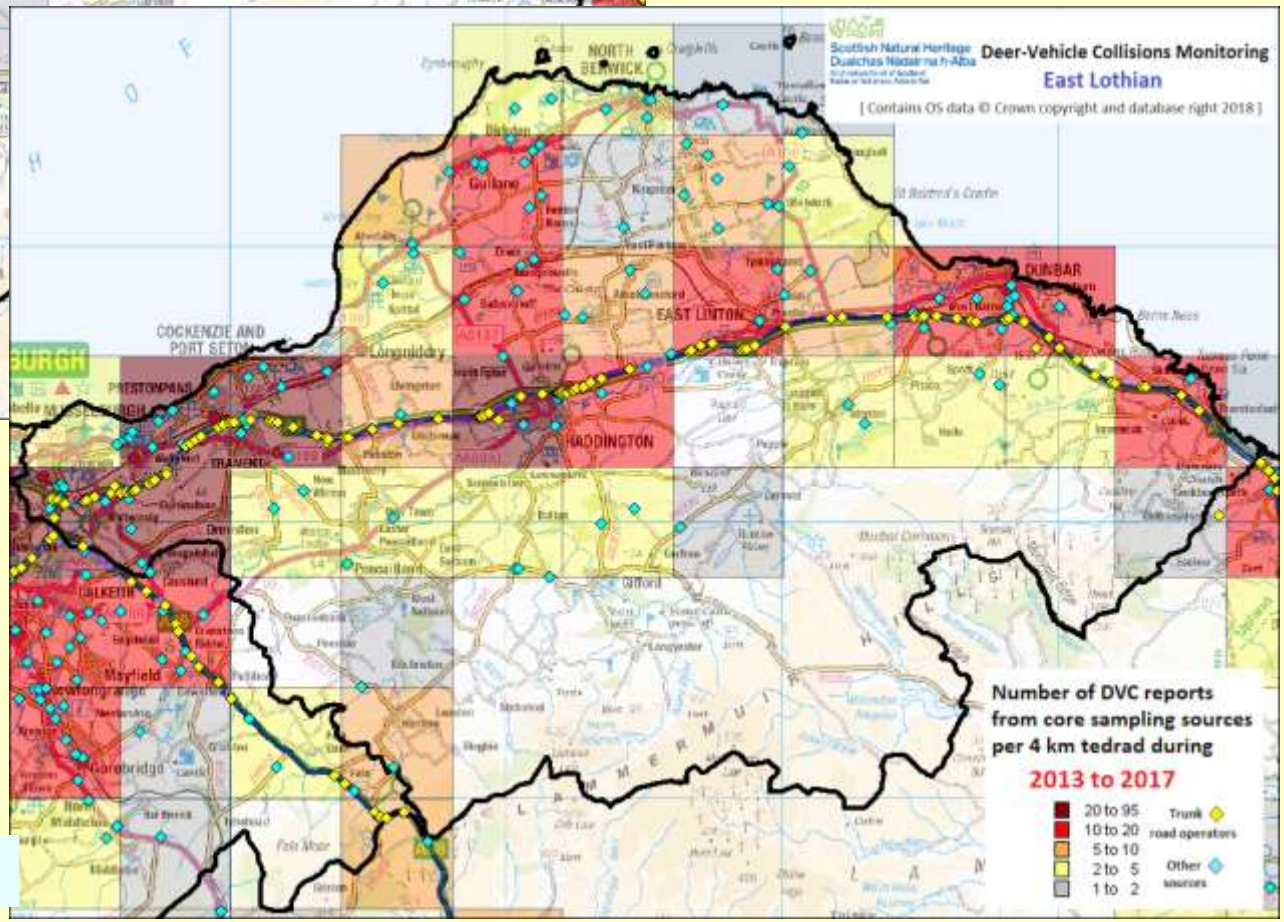


DVC/km unadjusted

East Lothian

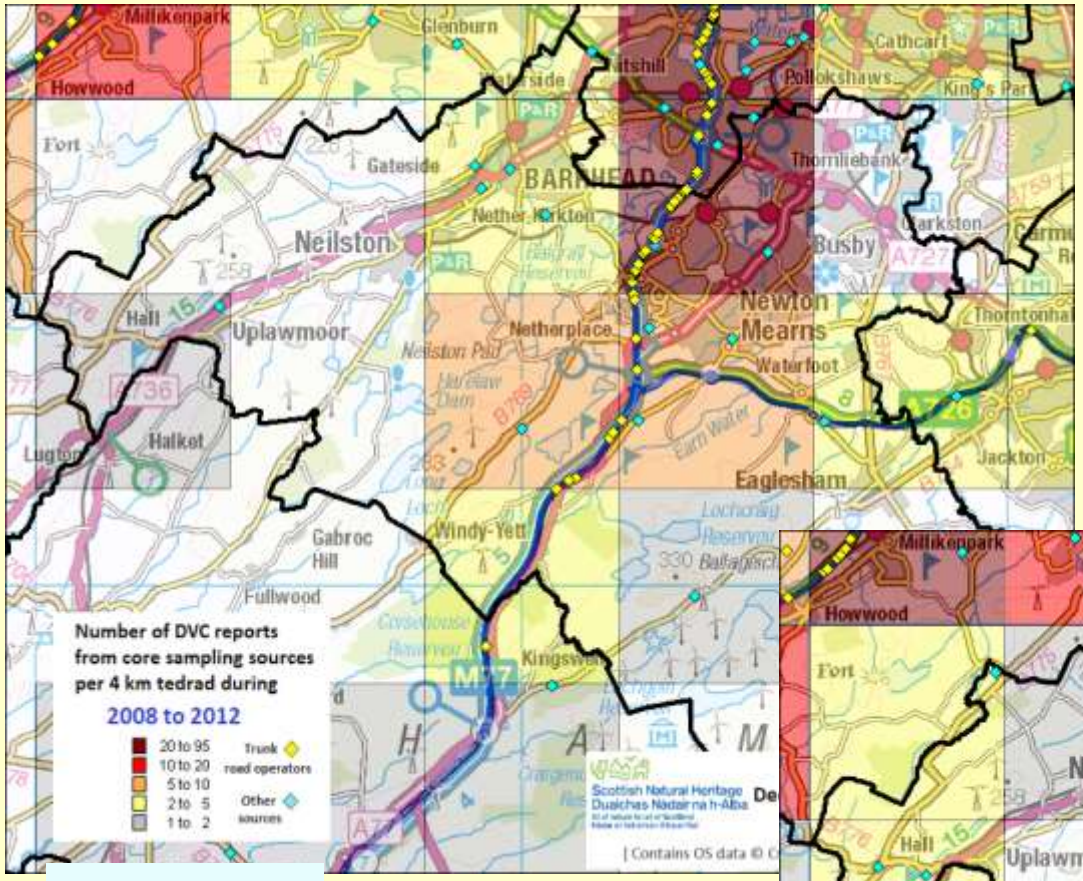


2008-2012

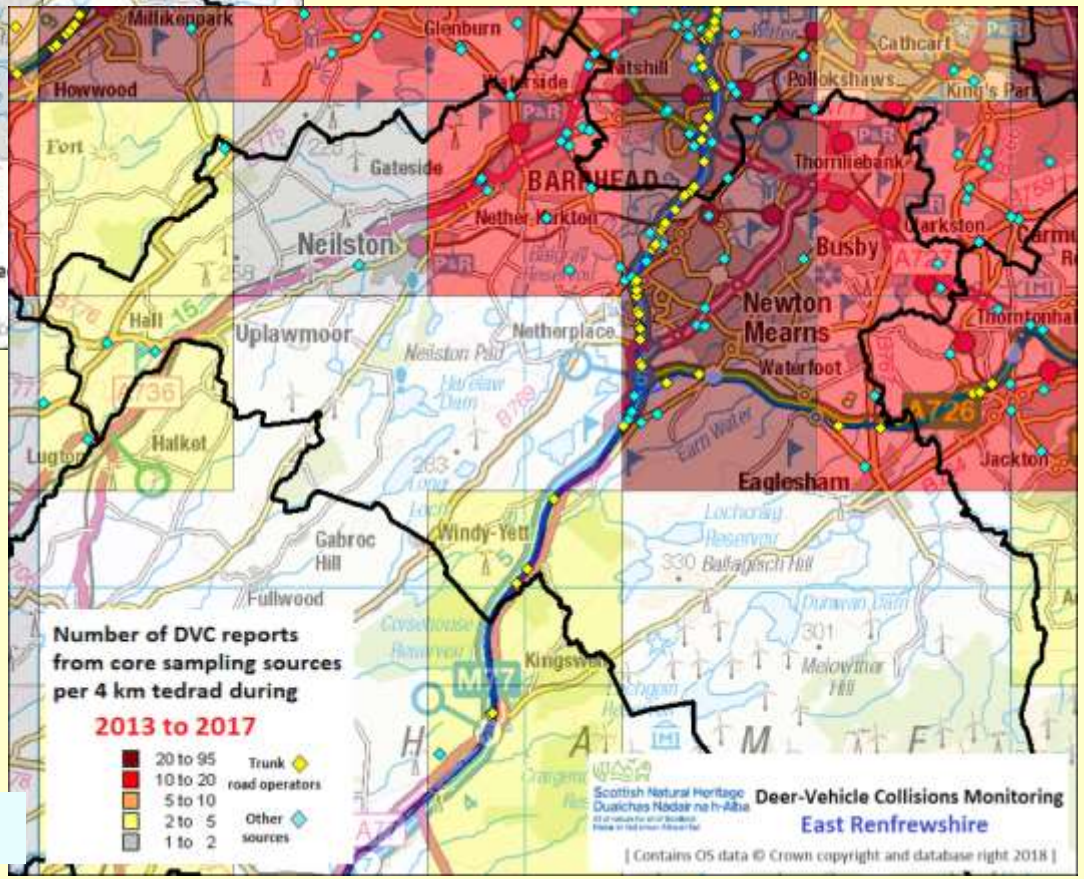


2013-2017

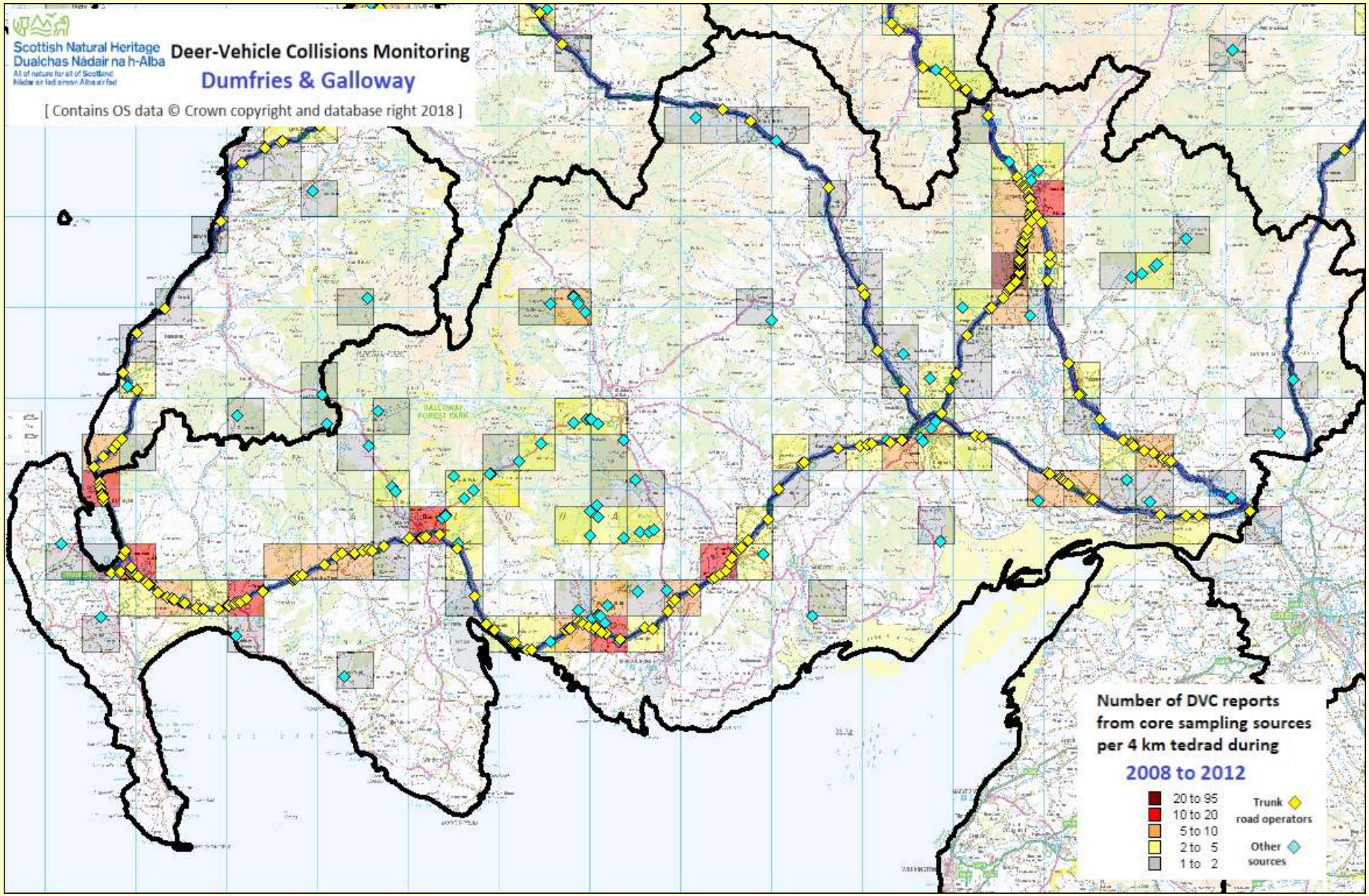
East Renfrewshire

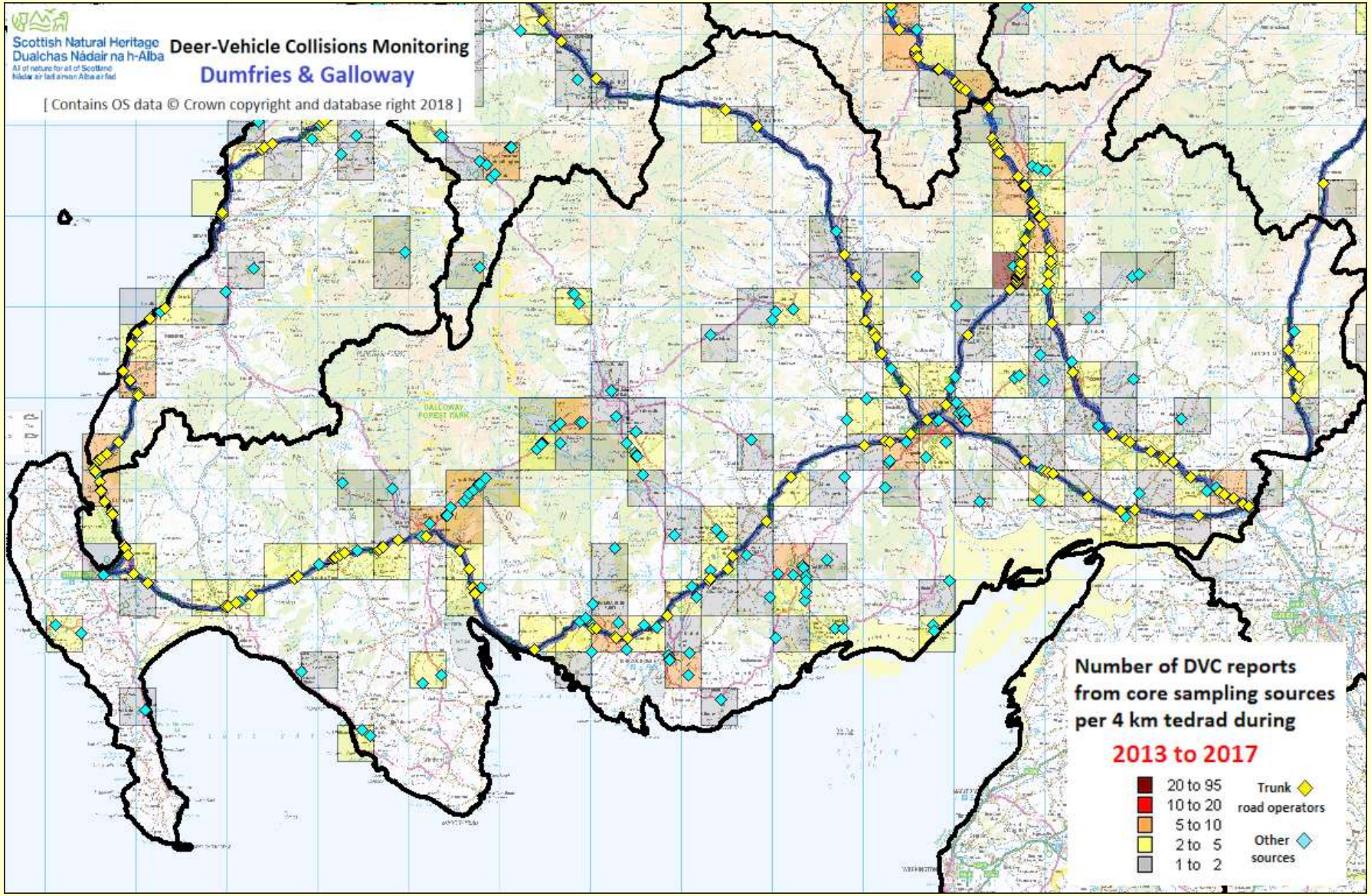


2008-2012



2013-2017


Scottish Natural Heritage
Dualchas Nàdair na h-Alba
All of nature for all of Scotland
Nàdar air fad airson Alba air fad
Deer-Vehicle Collisions Monitoring
Dumfries & Galloway
[Contains OS data © Crown copyright and database right 2018]
Number of DVC reports from core sampling sources per 4 km tedrad during
2008 to 2012
20 to 95
10 to 20
5 to 10
2 to 5
1 to 2
Trunk road operators
Other sources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Number of DVC reports from core sampling sources per 4 km tedrad during
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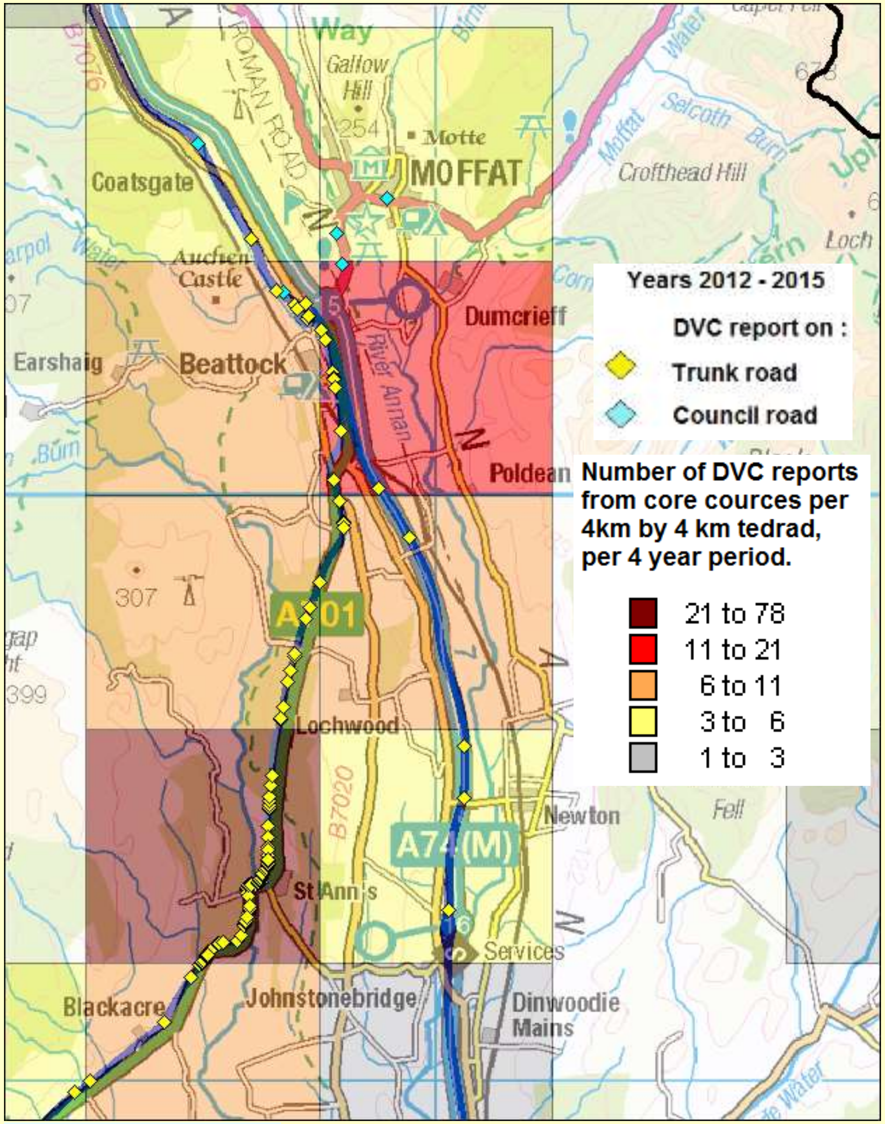
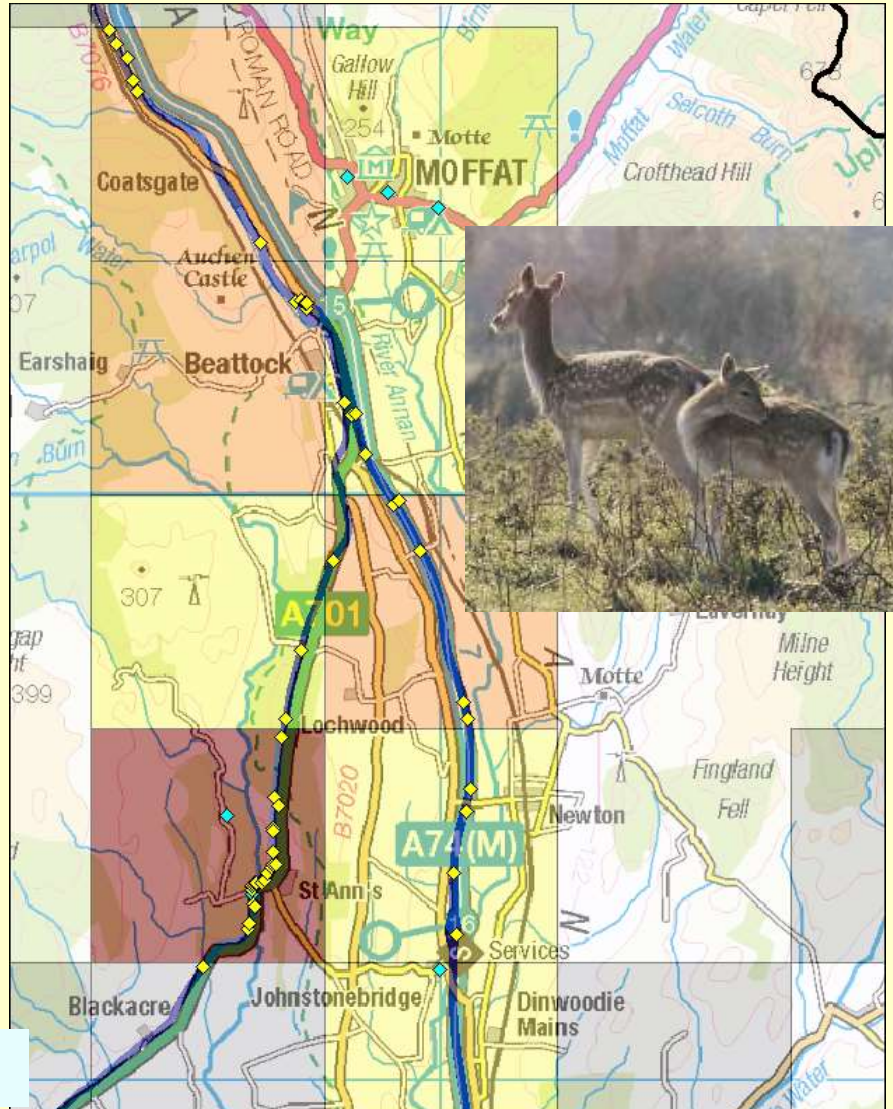
Trunk road operators
Other sources

Moffat to St Ann's



2008-2012



2013 -2017

How can LDNS and individual stalkers help ?

- **Report sightings of deer casualties on-line.**

- **Helps us assess 'sampling' rate achieved via Trunk OCs & SSPCA**
- **Help provide deer species detail (rarely available from our main data sources)**

Please report incidents (with date and location) on-line at : DeerAware.com 'Inciden report' Tab – at this link: deeraware.com/index.php/research/incident-report

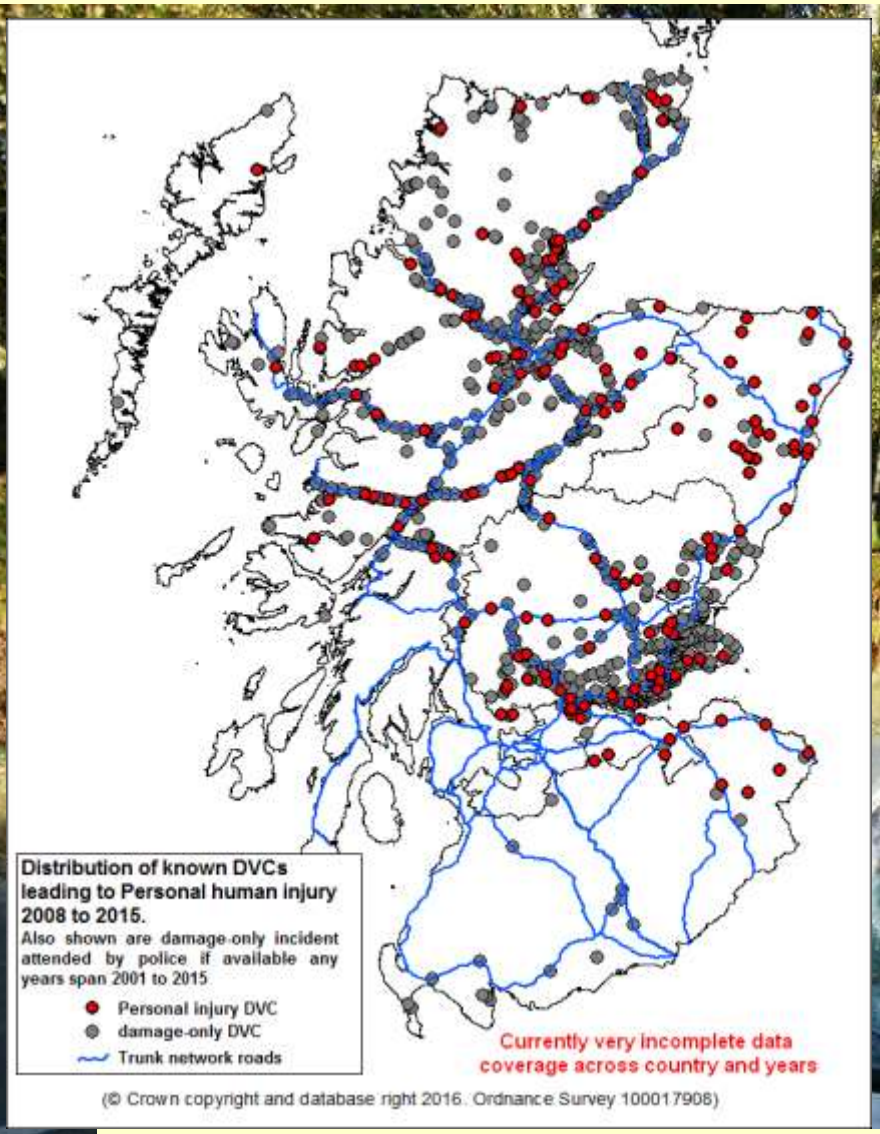
Helpful if in comments mention if member of deer group / DMG / LDNS, to distinguish from general public less familiar with deer species

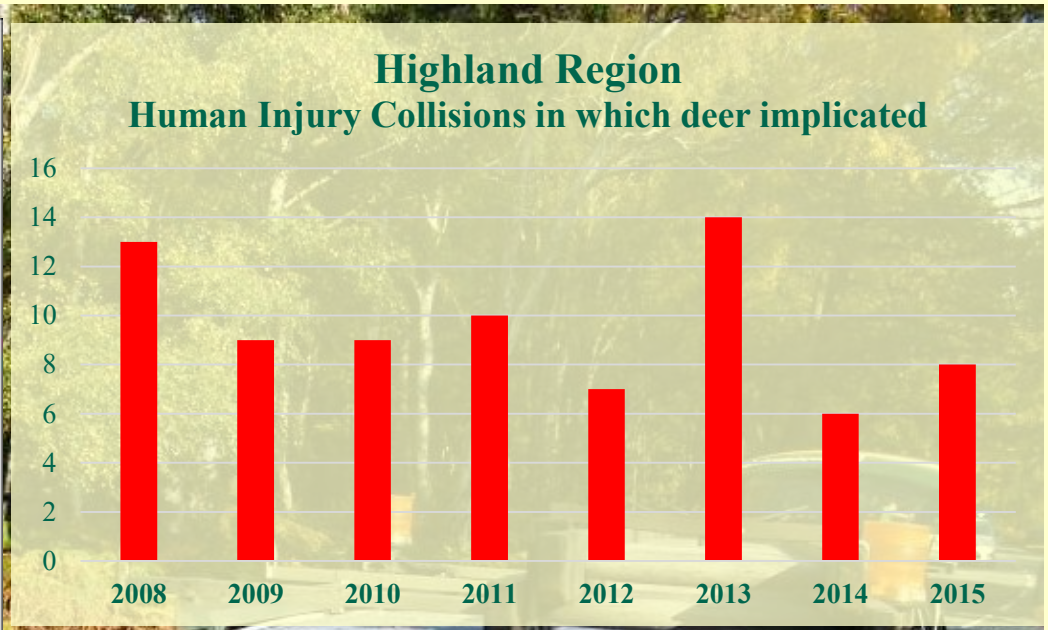
Extraction of data on “Reported” Human injury DVCs

Remains very incomplete at present

Year	Fife	Northern	*Central	Grampian	Tayside	Lothian & Borders	Strathclyde	Dumfries Galloway	Total
2008	3	13	7	7	nd	nd	nd	nd	30
2009	2	9	0	8	nd	nd	nd	nd	19
2010	0	9	1	3	nd	nd	nd	nd	13
2011	4	10	1	6	nd	nd	nd	nd	21
2012	4	7	4	6	nd	nd	nd	nd	21
2013	0	14	3	nd	9	4	nd	nd	30
2014	1	6	2	nd	1	3	nd	nd	13
2015	2	8	3	nd	6	5	nd	nd	24
2016	1	8	2	nd	4	2	nd	nd	17
2017	(2)	3	(4)	( )	( )	( )	*(1)	( )	10
Total	19	87	27	30	20	14	1	-	198

Extraction of data on “Reported” Human injury DVCs
Remains very incomplete at present





Dft Stats		£2015
Accident/casualty type	Cost per casualty	Cost per accident
Fatal	1,783,556	2,005,664
Serious	200,422	229,757
Slight	15,450	24,194
Average for all severities	53,878	76,466
Damage only	-	2,142

At estimated 50 to 100 deer related injury accidents in Scotland each year value of prevention > £ 3.8 to 7.6 Million ££ per annum

Mitigation – What if anything works and where?

Wide range of potential measures:

Deer Fencing

- remains best proven form of mitigation for major trunk roads
- *provided of adequate specification for all deer species present*
- *and well maintained (= **high cost**!)*
- *Fencing most effective where leads to safer crossing(s)*
- *& long sections may require exit ramps or gates*

Effectiveness: HIGH

Green / Land Bridges

- enable safe crossing by large and small animals on major trunk roads

- but **High cost**
- especially when retrofitted.

Effectiveness: HIGH

Examples of joint use accommodation structures

M25 Bridge & tunnel used by fallow and muntjac

Effectiveness:
Promising / HIGH

Adaptation of much smaller existing structures can also work

Fallow crossing narrow joint use bridge over M25 – London orbital

and even 100m long narrow low underpass beneath M25

Management of Verge Vegetation –

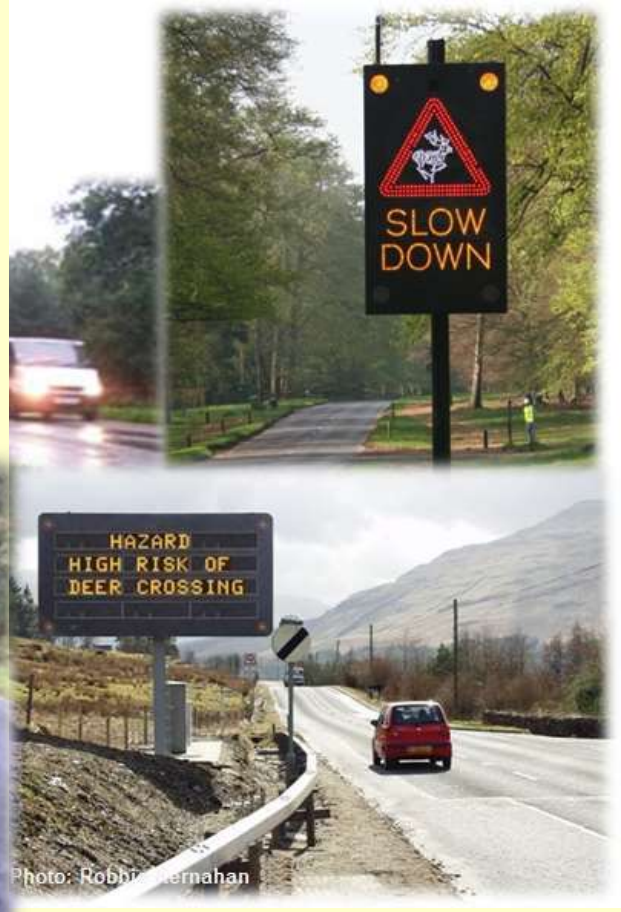
– to improve sight lines

- but costly if high scrub developed

Effectiveness: Promising

Temporal / Seasonal Awareness

- **Enhanced road signage / VMS / and/or Vehicle activated signage**
- **Animal activated signage?**



Effectiveness: Promising / Intuitive

Roadside deer deterrents

- **Passive Light-reflecting devices (wolves eyes / reflectors)**

- widespread use across UK, EU & US for 50+ years

- but almost total lack of scientific evidence of effectiveness.

Most trials also poorly designed, and lack of research of true effects on deer behaviour.

Effectiveness: Poor , at best short-term

Recent Reviews: Brieger et al (2016) & Brieger et. al 2017

- **Newer deterrents with Active light plus variable acoustic signals more promising results <u>abroad</u>**

  (Austria / Netherlands / Australia)

- **but require robust widespread trials to assess under UK conditions and all differing deer and other animal species**

WiConNET Application No. 1:
Wildlife Safety at National Roads

Preventing wildlife collisions at national roads

In Austria, still about 77,000 wildlife related accidents happens each year mainly at National and 3rd level roads. New functions are daytime-operation and pre-activation to cover higher vehicle speeds.

Concerned Wildlife: Red deer, roe deer and wild boars.

Austrian Government supported DeerDeter research 2017-19

WiConNET Application No. 2:
Wildlife Safety at Railway Sections

Preventing wildlife collisions with trains and highspeed trains

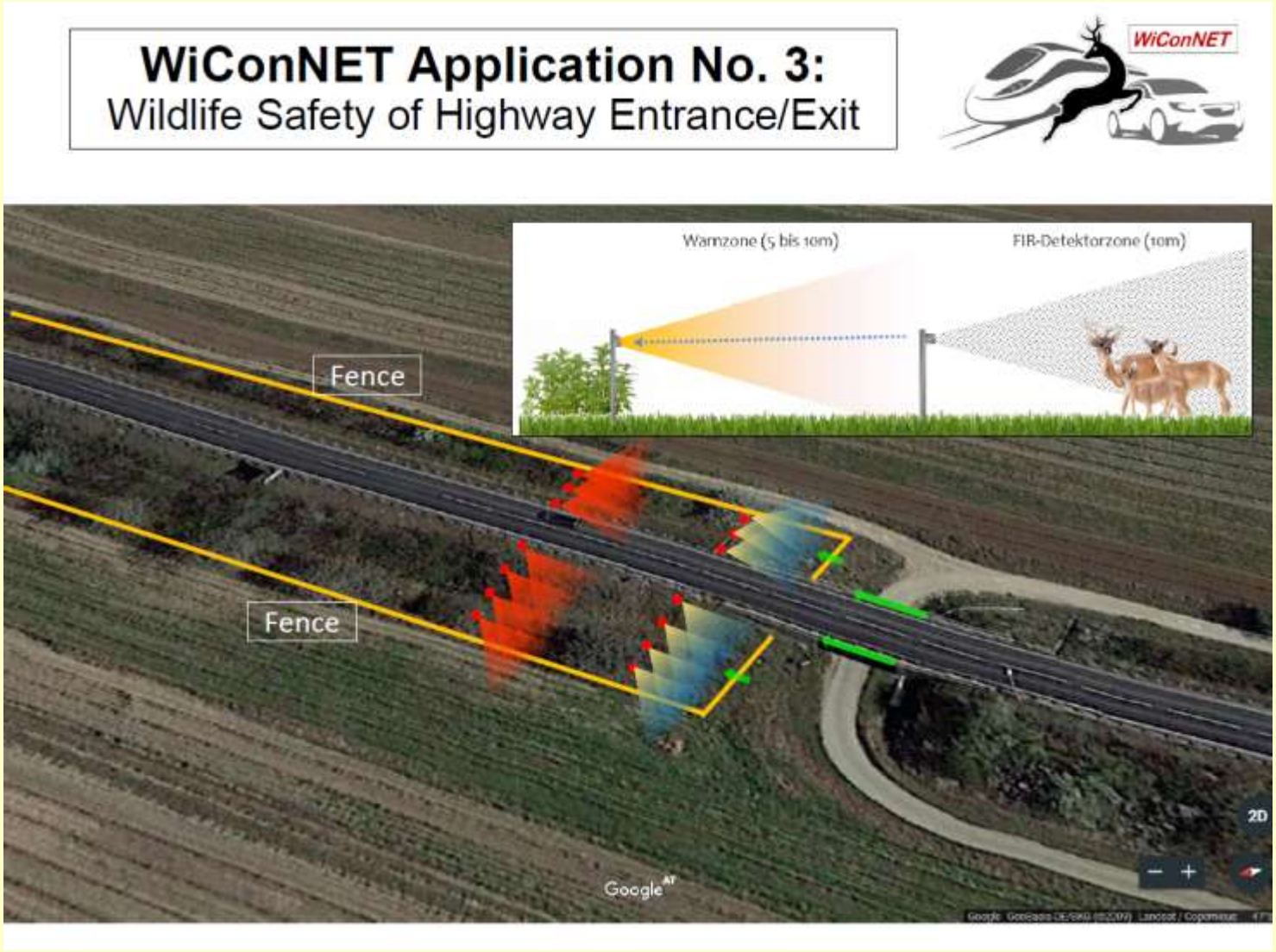
Wildlife killed by trains is a problem worldwide, associated with high costs in damage repair and compensation payments for delays and cancelled trains. Testsite Wieselbruck with train speeds up to 240 km/h.

Concerned Wildlife: Red deer, roe deer and wild boars.

On Single lane, dual lane, as well as railways.

Will include networked devices, & advance trigger gateways.

Austrian Government supported ‘DeerDeter’ research 2017-19



Cannock Chase A513 DeerDeter Trial

Drive-by video along trial site & close-up of DeerDeter strobe and sound signals .
To view video clips shown visit youtube.com/jochenlangbein
CannockDeerTrialNov17: https://youtu.be/IG5aZTiZzq8

Individual measures: What if anything works ?

Measures	Pros	Cons
Fencing	Well proven	Maintenance cost; Barrier effect
Brigdes / Underpass	Good	High cost; Feasibility
Deer Control	Good / Variable	can move problem / destabilise
Speed Restriction	Good	Feasibily for trunk roads
Interactive Signage	Promising / uncertain	Driver habituation?
Verge Clearance	Promising / unproven	Attractiveness
Public Awareness	Promising	Effect unclear
Deterrents	NONE yet well proven in UK situation	Inadequate signals; habituation

Fuller review: Langbein, Putman and Pokorny (2011) Traffic collisions involving deer and other ungulates in Europe and available measures for mitigation. In Ungulate Management in Europe

For overview see : Langbein2011etal_mitigationoverview.pdf

Best results likely to arise from local integration of a number rather than reliance on a single measure

- **Fencing – leading to safer crossing**
- **Public &Driver awareness / seasonal VMS /**
- **Coordination / landowner liaison on deer control on adjoining land and TfS soft estate**
- **Verge vegetation management**
- **Speed-triggered / temporal Vehicle Activated signage at high risk road sections ??**
- **Roadside Wildlife Deterrents with active signals**

(rather than current passive light-reflecting devices) ??

Highly desirable to back any trials with robust Before / After monitoring to assess true effectiveness ;

Including study of animal behaviour at roadside.

Conclusions

- **There is no reason to believe wild deer and also feral wild boar numbers and ranges should not continue to increase in future.**

Conclusions

- **There is no reason to believe wild deer and also feral wild boar numbers and ranges should not continue to increase in future.**
- **Continued consistent monitoring essential, to provide early warning and assess / confirm effectiveness of mitigation;**
- **The most successful mitigation measures will seek not to prevent deer crossing altogether but displace them to cross roads in places or at times where accident risk is reduced.** Lowered traffic speed, Enhanced visibility, Signage, traffic free wildlife passages
- **Active road side wildlife deterrents, as well as VMS or animal activated signage need wider trials to assess effectiveness in differing situations.**

The Deer Go Marching … if you see one deer Watch out for another

DVC awareness video clip

To view visit youtube.com/jochenlangbein

The Deer Go Marching: https://youtu.be/vZq88lw8dsM

Thank you for listening

To keep in touch & help spread awareness of animal collisions do follow on social media

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LangbeinWildlife

www.langbeinwildlife.co.uk