Scottish Pollution Mapping

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Overview

- **Scottish modelling method**

- **Scottish model outputs**

- **Projected annual mean concentrations**

- **Results**
  - Modelled annual mean concentrations of NO_X/NO_2 and PM_{10} for 2008
  - Projected annual mean concentrations of NO_X/NO_2 and PM_{10} for 2010, 2015 and 2020

Method

Methodology

Components of the model:

- **Scottish point sources**
  - taken from SEPA database

- **Emissions grid for Scottish combustion sources**
  - taken from UK NAEI

- **Scottish specific dispersion kernel used in area source model**
  - based on wind speed and direction observations from RAF Leuchars

- **2008 pollutant concentration data from Scottish monitoring sites (only) used to calibrate the model**

- **PM_{10} model accounts for inputs from long range transport and secondary inorganic aerosol**

Outputs

- **Modelled (background & roadside) annual mean concentrations of specific pollutants for 2008**

- **Background maps provide modelled pollutant concentrations on a 1 km^2 basis**

- **Spatial distribution of annual mean NO_X/NO_2 and PM_{10} concentrations**

- **Roadside maps provide identification of pollutant concentrations along specific roads and road lengths**

Projections

Background maps of projected pollutant concentrations

- **Background maps provided to assist LAs in support of review and assessment of local air quality**

- **Maps of the total concentration and for a set of source sectors are provided for NO_X and PM_{10} for 2010, 2015 and 2020 from the base year (2008)**

- **Sources sectors include:**
  - roads(motorways, major & minor 'A' roads), industry, domestic, aircraft, rail, natural sources
  - allows sectors to be subtracted from the total if a more detailed local assessment is to carried out

- **Include emissions from inside and outside each 1 km grid square**

- **Based on updated emissions projections**

Background maps of projected pollutant concentrations

- **UK maps accessed through the Scottish Air Quality archive**

Results

Summary: background NO$_2$

Modelled and projected results* show a reduction in exceedences of the Scottish AQO for NO$_2$ between 2008 and 2020 at background locations

Year	Total area (km^2)	Total population exposed
2008	2	3358
2010	0	0
2015	0	0
2020	0	0

(* denotes provisional results)

Scottish AQO for NO$_2$: 40 μg m^{-3} (annual mean)

Population weighted mean NO$_2$ concentration

Downward trend for population weighted mean NO$_2$ concentration

2008* : 13 μg m^{-3}
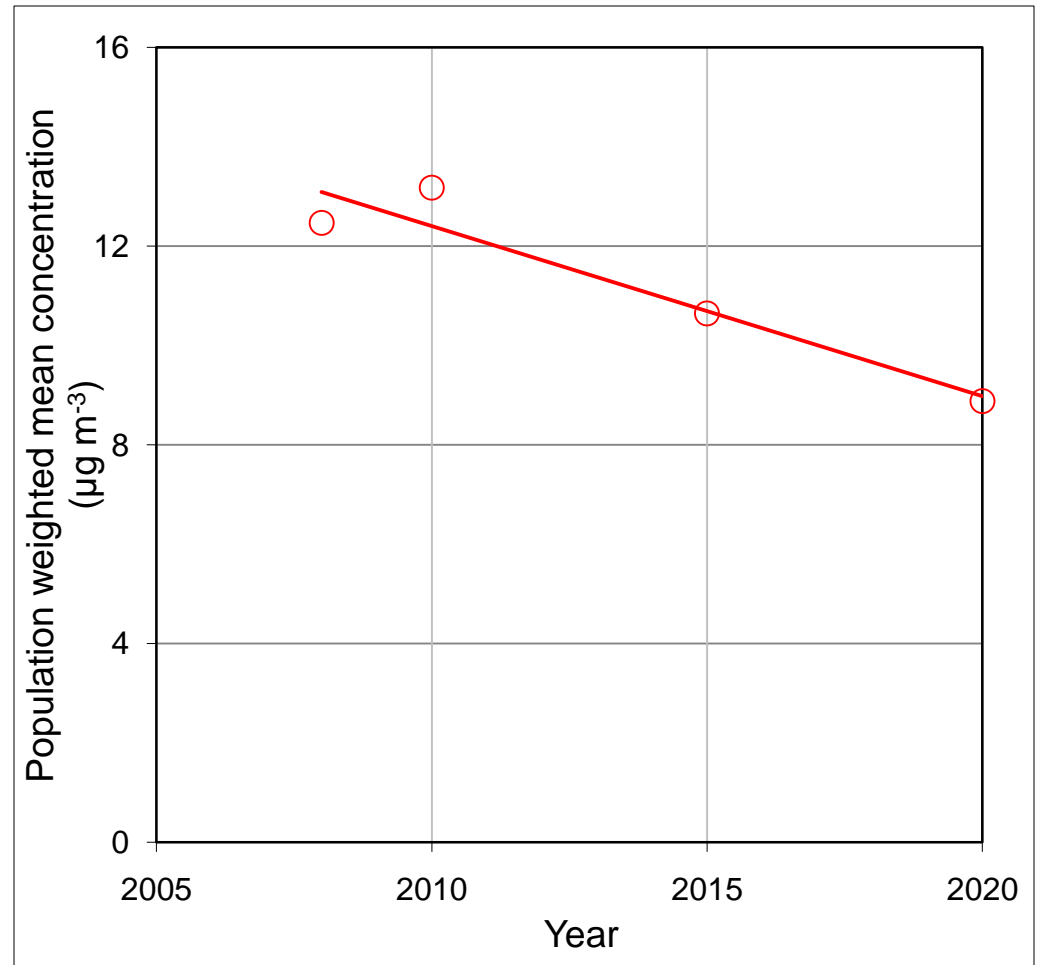
2020*: 9 μg m^{-3}

(* denotes provisional results)

Results

Background NO$_2$ (μg m^{-3})*:
2008
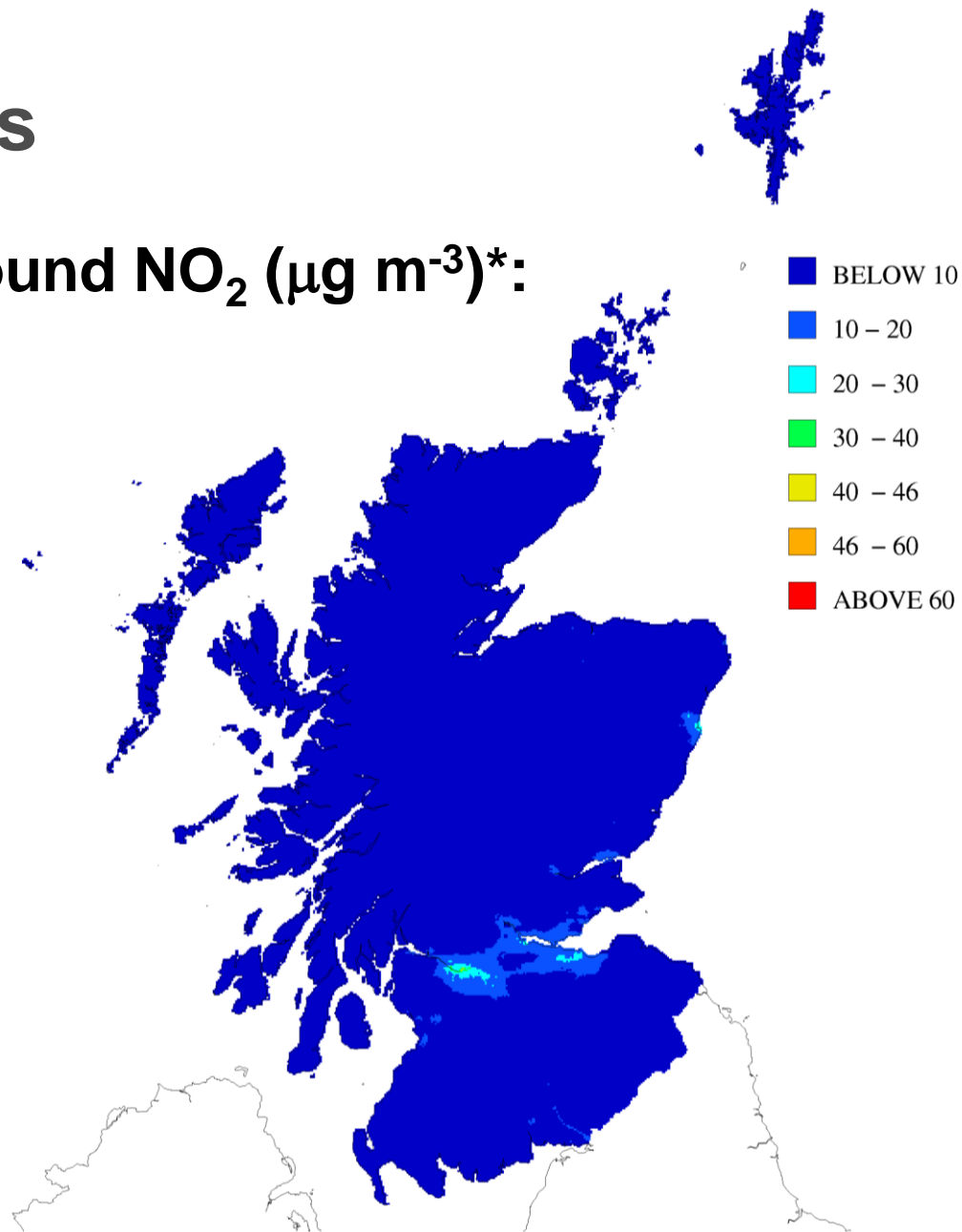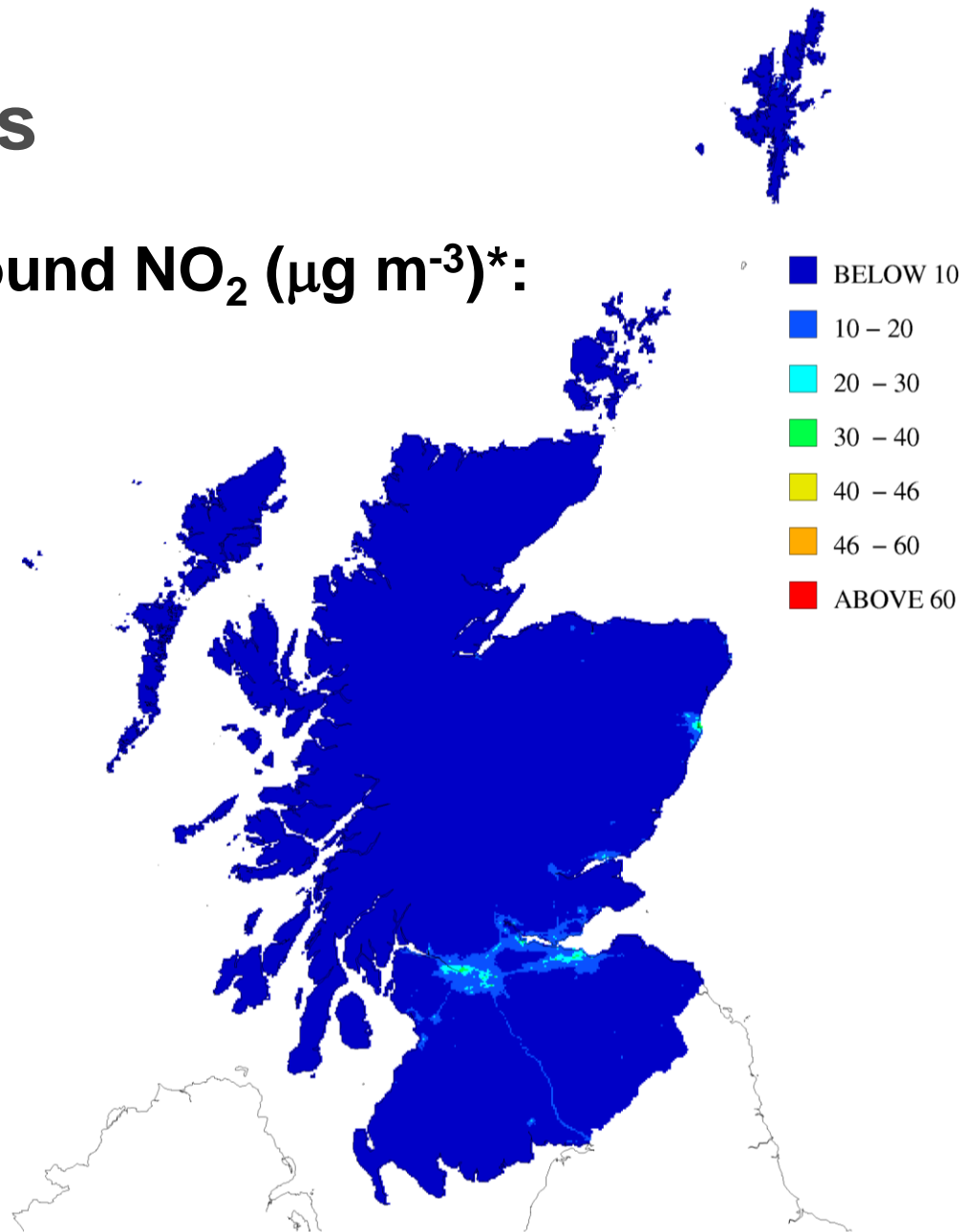
	BELOW 10
	10 – 20
	20 – 30
	30 – 40
	40 – 46
	46 – 60
	ABOVE 60

* denotes provisional results

Results

**Background NO$_2$ (μg m^{-3})*:
2010**

■	BELOW 10
■	10 – 20
■	20 – 30
■	30 – 40
■	40 – 46
■	46 – 60
■	ABOVE 60

* denotes provisional results

Results

**Background NO$_2$ (μg m^{-3})*:
2015**

BELOW 10
10 – 20
20 – 30
30 – 40
40 – 46
46 – 60
ABOVE 60

* denotes provisional results

Results

Background NO$_2$ (μg m^{-3})*: 2020

BELOW 10
10 – 20
20 – 30
30 – 40
40 – 46
46 – 60
ABOVE 60
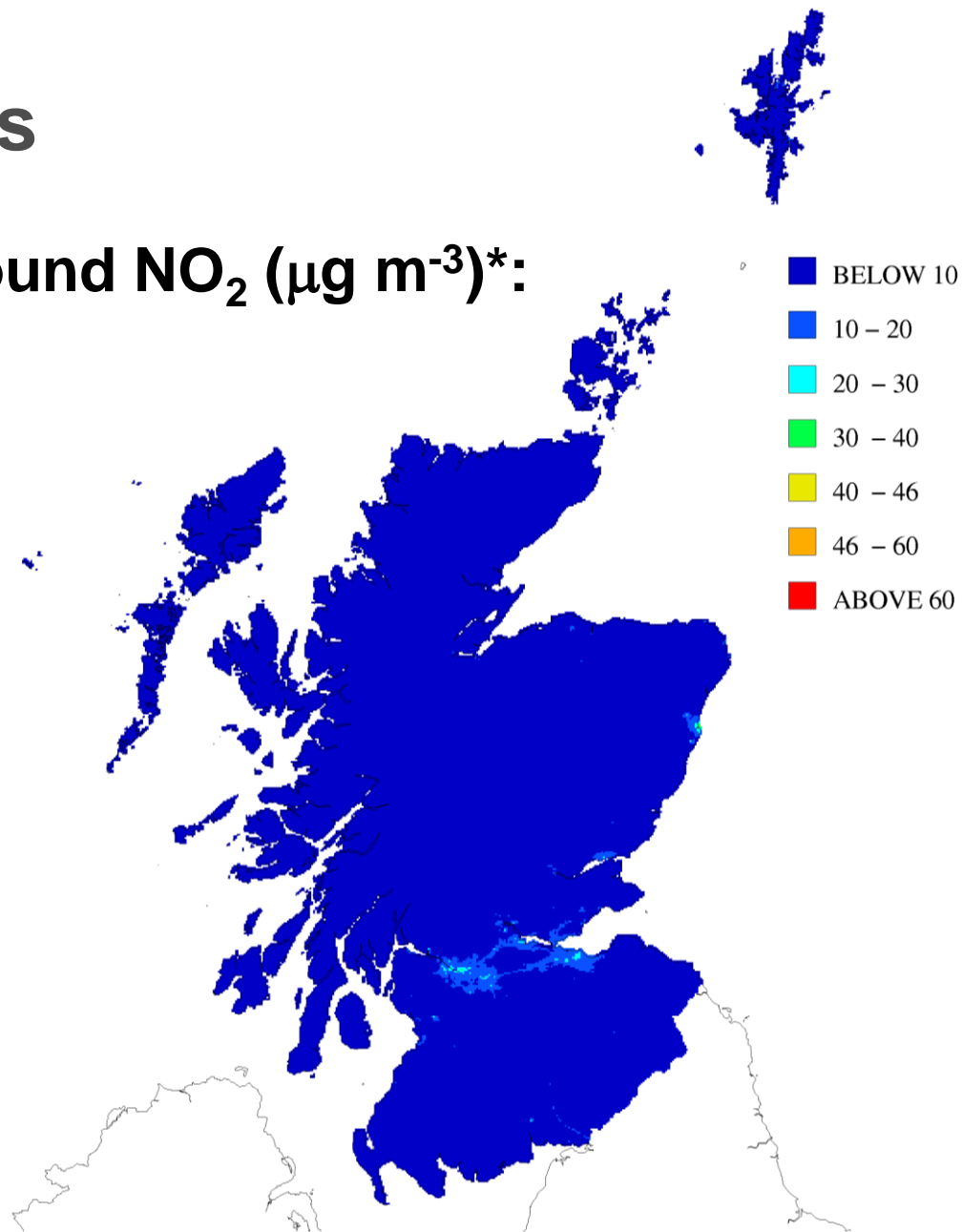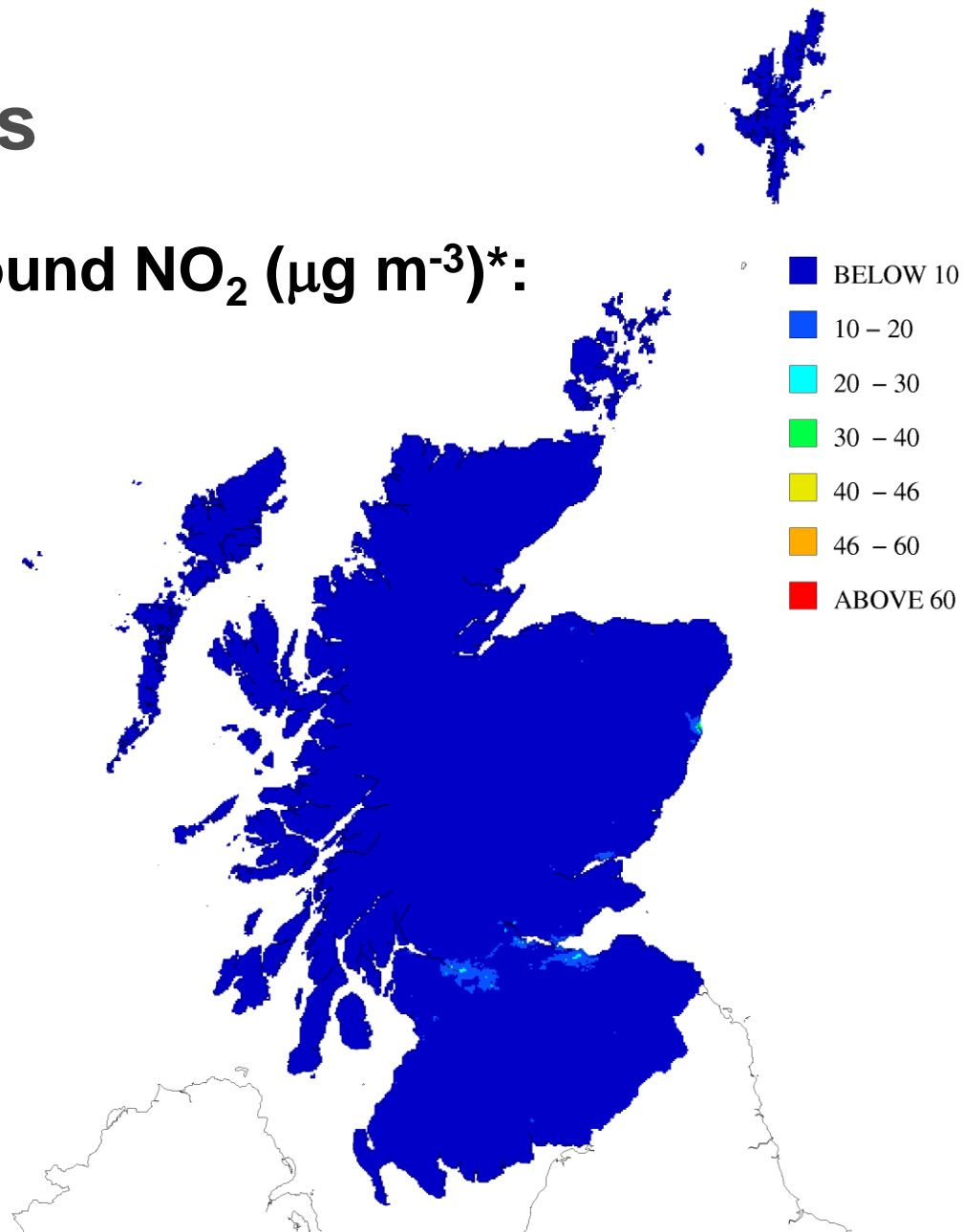
* denotes provisional results

Summary: roadside NO$_2$

Modelled and projected results* show a progressive decrease in exceedences of the Scottish AQO for NO$_2$ between 2008 and 2020 at the roadside

Year	Total road links (% of Scottish total)	Total road length (km) (% of Scottish total)
2008	72 (11)	104 (10)
2010	45 (7)	69 (6)
2015	3 (<1)	5 (<1)
2020	0 (0)	0 (0)

(* denotes provisional results)

Scottish AQO for NO$_2$: 40 μg m^{-3} (annual mean)

Results

Roadside NO$_2$ (μg m^{-3})*:
2008
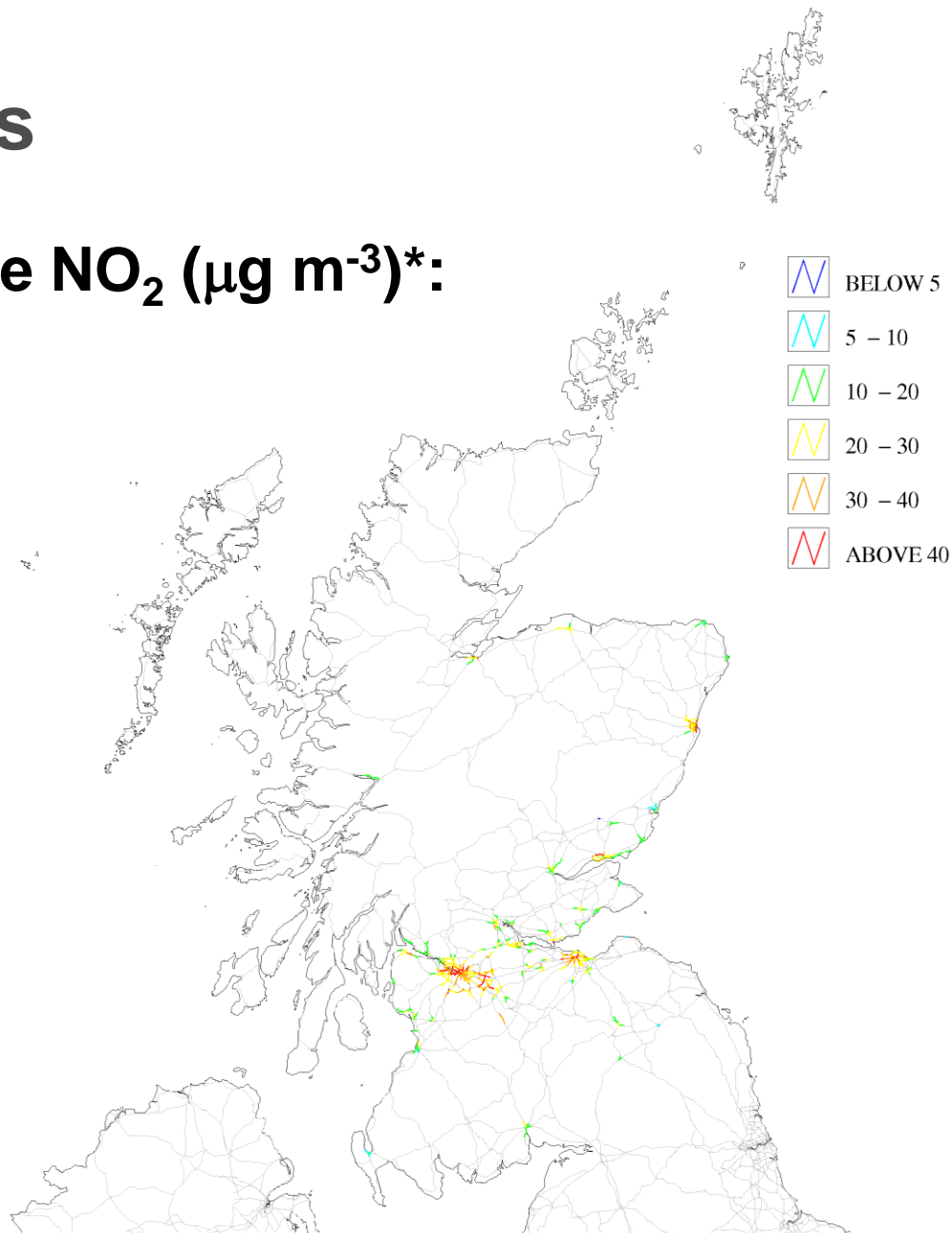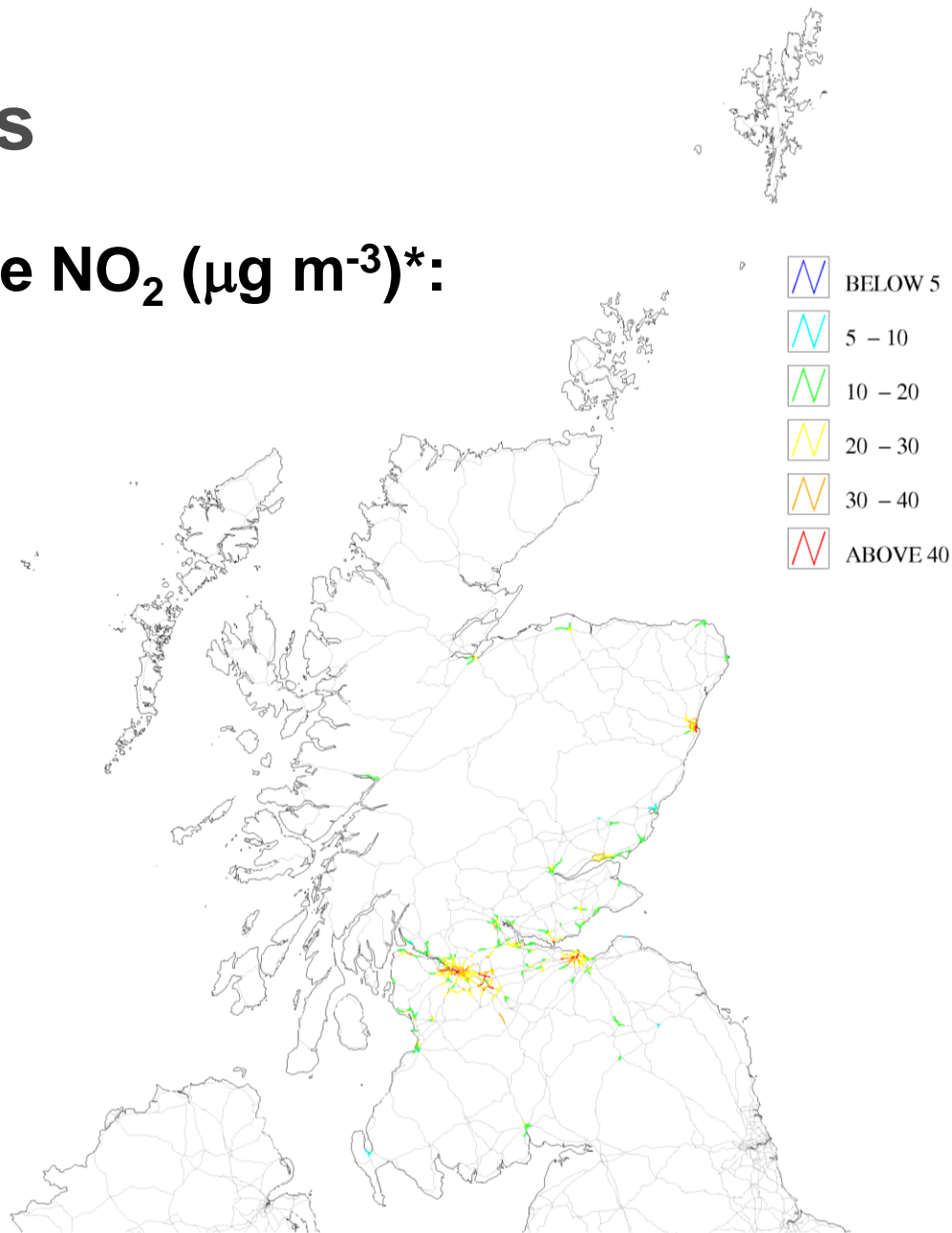
Legend:
- BELOW 5
- 5 – 10
- 10 – 20
- 20 – 30
- 30 – 40
- ABOVE 40

* denotes provisional results

Results

Roadside NO$_2$ (μg m^{-3})*:
2010

BELOW 5
5 – 10
10 – 20
20 – 30
30 – 40
ABOVE 40

* denotes provisional results

Results

Roadside NO$_2$ (μg m^{-3})*:
2015

BELOW 5

5 – 10

10 – 20

20 – 30

30 – 40

ABOVE 40

* denotes provisional results

Results

**Roadside NO$_2$ (μg m^{-3})*:
2020**

BELOW 5
5 – 10
10 – 20
20 – 30
30 – 40
ABOVE 40
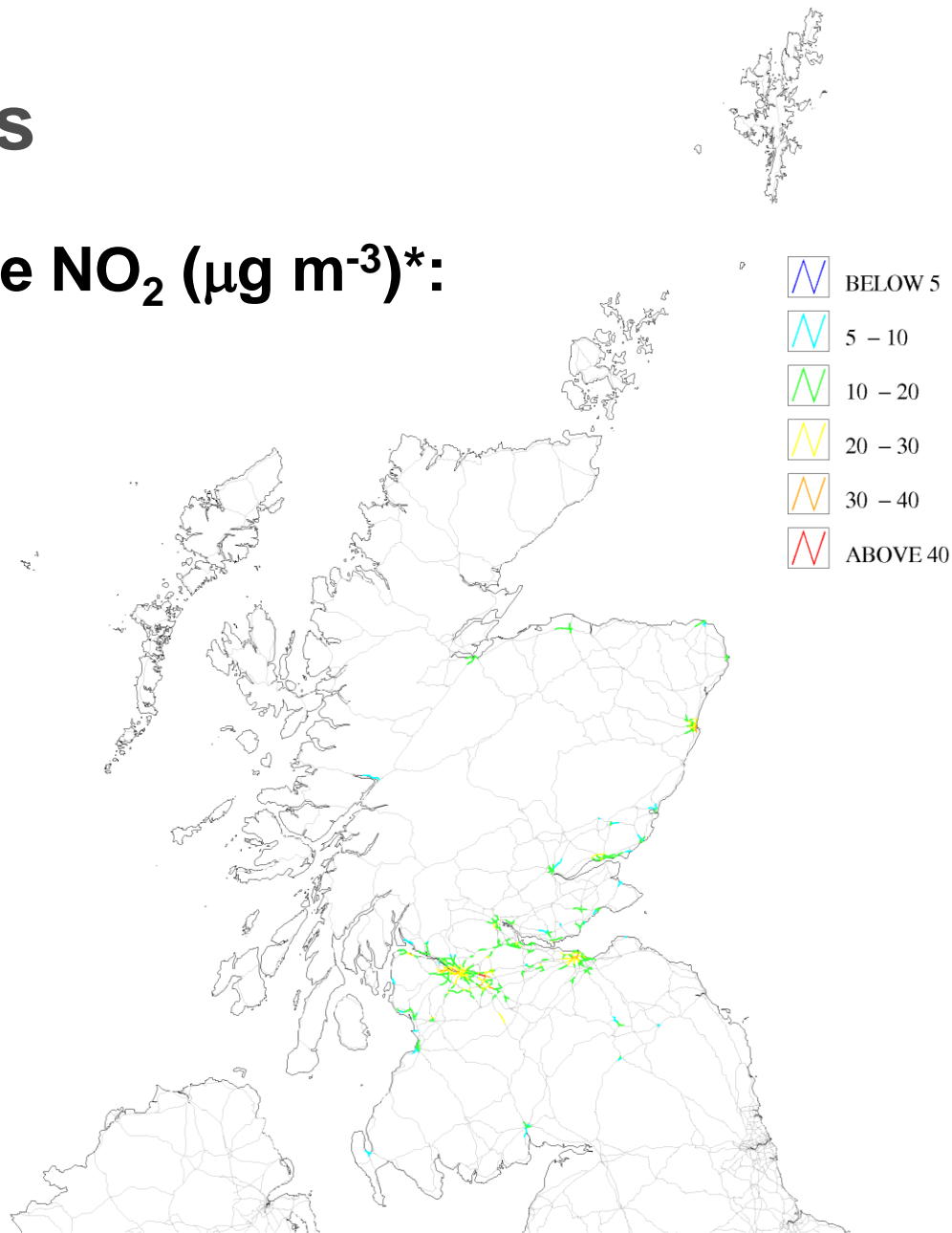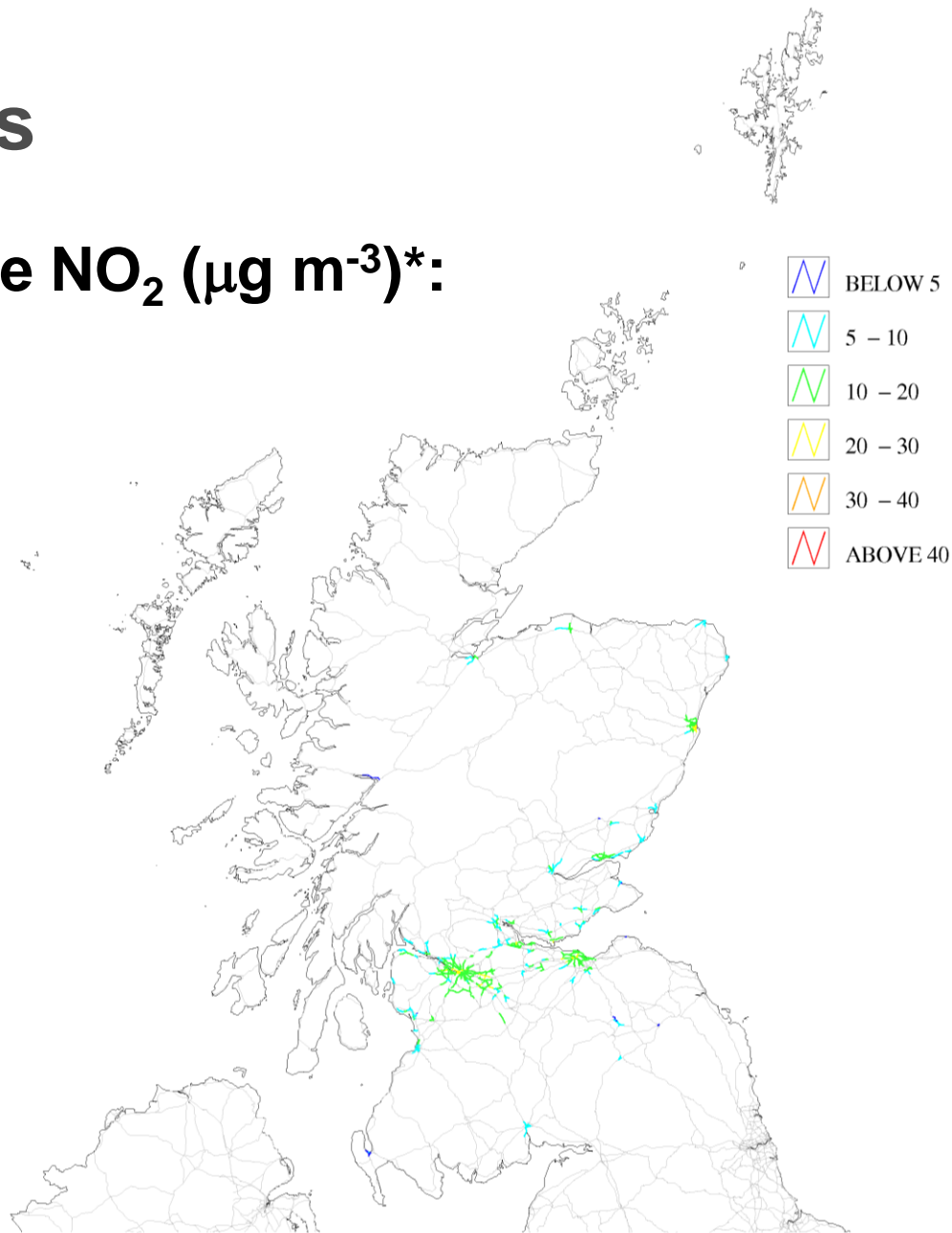
* denotes provisional results

Summary: roadside & background PM$_{10}$

Modelled results* show exceedence of the Scottish PM$_{10}$ AQO along 130 road links (167 km of road) in 2008

Modelled and projected results* show a progressive decrease in exceedences of the Scottish AQO for PM$_{10}$ between 2008 and 2020 at background locations

Year	Total area (km^2)	Total population exposed
2008	1	2595
2010	2	133
2015	1	29
2020	1	29

(* denotes provisional results)

Scottish AQO for PM$_{10}$: 18 μg m^{-3} (annual mean)

Population weighted mean PM$_{10}$ concentration

Slight decrease in the population weighted mean PM$_{10}$ concentration

2008* : 11 μg m^{-3}

**2020*: 10 μg m^{-3}**

(* denotes provisional results)
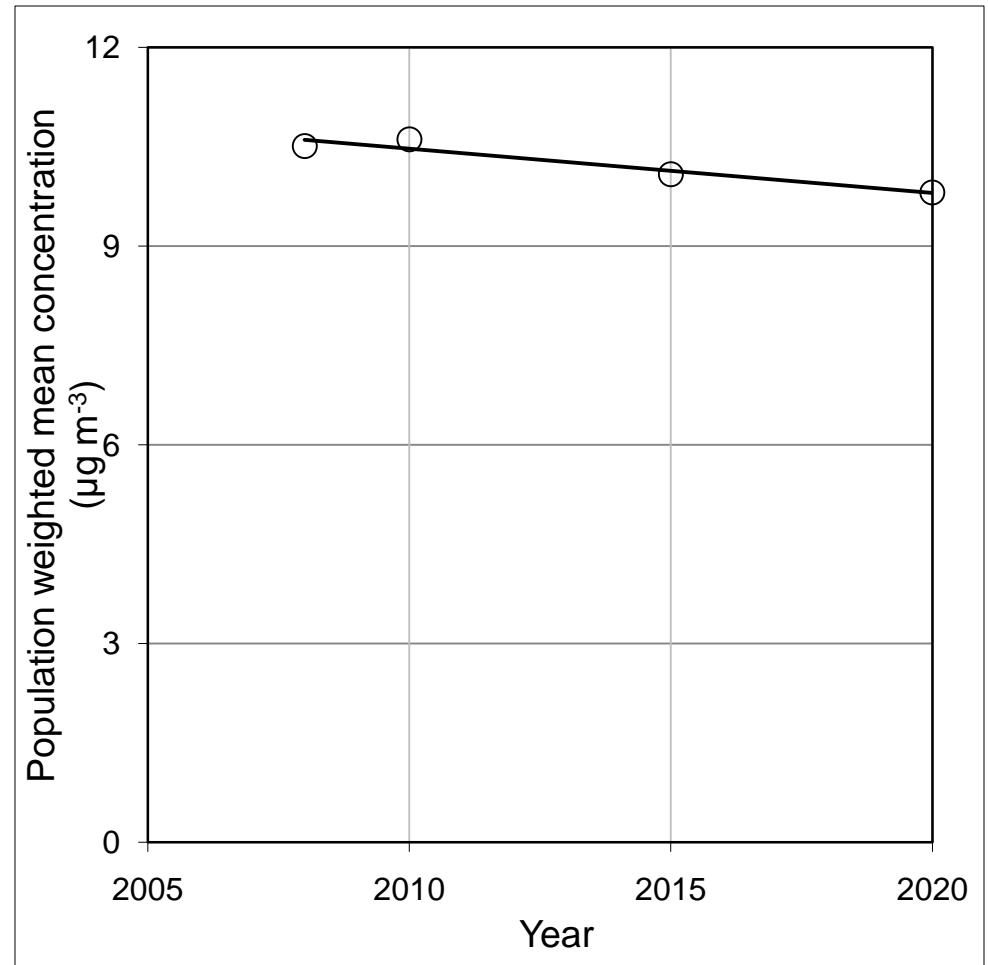
Results

**Roadside PM$_{10}$ (μg m^{-3})*:
2008**
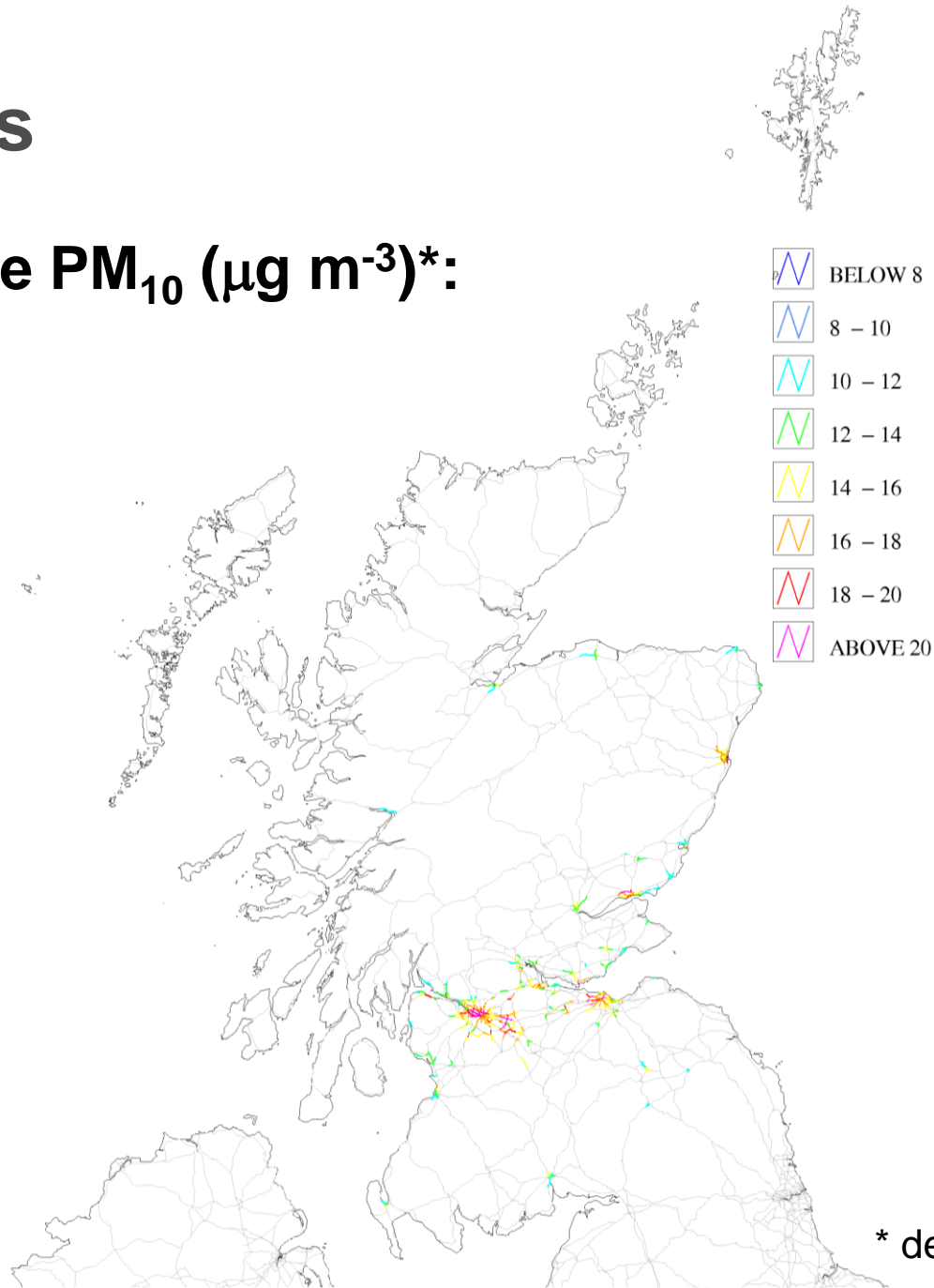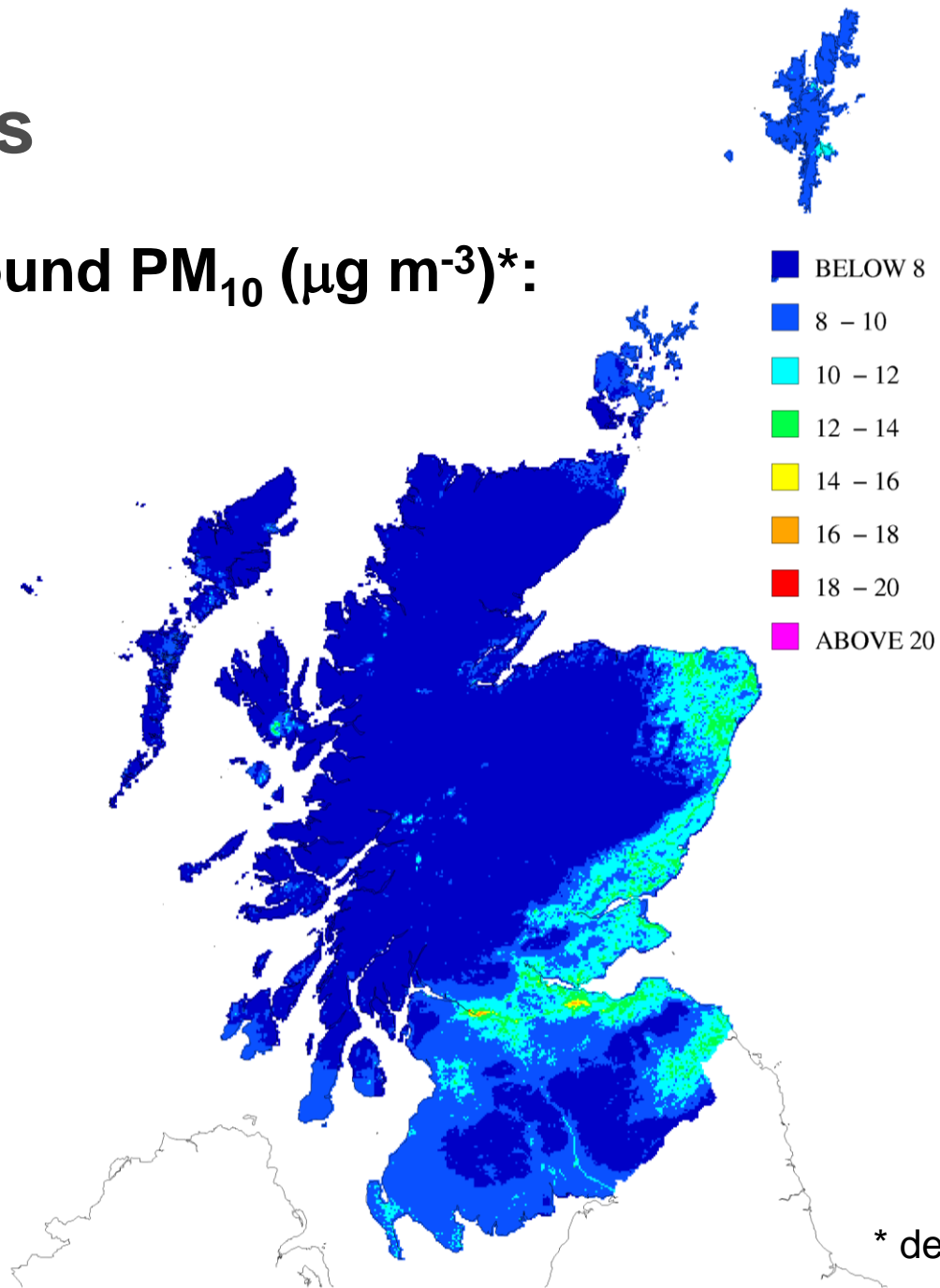
BELOW 8

8 – 10

10 – 12

12 – 14

14 – 16

16 – 18

18 – 20

ABOVE 20

* denotes provisional results

Results

Background PM$_{10}$ (μg m^{-3})*:
2008

BELOW 8
8 – 10
10 – 12
12 – 14
14 – 16
16 – 18
18 – 20
ABOVE 20

* denotes provisional results

Results

**Background PM$_{10}$ (μg m^{-3})*:
2010**

BELOW 8
8 – 10
10 – 12
12 – 14
14 – 16
16 – 18
18 – 20
ABOVE 20

* denotes provisional results

Results

Background PM$_{10}$ (μg m^{-3})*:
2015

BELOW 8
8 – 10
10 – 12
12 – 14
14 – 16
16 – 18
18 – 20
ABOVE 20

* denotes provisional results

Results

Background PM$_{10}$ (μg m^{-3})*: 2020

BELOW 8
8 – 10
10 – 12
12 – 14
14 – 16
16 – 18
18 – 20
ABOVE 20
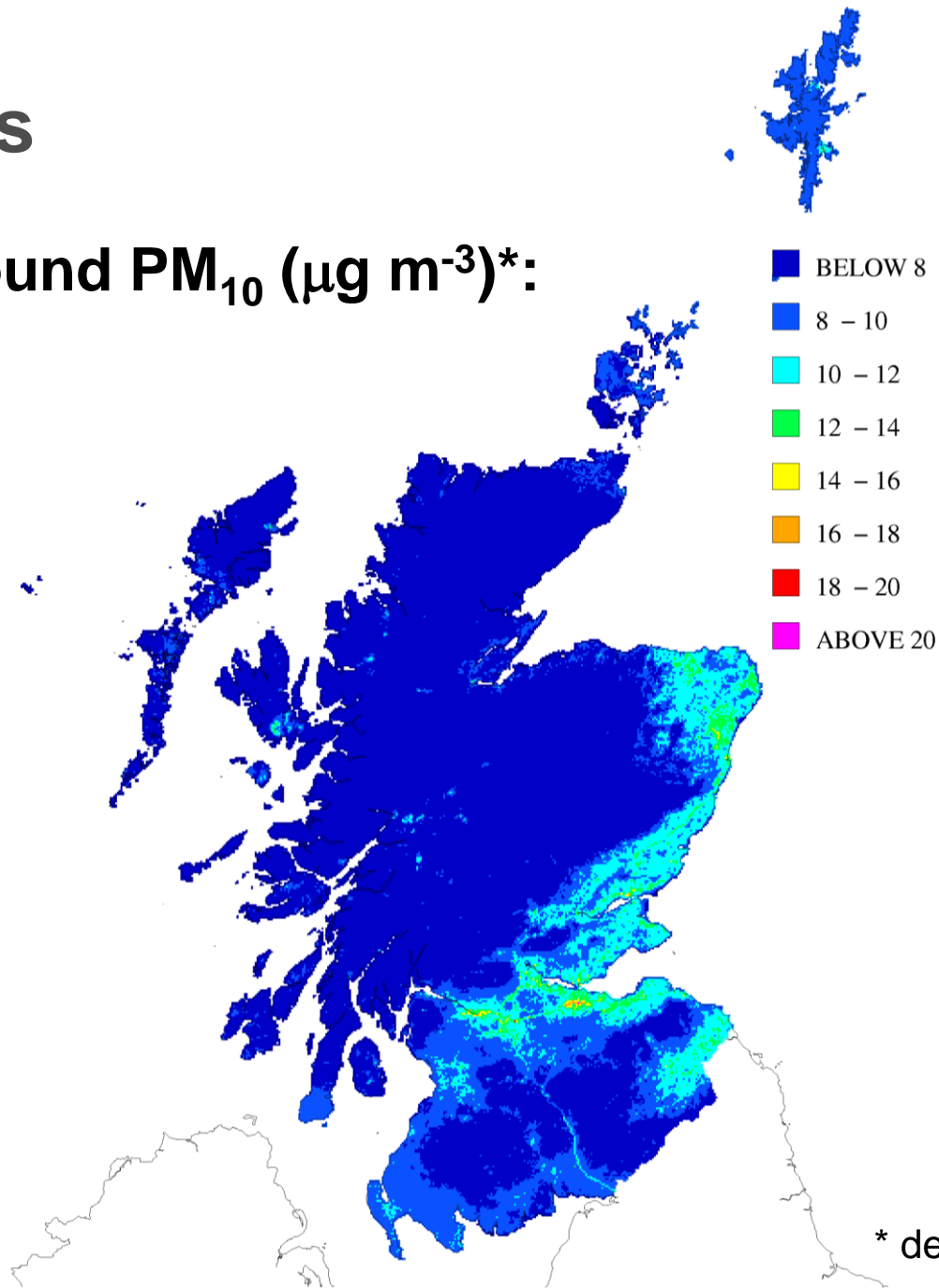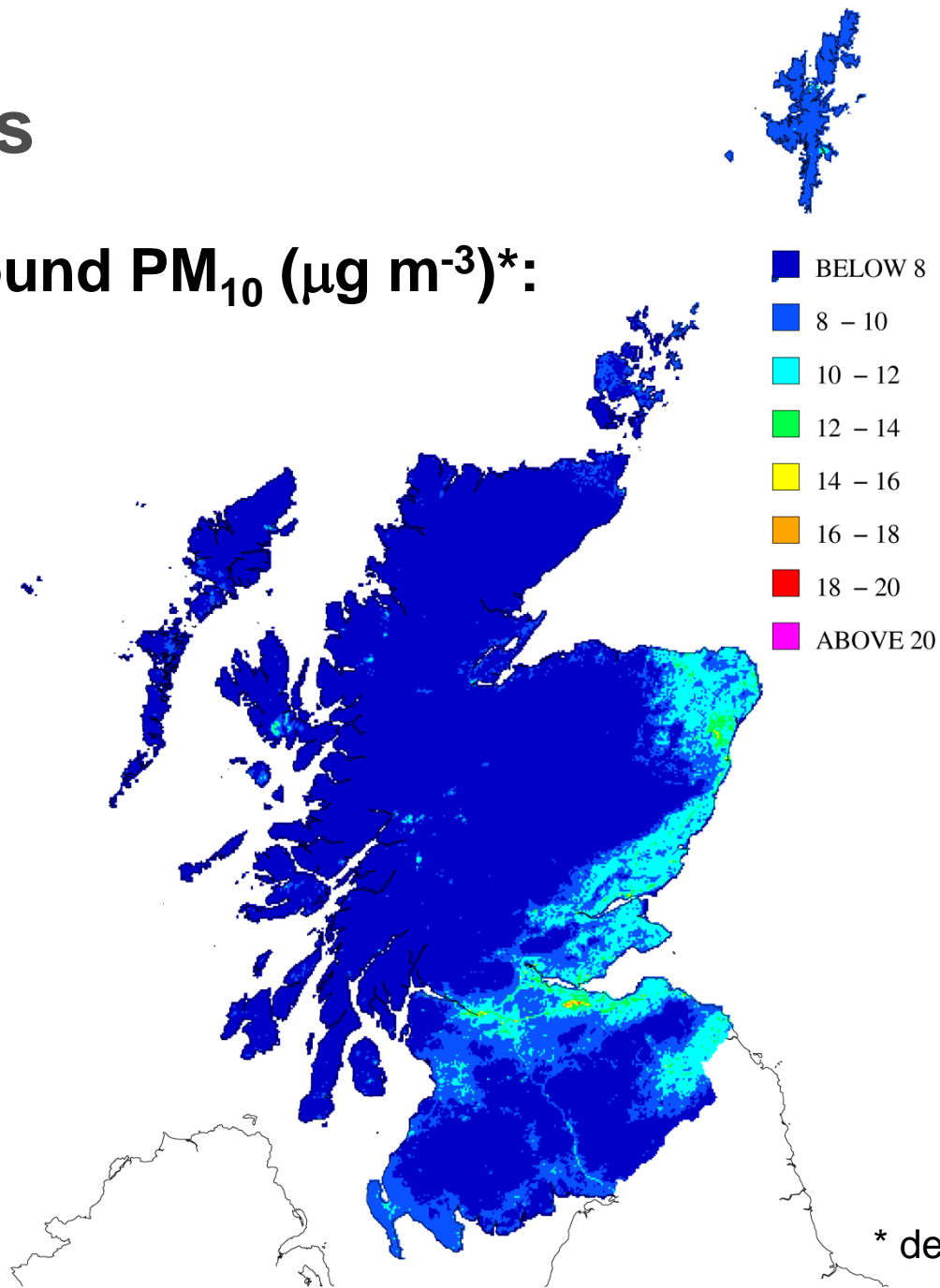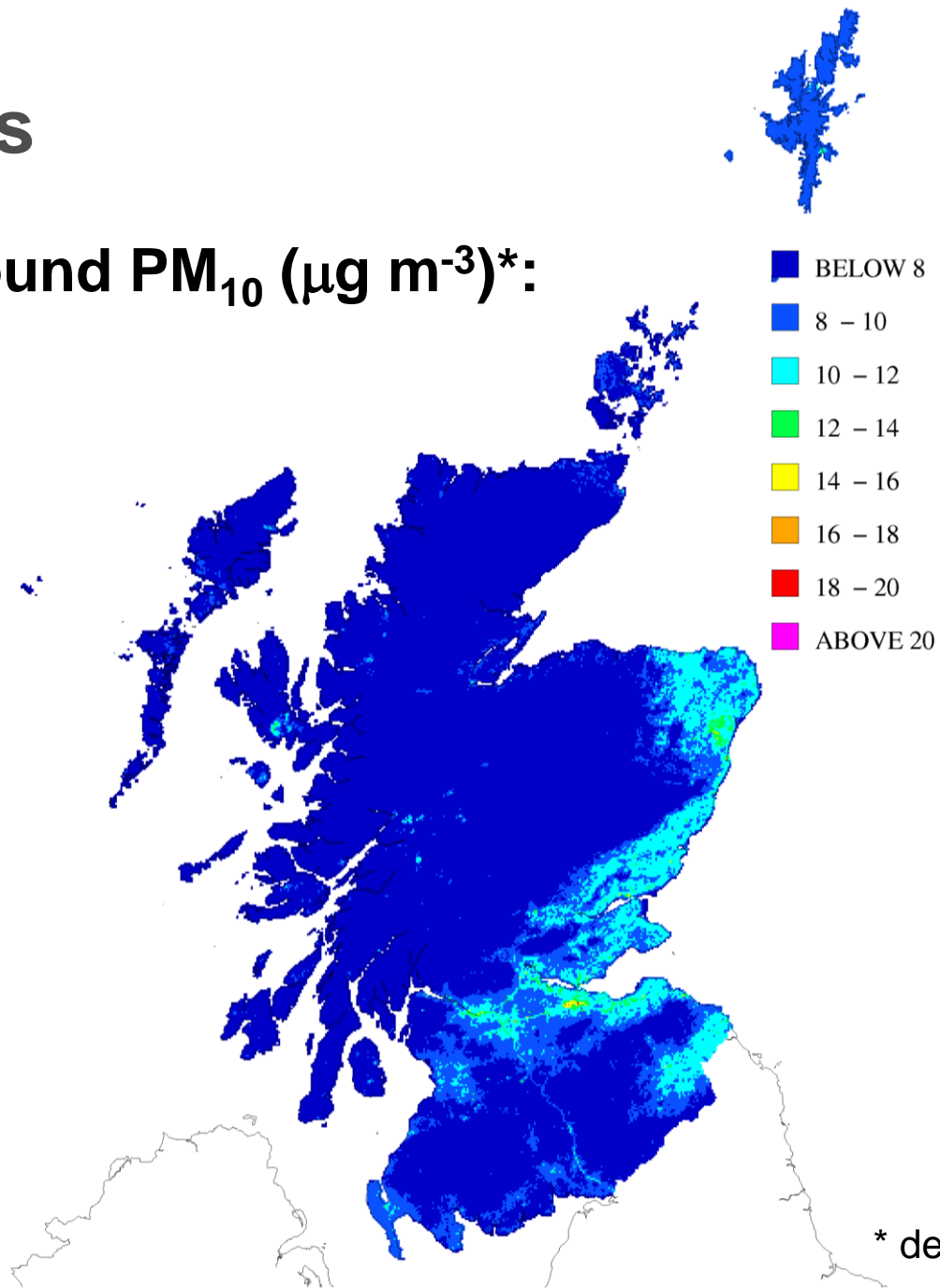
* denotes provisional results

Conclusions

- **Modelled (background & roadside) annual mean concentrations of specific pollutants for 2008 of NO_X/NO_2 and PM_{10}**

- **Modelled projected concentrations of NO_X/NO_2 and PM_{10} for 2010, 2015 and 2020 from base year (2008)**

- **2008 modelled annual mean concentrations results show:**
  - Modelled results* show exceedence of the Scottish NO_2 AQO along 72 road links (104 km of road) in 2008
  - Exceedence of the Scottish NO_2 AQO in 2 grid squares

  - Modelled results* show exceedence of the Scottish PM_{10} AQO along 130 road links (167 km of road) in 2008
  - Exceedence of the Scottish PM_{10} AQO in 1 grid square

* denotes provisional results

Conclusions

- **Projected annual mean concentrations* show that between 2008 and 2020:**

  - 5 μg m^{-3} reduction in the population weighted mean NO$_2$ concentration

  - Progressive decease in the number of road links along which the Scottish NO$_2$ AQO is exceeded from 72 to almost none

  - 1 μg m^{-3} reduction in the population weighted mean PM$_{10}$ concentration

  - Decreases in the population exposed to exceedences of both NO$_2$ and PM$_{10}$

* denotes provisional results

Questions

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