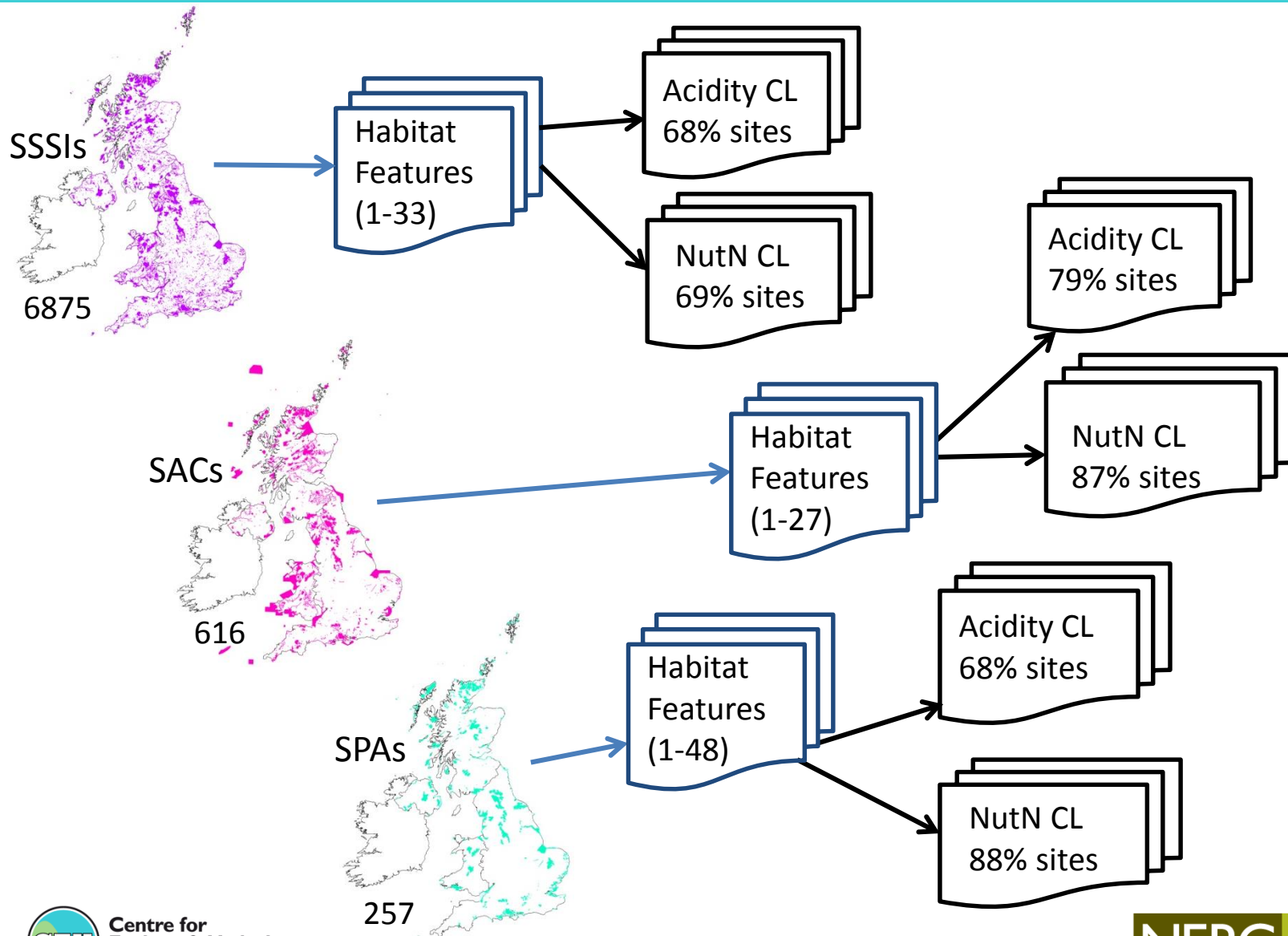


Long-term trends in exceedance of critical loads for UK SACs

Jane Hall, Ron Smith

Site Relevant Critical Loads



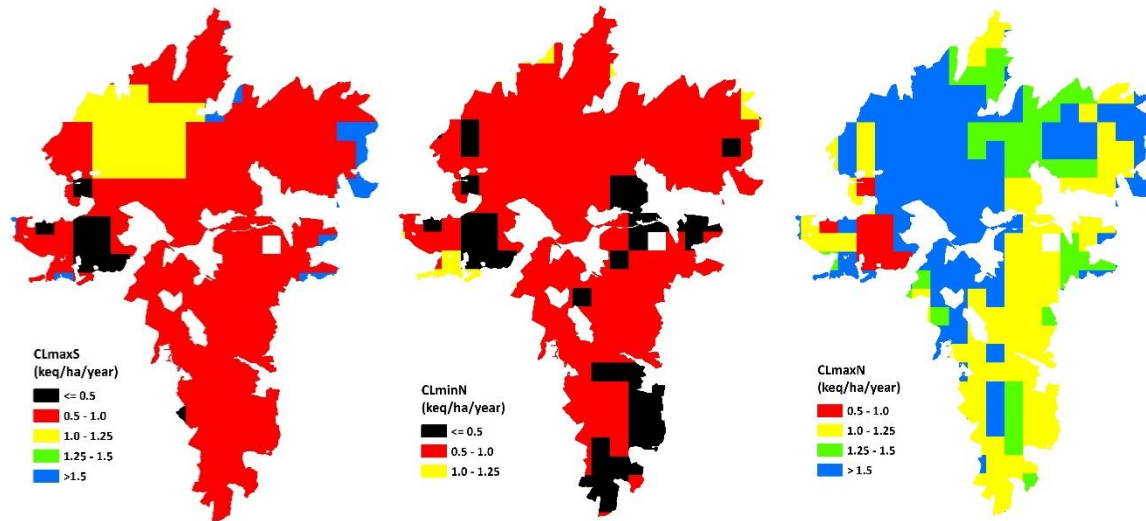
Example: Migneint SAC

Code	Habitat Feature	Acidity CL applied	EUNIS code	Nutrient N CL (kg N ha ⁻¹ year ⁻¹)
H3130	Oligotrophic lakes	None available	C1.1	3
H3160	Dystrophic lakes	None available	C1.4	3
H4010	Wet heath	Heath	F4.11	10
H4030	Dry heath	Heath	F4.2	10
H7130	Blanket bog	Bog	D1	5
H7140	Transition mire/quaking bog	Bog	D2	10
H7150	Depressions on peat substrate	Bog	D2	10
H7230	Alkaline fens	Not sensitive	D4.1	15
H8220	Plants in crevices on acid rocks	Montane	F2	5
H91A0	Acidic oak woodland	Unmanaged wood	G1.8	10
S1393	Slender Green Feather Moss	Bog	D2	10

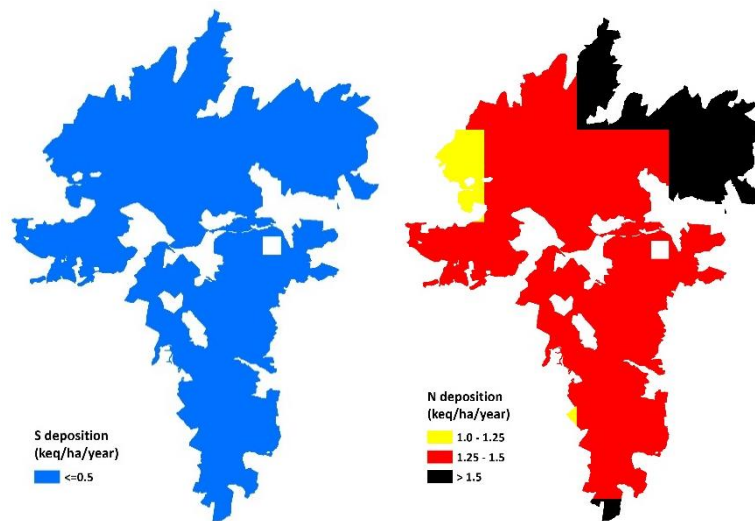


H4010 Acidity CL and exceedance

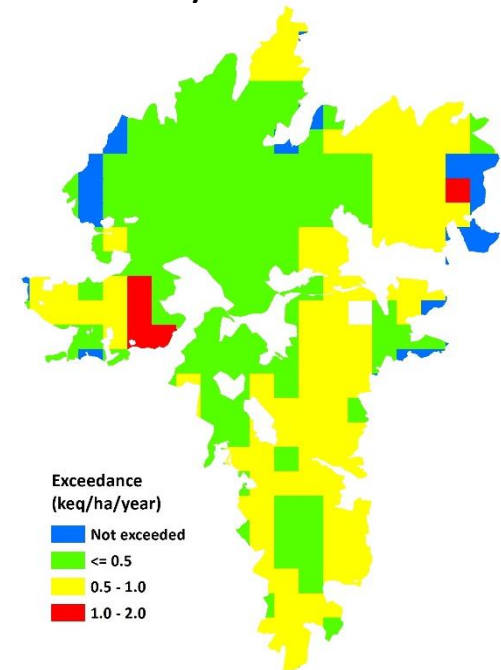
Acidity critical loads



Sulphur and Nitrogen deposition

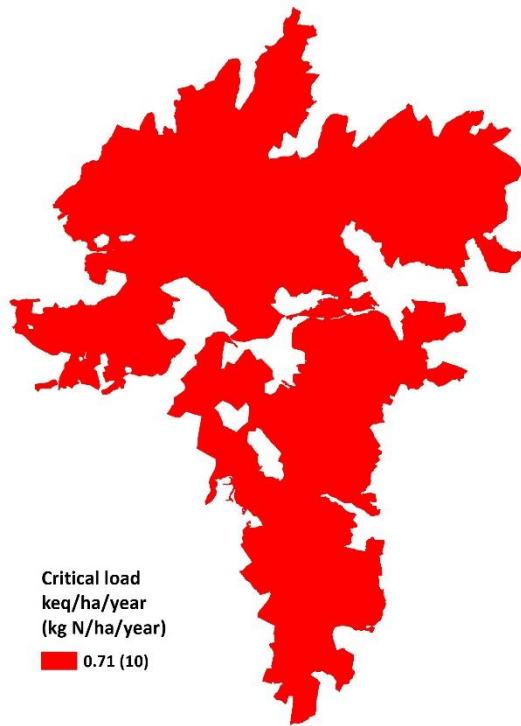


Acidity exceedance

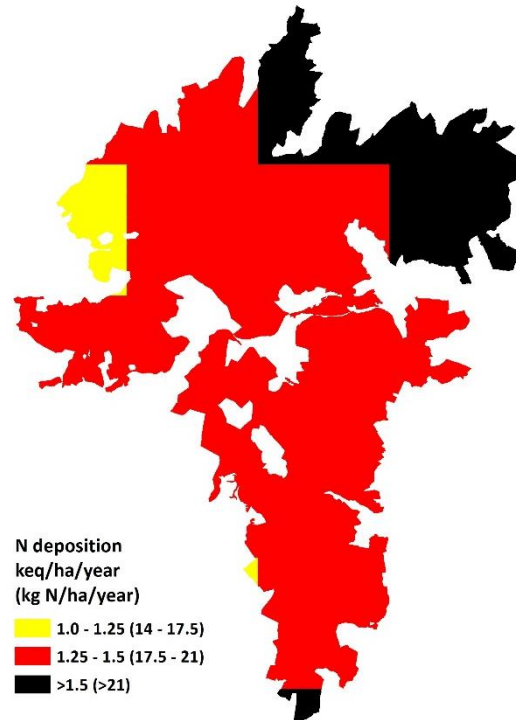


H4010 Nutrient N CL and exceedance

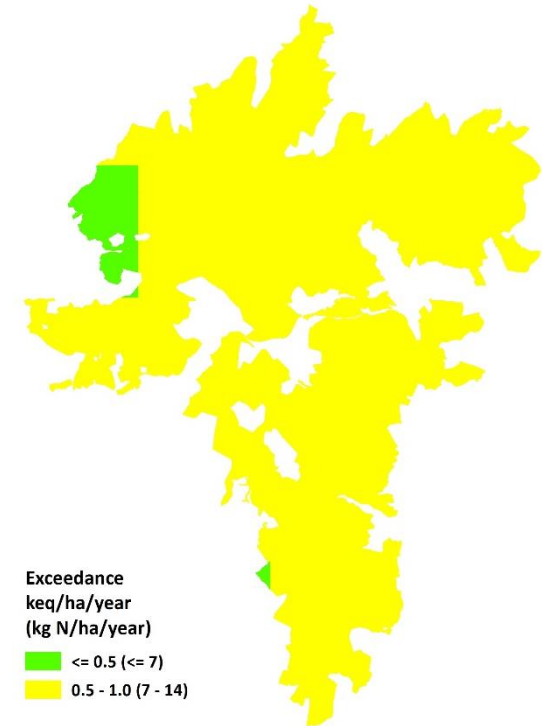
Nutrient N critical load



Nitrogen deposition



Nutrient N exceedance



Migneint results by habitat feature

Code	Habitat Feature	Acidity exceedance keq ha ⁻¹ year ⁻¹		Nutrient N exceedance keq ha ⁻¹ year ⁻¹ (kg N ha ⁻¹ year ⁻¹)	
		Min	Max	Min	Max
H3130	Oligotrophic lakes	N/A	N/A	0.99 (13.9)	1.49 (20.9)
H3160	Dystrophic lakes	N/A	N/A	0.99 (13.9)	1.49 (20.9)
H4010	Wet heath	Not Exceeded	1.11	0.46 (6.4)	0.99 (13.9)
H4030	Dry heath	Not Exceeded	1.11	0.46 (6.4)	0.99 (13.9)
H7130	Blanket bog	0.2	1.18	0.81 (11.3)	1.34 (18.8)
H7140	Transition mire/quaking bog	0.2	1.18	0.46 (6.4)	0.99 (13.9)
H7150	Depressions on peat substrate	0.2	1.18	0.46 (6.4)	0.99 (13.9)
H7230	Alkaline fens	N/A	N/A	0.1 (1.4)	0.63 (8.8)
H8220	Plants in crevices on acid rocks	Not Exceeded	1.43	0.81 (11.3)	1.34 (18.8)
H91A0	Acidic oak woodland	Not Exceeded	1.92	1.08 (15.1)	1.68 (23.5)
S1393	Slender Green Feather Moss	0.2	1.18	0.46 (6.4)	0.99 (13.9)

Note: Exceedances calculated assuming each habitat occurs across entire site!

Exceedance results summarised by site

Example: Migneint SAC

Parameter calculated	Acidity	Nutrient N
Number features with critical loads	8	11
Number features with exceedance of critical loads	8	11
% features with exceedance of critical loads	100%	100%
Site Area (ha) with critical loads	19958	19968
Maximum exceeded area (ha)	19958	19968
% maximum exceeded area	100%	100%
Maximum AE (keq year ⁻¹)	15881	28030
Maximum AAE (keq ha ⁻¹ year ⁻¹) [kg N ha ⁻¹ year ⁻¹]	0.80	1.40 [19.6]

AE = Accumulated Exceedance

AE (keq year⁻¹) = Exceedance (keq ha⁻¹ year⁻¹) * exceeded area (ha)

AAE = Average Accumulated Exceedance

AAE (keq ha⁻¹ year⁻¹) = AE / total habitat area (ha)

Exceedance results summarised by country

Example: Wales (SACs)

Parameter calculated	Acidity	Nutrient N
Number of sites	85	85
Number of sites with critical loads	71	79
Number of sites with exceedance of critical loads for ≥ 1 feature	67	74
% of sites with exceedance of critical loads for ≥ 1 feature	94%	94%
Number features with critical loads	298	387
Number features with exceedance of critical loads	256	345
% features with exceedance of critical loads	86%	89%
Site Area (ha) with critical loads	119877	283955
Maximum exceeded area (ha)	106741	174136
% maximum exceeded area	89%	61%
Maximum AE (keq year^{-1})	95035	168712
Maximum AAE ($\text{keq ha}^{-1} \text{ year}^{-1}$)[$\text{kg N ha}^{-1} \text{ year}^{-1}$]	0.79	0.59 [8.3]

AE = Accumulated Exceedance

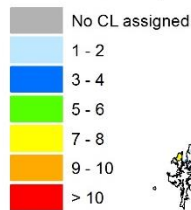
$\text{AE (keq year}^{-1}\text{)} = \text{Exceedance (keq ha}^{-1} \text{ year}^{-1}\text{)} * \text{exceeded area (ha)}$

AAE = Average Accumulated Exceedance

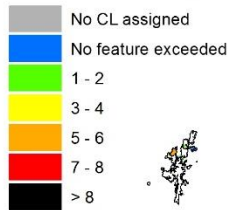
$\text{AAE (keq ha}^{-1} \text{ year}^{-1}\text{)} = \text{AE} / \text{total habitat area (ha)}$

SAC Acidity exceedance maps

No. features

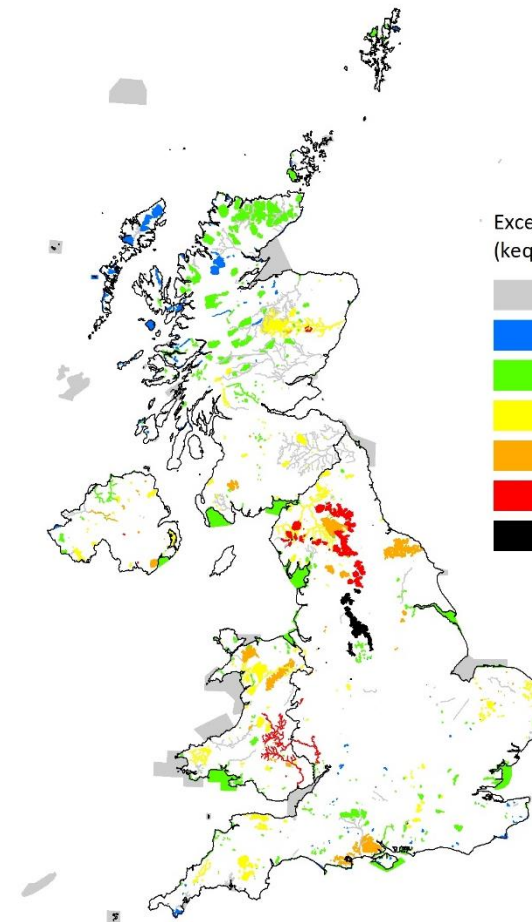
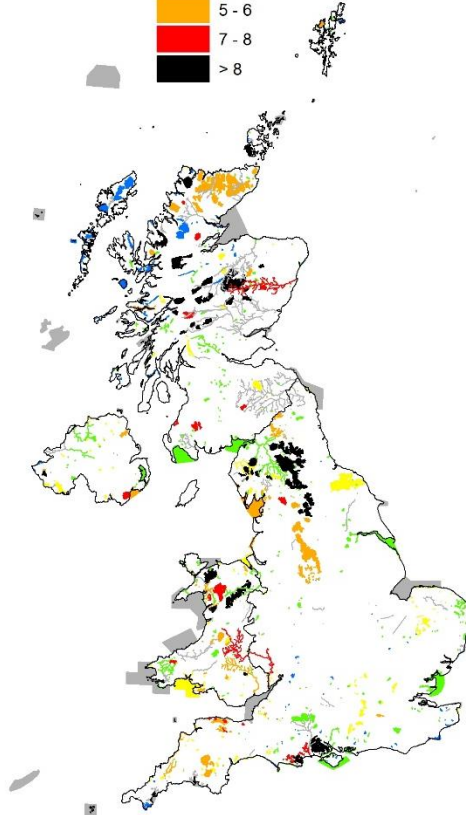
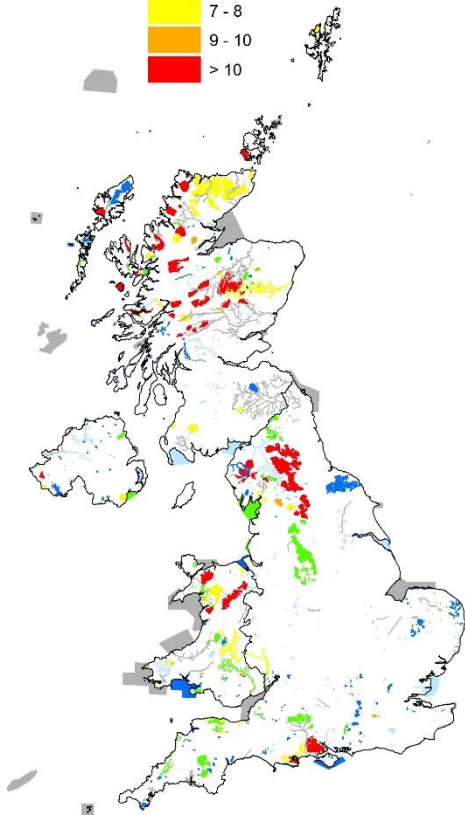
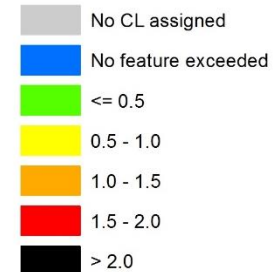


No. exceeded features

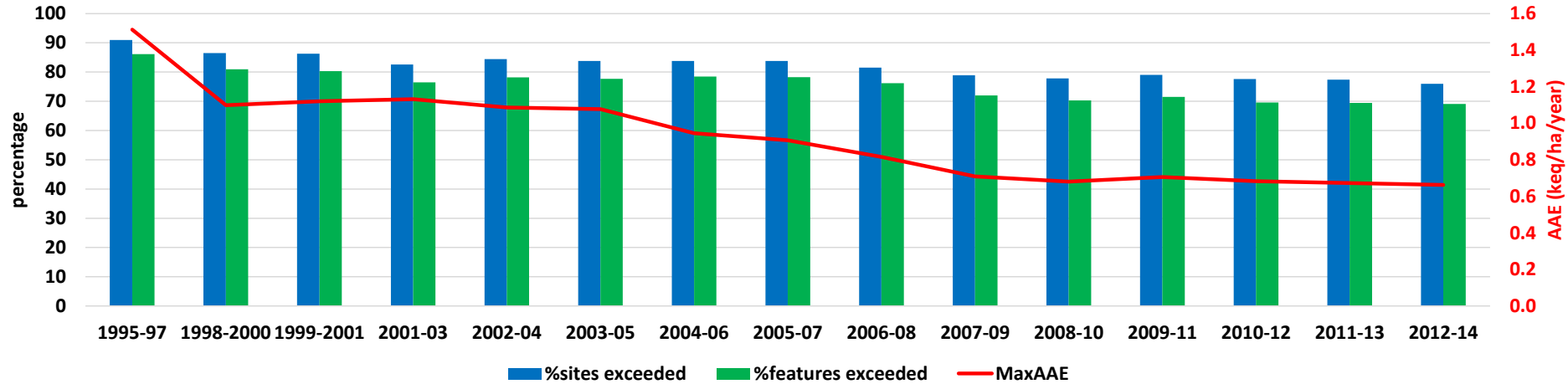


Maximum AAE per site

Exceedance (keq ha⁻¹ year⁻¹)



UK acidity exceedance trends for SACs



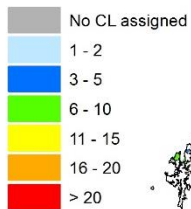
Parameter	Results 2012-14	Decline since 1995
% sites with ≥ 1 feature exceeded*	76%	15%
% features exceeded*	69%	17%
Maximum AAE ($\text{keq ha}^{-1} \text{ year}^{-1}$)**	0.66	56% ($0.85 \text{ keq ha}^{-1} \text{ year}^{-1}$)

* Calculated as percentage of sites/features with critical loads

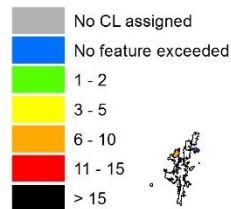
** Calculated using total area of sites with critical loads

SAC Nutrient N exceedance maps

No. features

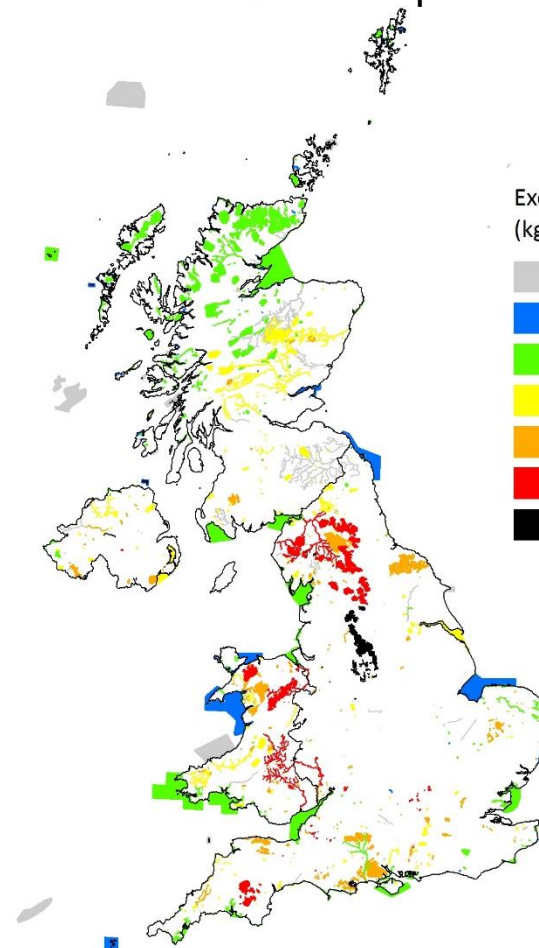
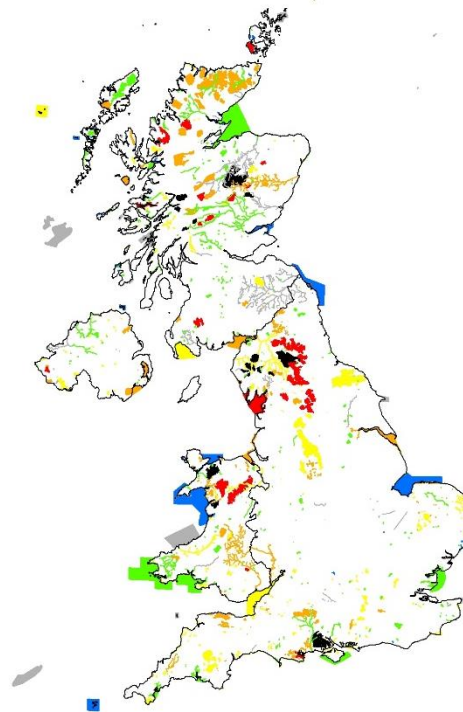
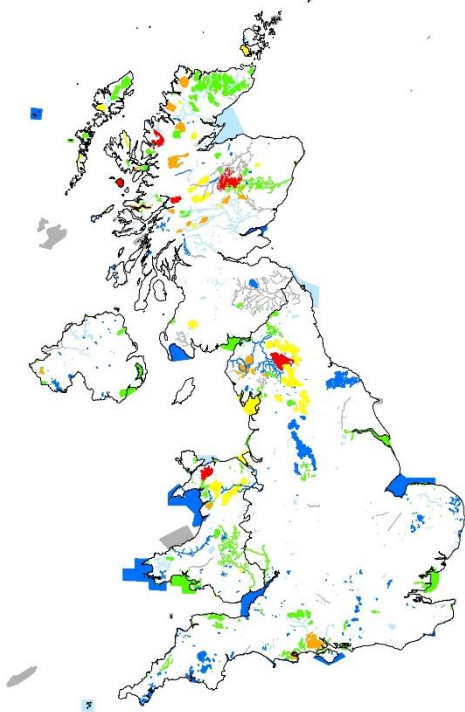
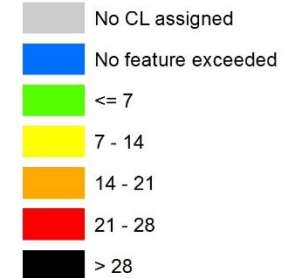


No. exceeded features

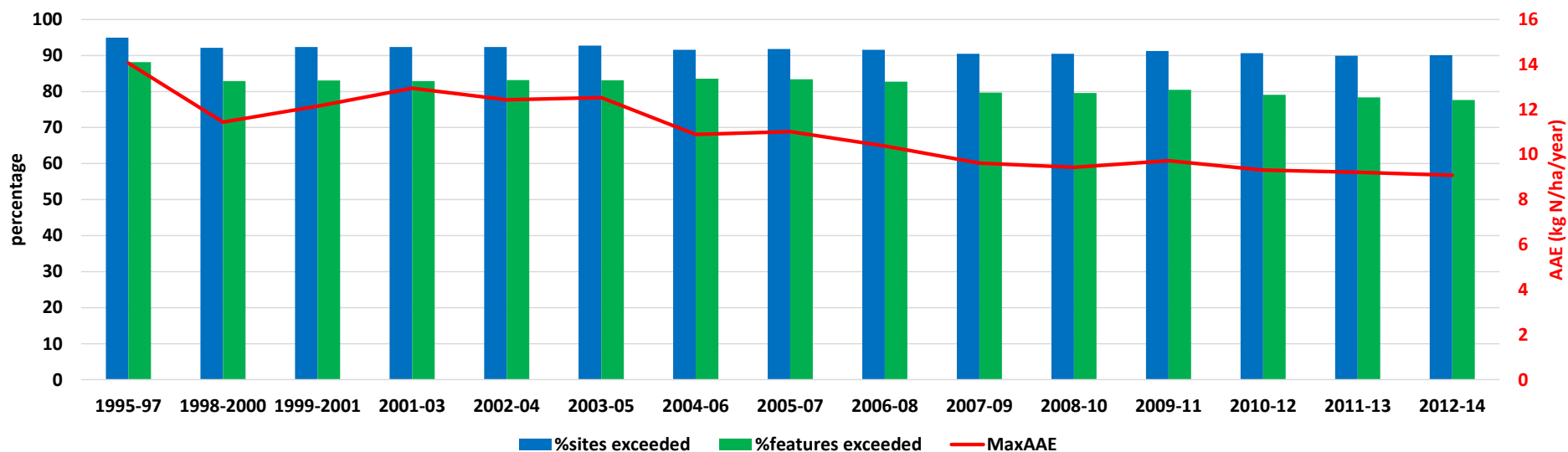


Maximum AAE per site

Exceedance
(kg N ha⁻¹ year⁻¹)



UK Nutrient N exceedance trends for SACs



Parameter	Results 2012-14	Decline since 1995
% sites with ≥ 1 feature exceeded*	90%	5%
% features exceeded*	78%	11%
Maximum AAE ($\text{kg N ha}^{-1} \text{ year}^{-1}$)**	9.1	35% ($5 \text{ kg N ha}^{-1} \text{ year}^{-1}$)

* Calculated as percentage of sites/features with critical loads

** Calculated using total area of sites with critical loads

Conclusions: SRCL exceedances

Exceedance of acidity critical loads:

- significant reductions in number sites/features with exceedance
- in line with reductions in acid deposition since 1995

Exceedance of nutrient nitrogen critical loads:

- smaller reductions in number sites/features with exceedance
- smaller reductions in nitrogen deposition since 1995

Remember: summary results may be “worst-case”:

- “% of sites with at least one feature exceeded”
 - critical loads for some features may not be exceeded
- “Maximum AAE” of all features (by site/country)
 - AAE for some features may be smaller

Could improve estimates of site areas at risk...

If UK-wide spatial digital data of site habitat cover were available