

Assessing Climate Risk to Protected Areas

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Working with ...



Scotland's centre of expertise connecting
climate change research and policy

**Developing a climate change risk-based
assessment for Notifiable Features in Scotland**

Rob Brooker
The James Hutton Institute

Project aim

- To develop an assessment of the risk posed by climate change to notified features of protected areas in Scotland



Quick history

Joint project over 4 years by SNH and ClimateXchange (at JHI)

2012-13 Develop the assessment process model, collate data sources, expert opinions, apply to feature list => initial scorings

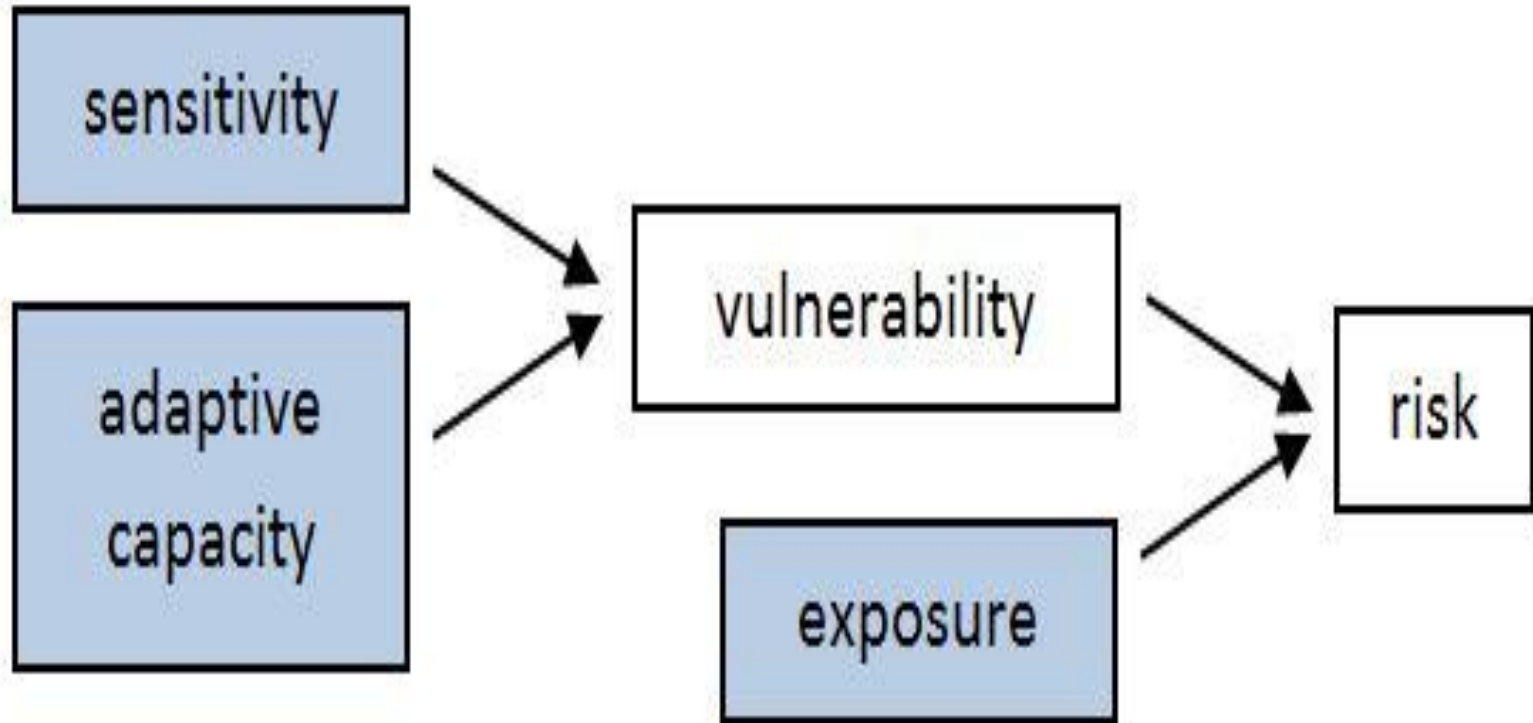
2013-14 Improvements to the model, summary report, risk assessed all bio and geo features.

2014-15 Develop understanding, workshops (freshwaters & wetlands, Earth science features)

2015-16 Workshops (woodlands, uplands), mapping, report.



The model ...



- Sensitivity

- expert judgement

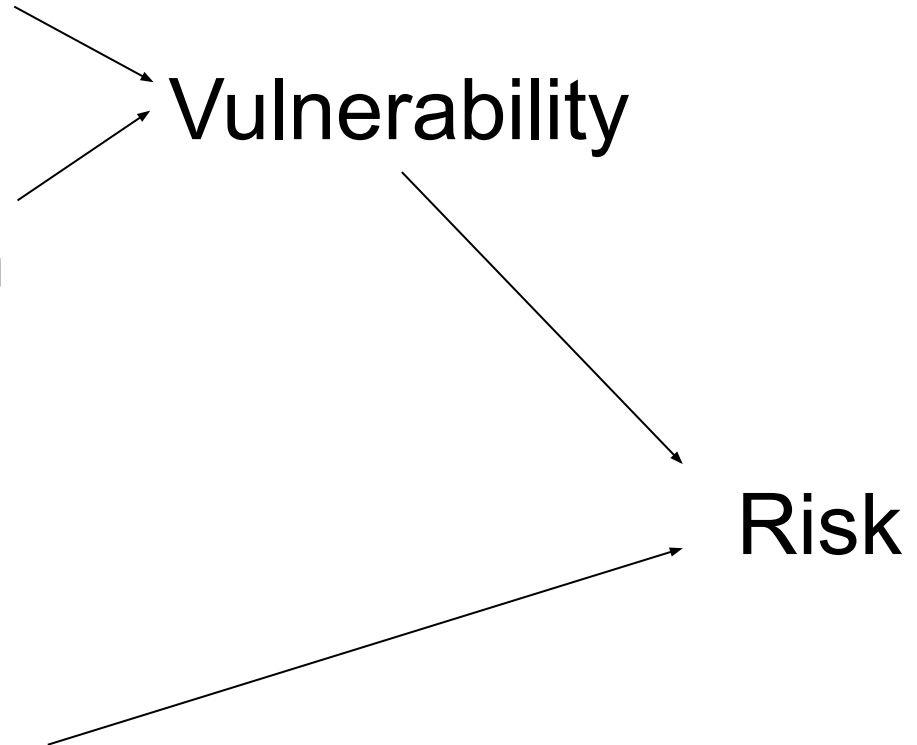
&

- Adaptive capacity

- Feature condition
- Site size
- Connectivity

- Exposure

- 13 climate variables



Site name	Feature	Rank					Antilog-1				
		Sensitivity	Ad cap	Vulnerability	Exposure	Risk ranking	Sensitivity	Ad cap	Vulnerability	Exposure	Risk
Craig Leith and Myreton Hill	Upland assemblage	1	1079	55	131	19	1.00	0.69	0.84	0.37	0.59
Ben Lomond	Snowbed	222	495	73	1009	47	0.85	0.78	0.82	0.35	0.57
Ben Lomond	Upland assemblage	1	3184	258	1009	190	1.00	0.42	0.68	0.35	0.51
Roscobie Hills	Fen meadow	2492	27	941	47	513	0.22	0.95	0.54	0.38	0.46
Firth of Forth	Lowland neutral grassland	4311	75	1721	291	1171	0.10	0.94	0.46	0.37	0.41
Lochmill Loch	Lowland dry heath	2319	580	1408	956	1177	0.24	0.77	0.48	0.35	0.41
Bo'mains Meadow	Lowland neutral grassland	4311	546	2357	487	1746	0.10	0.77	0.40	0.36	0.38
Glen Falloch Pinewood	Native pinewood	2160	1560	2071	1807	1829	0.25	0.62	0.42	0.33	0.38
Arthur's Seat Volcano	Lowland calcareous grassland	4311	828	2770	161	1893	0.10	0.71	0.37	0.37	0.37
Star Moss	Upland birch woodland	2160	2514	2974	1164	2392	0.25	0.46	0.35	0.35	0.35
Ben Heasgarnich	Rocky slopes (includes inland cliff, rocky outcrops, chasmophytic vegetation)	3869	3261	3765	1426	3332	0.13	0.41	0.26	0.34	0.30

Rows selected for illustration – ordered by risk ranking (hi – lo)

Upland & Woodland features overview

Feature Type & Counts (1,453 features)		Highest risk rank	No in top 100
Upland assemblage	77	2	18
Montane assemblage	8	31	3
Snowbed	4	47	1
Alpine & subalpine heath	27	165	
Alpine moss heath etc	3	188	
Montane acid grass	24	292	
Upland oakwood	131	337	
Alpine heath	14	343	
Mountain willow scrub	15	472	

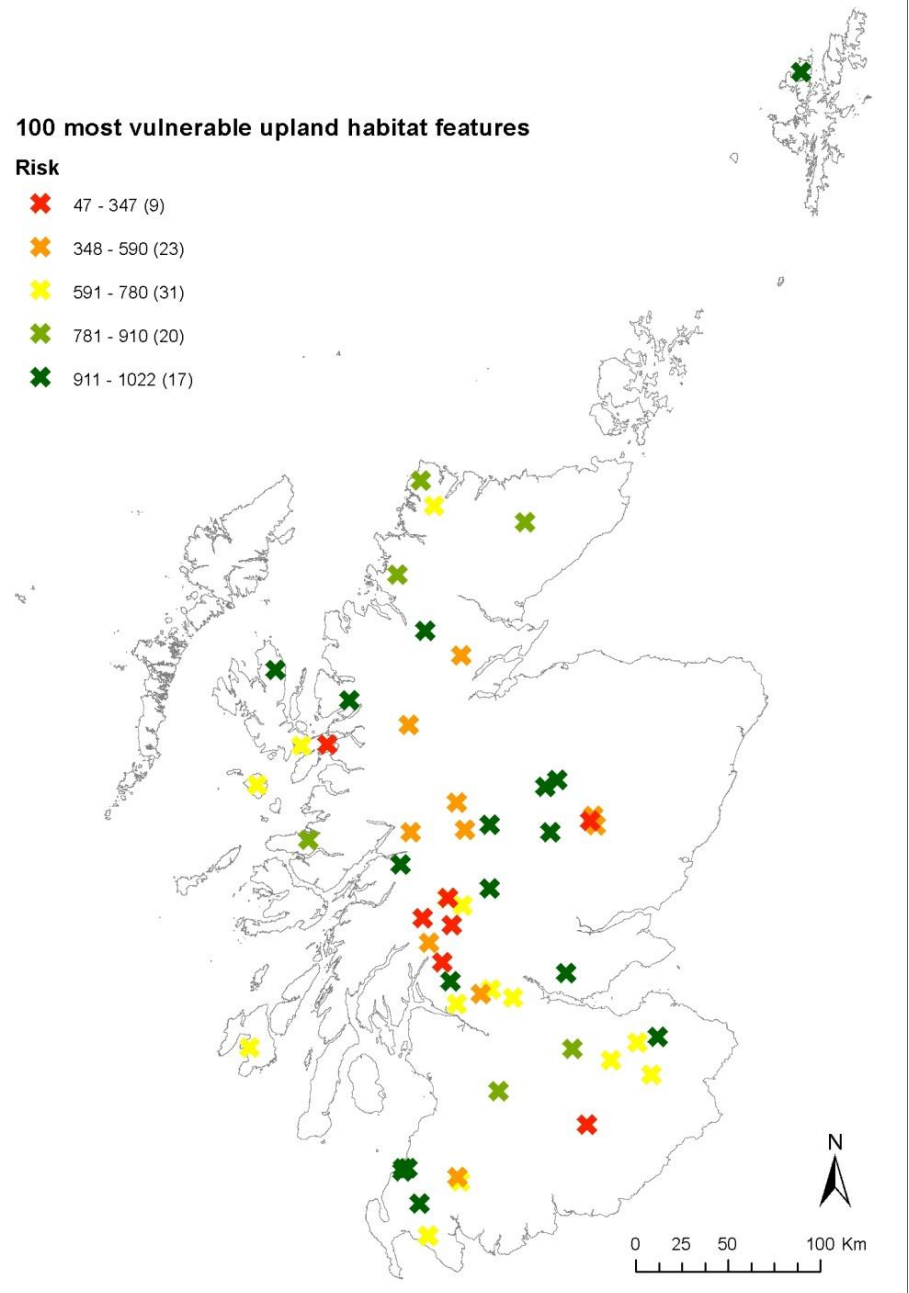
Examples of risk mapping

- vulnerability

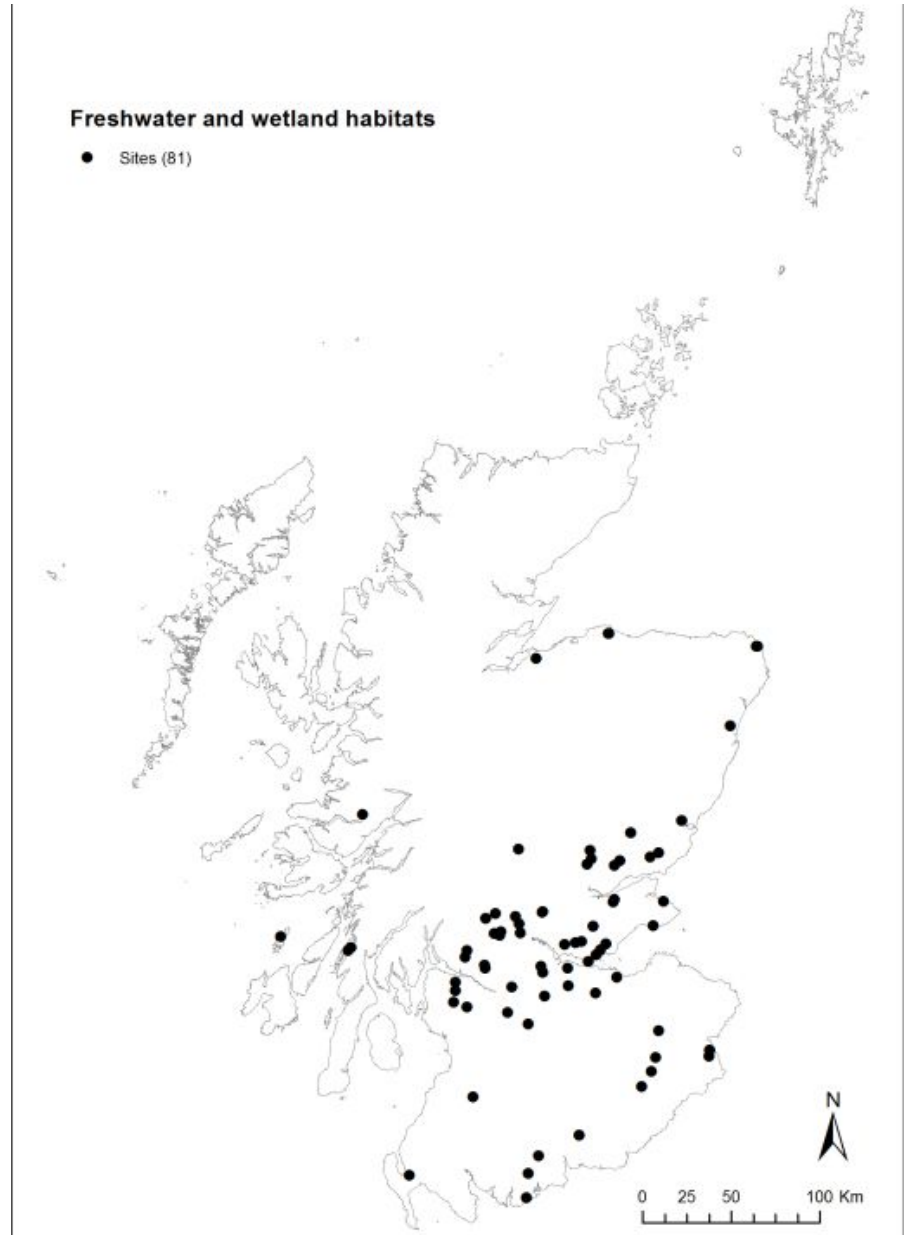
100 most vulnerable upland habitat features

Risk

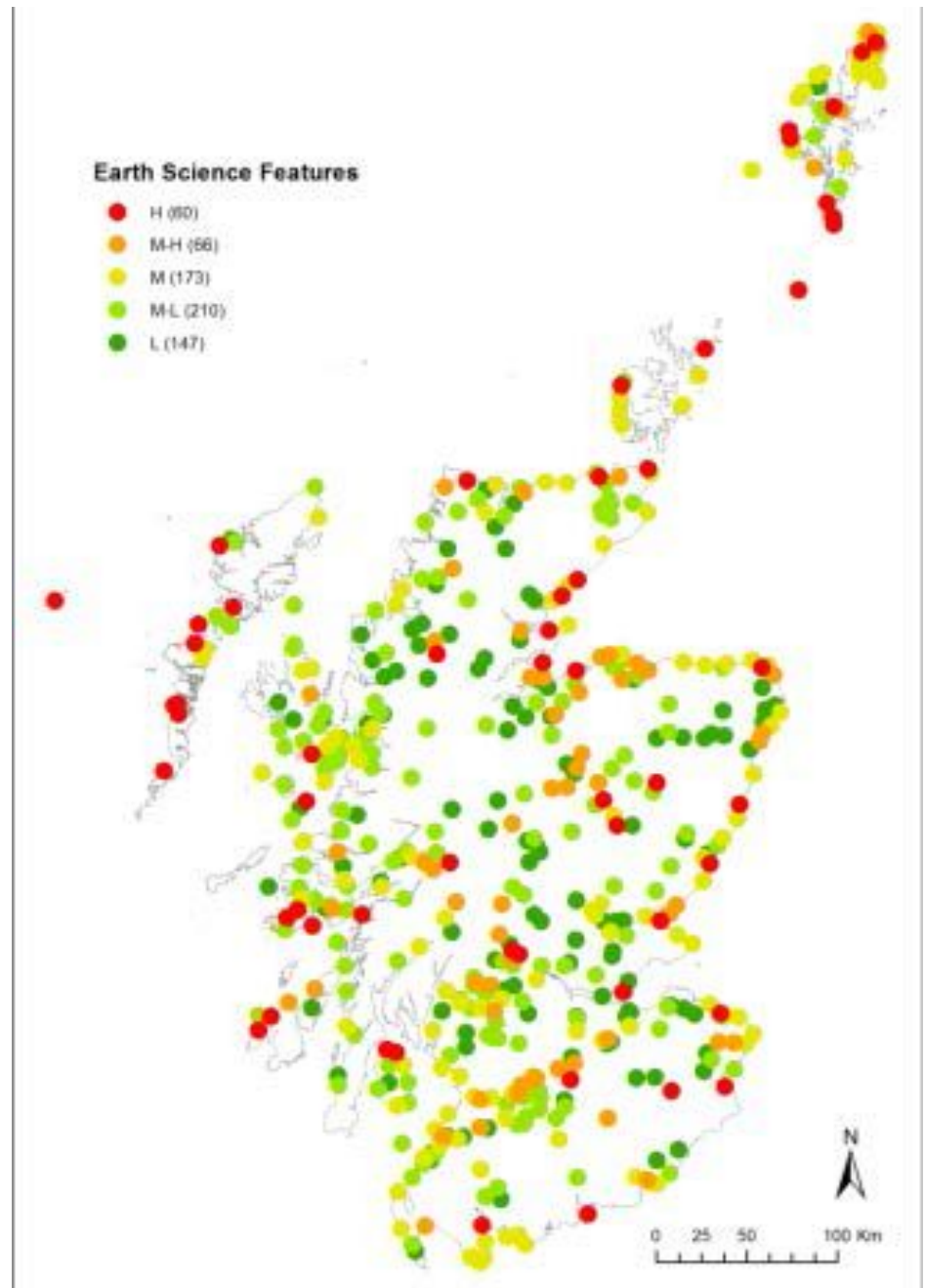
- ✖ 47 - 347 (9)
- ✖ 348 - 590 (23)
- ✖ 591 - 780 (31)
- ✖ 781 - 910 (20)
- ✖ 911 - 1022 (17)



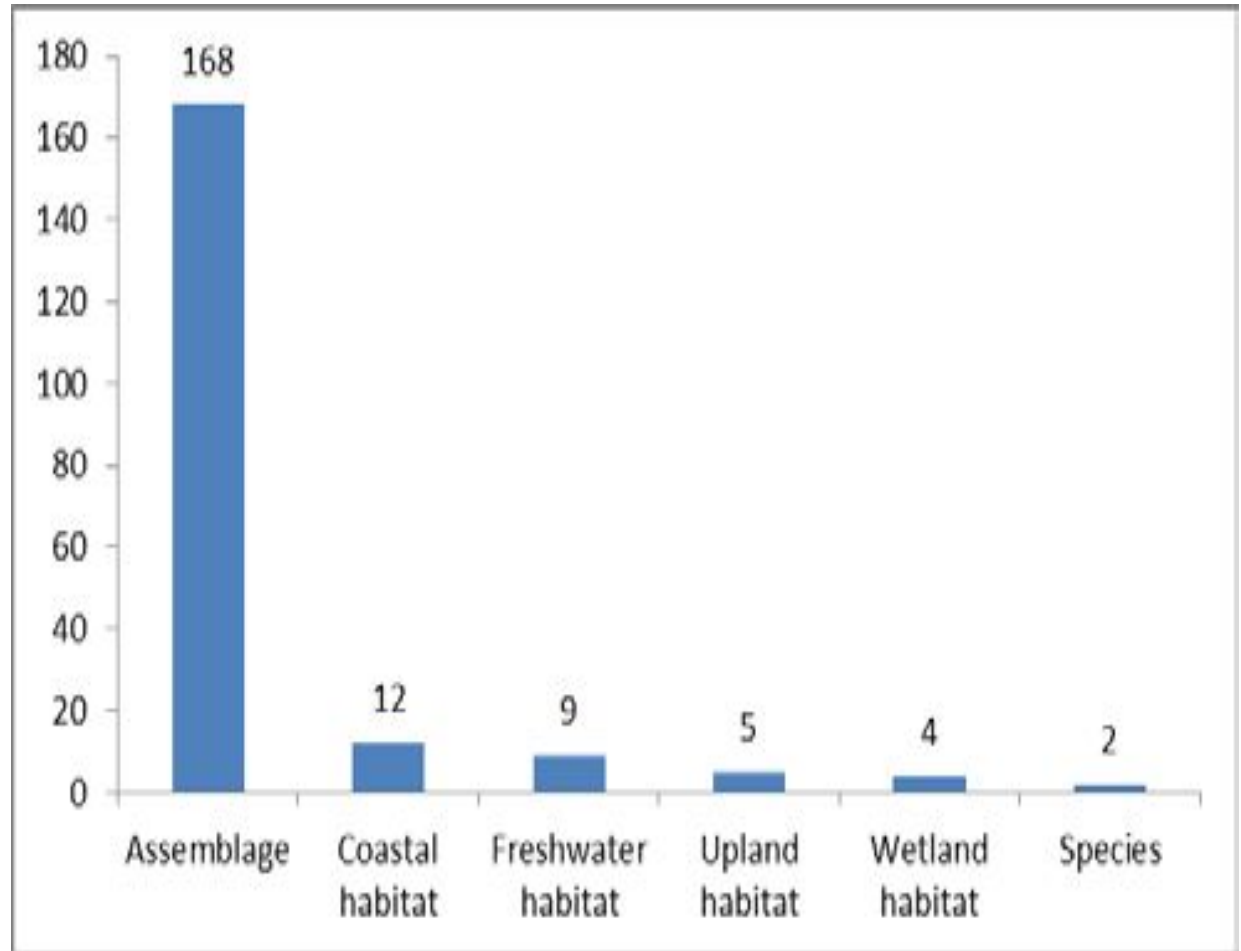
*Location of
highest risk
ranked freshwater
& wetland
features
(81)*



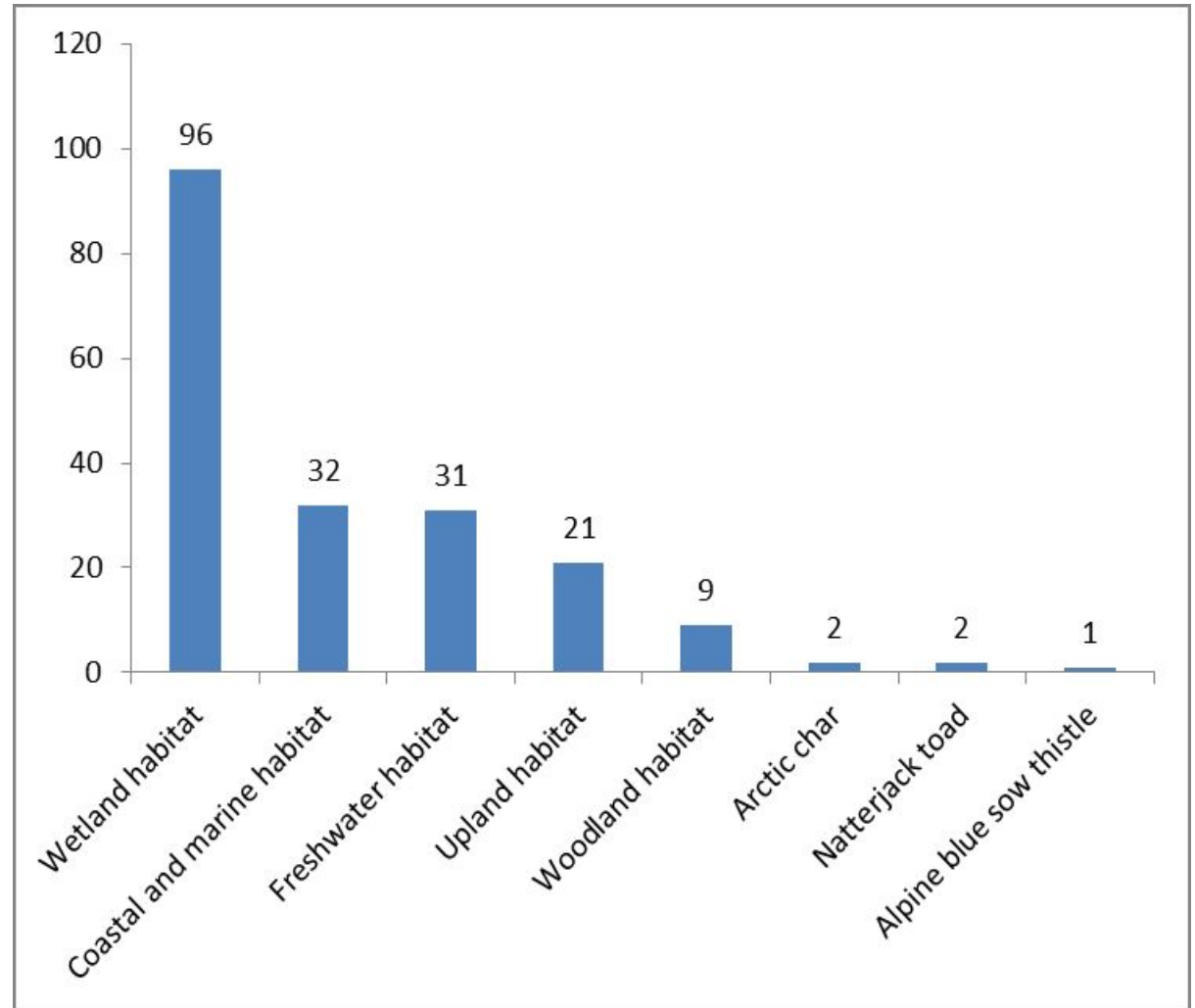
*Location of
geo-features
- colour coded
by risk category*



Distribution of top 200 highest ranked bio features within feature types (Assemblage, Coastal habitat, etc.).



Distribution (within feature types) of remaining features from the 500 highest ranked bio features following exclusion of assemblages.



Species features overview

Feature Type & Counts		Highest risk rank	No in top 100
Inverts 242	Species 105	130	
	Assemblage 137	18	9
Mammals 51	Spp - All other	3105	
Non-vascular plants 148	Spp 12	2365	
	Assemb 136	1	56
Reptiles & Amphibians 12	Spp 8	146	
	Assemb 4	83	1
Vascular plants 158	Spp 39	289	
	Assemb 119	28	9

Geo-features

Summary of high risk features

SSSI name	Feature category
DUNNET LINKS	All 'Coastal Geomorphology of Scotland'
GRUINART FLATS	
ST NINIAN'S TOMBOLO	
TAYPORT - TENTSMUIR COAST	
THE AYRES OF SWINISTER	

Actions

Timescale	Action
Immediate	<ul style="list-style-type: none"> Seek discussion on future status and management of A-road at Dunnet Links SSSI.
	<ul style="list-style-type: none"> Seek managed re-alignment of flood embankment at Gruinart Flats SSSI. Work with landowner to appraise managed re-alignment options and timescale.
	<ul style="list-style-type: none"> Seek 'pre-emptive' felling of trees to give space for beach and dunes to evolve as sea level rises at Tayport – Tentsmuir Coast SSSI.
	<ul style="list-style-type: none"> Reword 'finite' nature of interest as listed on citations for St Ninian's Tombolo SSSI and The Ayres of Swinster SSSI.

Influencing policy?

- SNH corporate and business plans
- SNH climate statement

But ...?



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