Indicators and trends

Monitoring climate change adaptation

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Indicator name				Version
NB19 Proportion of notified habitats and species in 'positive' condition				**June 2018**
Indicator type:	**Risk/opportunity**	**Impact**	**Action**	
			X	

SCCAP Theme	SCCAP Objective	CCRA risk/opportunity
Climate Ready Natural Environment	N2: Support a healthy and diverse natural environment with capacity to adapt.	General resilience

At a glance

- Climate change poses a very significant threat to Scotland's natural environment. In addition to direct impacts on habitats (e.g. sea-level rise), climate change will alter the complex ecological balances that allow the plants and animals to grow and thrive.
- The information provided by the site condition monitoring process enables a continued targeted approach to managing pressures that can be influenced by intervention, whilst providing evidence for the impact from the unpreventable pressures due to climate change.

Latest Figure	Trend
Proportion of notified habitat features in positive condition[1] (May 2018): 75.1% (Proportion in favourable condition: 79.3%) Proportion of notified species features in positive condition (May 2018): 68.3% (Proportion in favourable condition: 74.6%)	Between 2015 and 2018, the proportion of habitat features in positive condition increased by 1.7 percentage points. During the same period, the proportion of species features in positive condition decreased by 3.6 percentage points.

Why is this indicator important?

According to Scottish Natural Heritage (SNH), 'climate change is the single greatest threat to Scotland's habitats' (SNH 2015a). Whilst some habitats will be affected directly, due to sea-level rise or coastal erosion for example, for most, climate change will alter the complex ecological balances that allow the plants and animals to grow and thrive. Many species will be directly impacted by these changes, but indirect effects will potentially impact upon an even wider number of plant and animal

[1] For explanation for how the term 'positive' differs from the overall 'favourable' terminology utilised in official biodiversity statistics see 'Why is this indicator important?' section

species, for example via interactions with pollution, or habitat loss and fragmentation, which may prevent an effective response to climate change (Scottish Government, 2009a).

The ability of habitats to respond quickly enough will be limited- large habitats with few or minor existing pressures, and strong supporting natural processes are likely to do better than small, fragmented and isolated areas with additional pressures that will be more vulnerable to irreversible damage from rapid climate change (SNH 2015a). Species also vary considerably in their ability to adapt to climate change. Species that are habitat specialists or which are geographically restricted are potentially the most at risk.

Site Condition Monitoring (SCM) is SNH's programme for monitoring the condition of nature conservation features[2] of special interest on designated sites in Scotland. The monitoring determines whether the natural feature is likely to maintain itself in the medium to longer term under the current management regime and wider environmental or other influences. An important aspect of the SCM process involves inspecting the site for factors which have the capacity to impact upon the feature in a detrimental or positive way- these factors are termed 'Pressures' and can apply to both man-made and natural activities (SNH, 2015b). The first of SNH's 8 Adaptation Principles is to 'reduce other pressures on ecosystems, habitats and species' (SNH, 2012). By managing those pressures that can be influenced by intervention, the impact from the additional unpreventable pressures due to climate change can potentially be reduced.

This indicator aims to examine the success of the management of these features by monitoring the proportion of Scotland's notified habitat and species features which are in 'positive condition'. The term 'positive condition' is used to include habitat and species features which have been assigned to one of four condition categories by SNH (SNH, 2015c):

- **Favourable Maintained** - the attribute targets set for the natural features have been met, and the natural feature is likely to be secure on the site under present conditions;
- **Favourable Recovered** - the condition of the natural feature has recovered from a previous unfavourable condition, and attribute targets are now being met;
- **Unfavourable Recovering** - one or more of the targets have not been met on the site, but it has begun to show, or is continuing to show, a trend towards favourable condition;
- **Unfavourable Recovering due to Management (URDTM)** – a temporary status for where remedial management has been put in place to address all the known causes of unfavourable condition until such time SCM assessment can verify the condition, or identifies further work which may be required to further improve condition.

The indicator also makes reference to the 'favourable condition' status utilised in official statistics of feature condition[3] which also includes:

- **Favourable Declining** - the attribute targets set for the natural features have been met, but evidence suggests that condition will worsen *unless* remedial action is taken. The 'declining' terminology is used as a flag so that early action can be put into place to deal with the identified pressures (SNH, 2015f).

Related indicators:
NB12 Condition of key habitats: Proportion of notified habitats in unfavourable condition
NB13 Condition of key habitats: Area of modified deep peat soils
NB39 Freshwater habitats with reported presence of key invasive non-native species (INNS)

[2] 'Features' are divided into Habitats, Species and Earth Science Features
[3] For more detail see: http://www.snh.gov.uk/publications-data-and-research/official-statistics/official-stats/sites-favourable/

In addition, a 'knowledge document' (*Climate change pressure on Scotland's notified species*) examines the knowledge that can currently be drawn from SCM data regarding the impact of climate change on notified species.

What is happening now?

Currently, 75.1% of habitat features and 68.3% of species features are in positive condition (Figures 1 & 2). Although the overall positive figure is higher for habitat features, in comparison to species, there is a higher proportion of habitat features that are currently in unfavourable condition albeit deemed to be on their way to recovery.

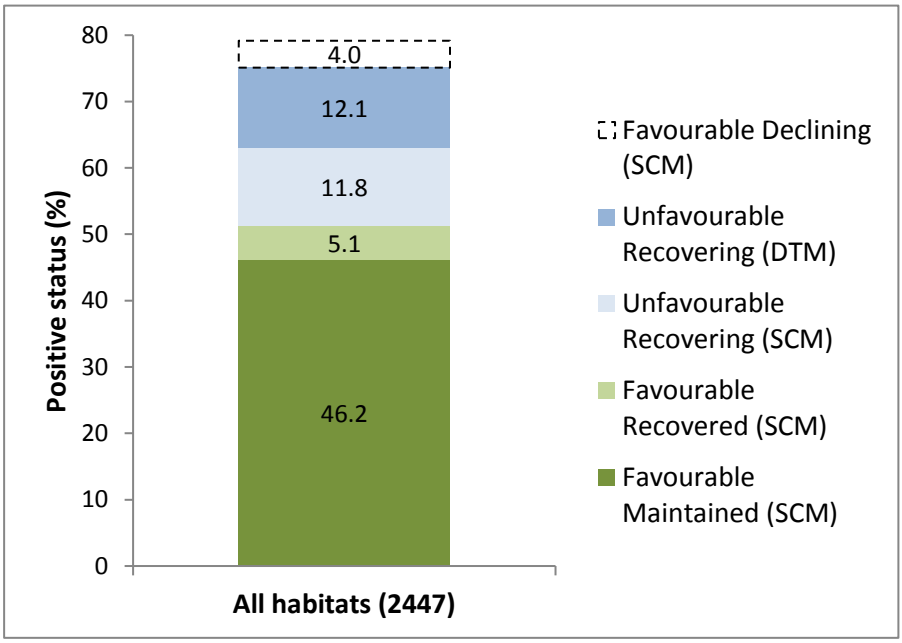

Figure 1 Proportion (%) of all notified habitat features in positive condition (May 2018). DTM- 'Due to management'; SCM- 'Site Condition Monitoring'. Total number of habitat features in brackets. (Source: SNH May 2018)

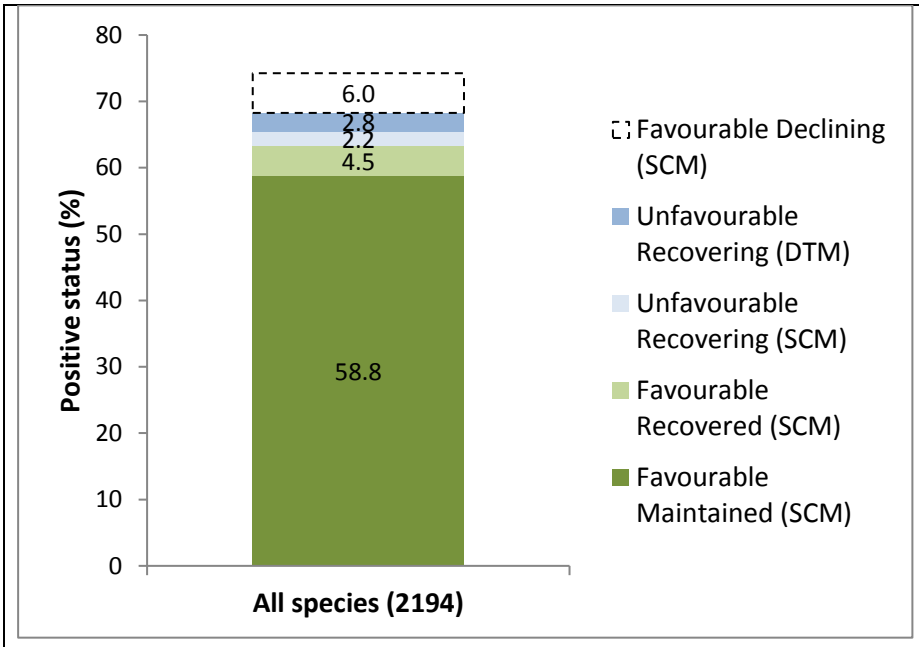

Figure 2 Proportion (%) of all notified species features in positive condition (May 2018). DTM- 'Due to management'; SCM- 'Site Condition Monitoring'. Total number of species features in brackets. (Source: SNH May 2018)

There are some noticeable differences within the habitat and species categories (Appendix 2, Figures A1 & A2):

- Coastal (80.8%), marine (95.1%) and wetland (80.0%) habitats have the highest proportion of habitat features in positive condition, whilst lowland heath (69.7%), woodland (63.4%) and freshwater (68.8%) habitats currently have the lowest. The presence of invasive species, mainly native, dominates the pressures associated with lowland heathland with encroachment of gorse & bracken a particular problem on some sites (SNH 2008; 2009b), along with the non-native rhododendron (SNH, 2010). Grazing is a major factor preventing, or restricting regeneration in woodlands. Whilst a certain amount of grazing and browsing by herbivores such as deer is important in sustainably managing woodland and maintaining biodiversity, excessive activity is described as 'currently the most widespread threat to the condition of designated woodland features' (SNH (2010), cited in Forestry Commission Scotland, 2014). Native and non-native invasive species are also a dominant pressure in Scotland's woodlands.
- Fish (84.8%) and vascular plants (82.9%) have the highest proportion of species features in positive condition. Despite the high proportion of positive marine habitats, as a group marine mammals (predominantly grey and harbour seals) have the lowest (57.1%) proportion of species features in positive status (though it should be noted that they form one of the smallest groups overall). For a significant number of these mammals, no on-site pressures have been identified. Birds make up around 70% of notified species features and therefore their condition has a significant impact on the overall species data.

What has happened in the past?

Official SNH statistics report the proportion of features in *favourable* condition has increased by 8.3 percentage points between 2005 and 2018, and 3.7 percentage points between 2007[4] and 2018 (SNH,

[4] The year that the current protocols were established to track the progress of remedial management measures out in place for unfavourable natural features identified in 2005

2018).[5] Figure 3 (NB for 2011-2018 only) illustrates that this has been predominantly due to an increase in the number of habitat features in favourable condition in comparison to species over the same period.

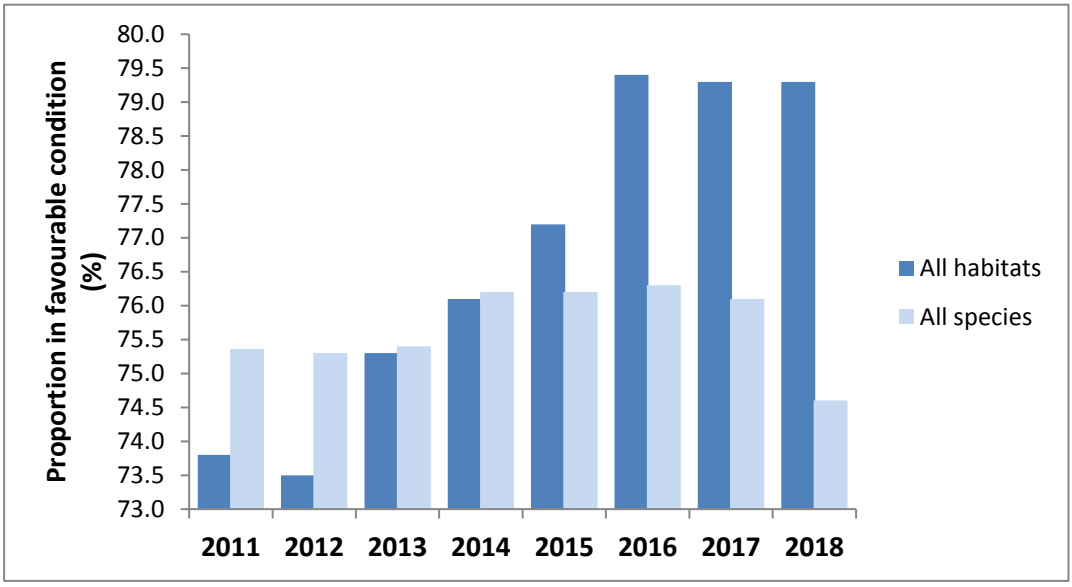

Figure 3 Proportion of all notified habitats and species in favourable[6] condition (2011-2018) (SNH, 2015d).

Figures A3 and A4 (Appendix 2) provide 2015 habitat and species positive condition data for comparison.

What is projected to happen in the future?

Projected climate change, in particular changing temperatures and water availability, threatens the viability of notified habitat sites across Scotland, with some habitats more at risk than others (SNH 2015a). Freshwater and wetland sites are often quite small, fragmented and geographically isolated in nature as well as being linked to potentially high direct impacts from projected climate change parameters such as an increase in temperatures and the number of dry days. A rise in temperature also makes specialist upland species vulnerable to commoner species from lower altitudes resulting in homogenisation of plant communities in upland areas. In addition, the range shifts associated with climatic change typically result in a reduction of territory for upland species as they are pushed further uphill to track suitable climatic space.

Since 2005, there has been a huge amount of work carried out by public bodies, non-Government nature conservation organisations and private individuals/companies to put in place changes in management to improve the condition of natural features (SNH, 2015e). The information provided by the SCM process should enable a continued targeted approach to managing those pressures that can be influenced by intervention, whilst providing evidence for the impact from the unpreventable pressures due to climate change.

[5] See Limitations section for more detail regarding discrepancies between indicator data and published statistics

[6] 'Favourable' condition includes: Favourable SCM (Recovered, Maintained & Declining), Unfavourable recovering SCM, Unfavourable recovering due to management

Patterns of change

This indicator does not currently analyse spatial or temporal patterns of change.

Interpretation of indicator trends

Since 2014, invasive species has taken over from over-grazing as the dominant pressure identified across all notified features on protected sites in Scotland (SNH, 2014). Whilst only a relatively small number of notified habitat and species features have had climate change specifically attributed as an identifiable pressure (47 in total), a large number of other pressures are potentially directly or indirectly influenced by climatic changes e.g. presence or changing extent of invasive species, plant pests and diseases, water availability and water quality.

During 2017/18, the condition of 72 features was seen to improve. These included 30 features which moved from Unfavourable to Unfavourable Recovering (DTM) due to work with land managers to address negative pressures (SNH, 2018). However, during the same period, 84 features deteriorated to unfavourable condition. Table 1 summarises the change in the condition of features during this period.

Amongst features categorised as Unfavourable, there are some where there are no identifiable pressures on or near the area itself. It is likely that for these features, factors outwith local management control are influencing feature condition (SNH, 2018). The majority of these features are sea bird populations where changes in prey distribution and abundance due to climate change and fishing activity are likely to be the main cause of declining populations (SNH, 2018)

Table 1 The change in condition of features[7] 2017-18

	Condition 31st March 2018			
Condition 31st March 2017	Favourable[1]	URDTM	Unfavourable	Total
Favourable[1]	3800	0	63	3863
URDTM	22	344	21	387
Unfavourable	20	30	991	1041
Not assessed / not notified	3	0	1	4
Total	3845	374	1076	5295
Improvement	Deterioration			

Source: SNH (2018) NB 'Favourable' includes those assessed in unfavourable recovering condition

Limitations

Site Condition Monitoring (SCM): A sample of the 5376 features (habitats, species and earth sciences) in Scotland are monitored for SCM on a six-year rolling programme, with the condition of 5295 having been assessed to date (SNH, 2018). This means not all features are visited and monitored every year,

[7] Habitat, species and earth science features combined

or every monitoring cycle. The sample for each reporting cycle is determined using a risk based random sampling model. This means that where the threat to, or vulnerability of a feature type is deemed to be low, the period between condition assessments is longer (e.g. butterfly features are monitored once every six years - i.e. once per monitoring cycle, whereas woodlands are monitored once every 3rd cycle)

There is a small discrepancy between the number of features included for analysis for positive condition in comparison to the latest (2018) published statistics of 'favourable condition'. This is due to a number of factors:

- The number of features included in SCM is not a settled figure and therefore snapshots of data may vary accordingly:
    - Through the Nature Conservation (Scotland) Act, SNH have the power to add or remove features from SSSIs
    - New Natura features are added from time to time
    - Where features are earmarked for denotification they are removed from calculation of official statistics (as are features which have not yet been assessed)

References

Forestry Commission Scotland (2014) *Scotland's Native Woodlands: Results From the Native Woodland Survey of Scotland*. http://scotland.forestry.gov.uk/supporting/strategy-policy-guidance/native-woodland-survey-of-scotland-nwss/national-nwss-report

Scottish Natural Heritage (2008) *Armadale Gorge, Site of Special Scientific Interest: Site Management Statement*. Available online at: http://gateway.snh.gov.uk/sitelink/index.jsp

Scottish Natural Heritage (2009a) *Climate change and the natural heritage SNH's approach and action plan*. Available online at: http://www.snh.org.uk/pdfs/publications/corporate/ClimateChange.pdf

Scottish Natural Heritage (2009b) *Eigg -An Sgurr and Gleann Charadail, Site of Special Scientific Interest: Site Management Statement*. Available online at: http://gateway.snh.gov.uk/sitelink/index.jsp

Scottish Natural Heritage (2010) *Ben Lomond, Site of Special Scientific Interest: Site Management Statement*. Available online at: http://gateway.snh.gov.uk/sitelink/index.jsp

Scottish Natural Heritage (2014). *The Proportion of Scotland's Protected Sites in Favourable Condition 2014*. Official Statistics Publication for Scotland. Available online at: https://www.nature.scot/information-library-data-and-research/official-statistics/official-statistics-protected-sites

Scottish Natural Heritage (2015a) *Climate Change impacts in Scotland*. Available online at: http://www.snh.gov.uk/climate-change/impacts-in-scotland/

Scottish Natural Heritage (2015b) *Pressures - impacts on feature condition*. Available online at: http://www.snh.gov.uk/protecting-scotlands-nature/protected-areas/site-condition-monitoring/assessment-of-condition/

Scottish Natural Heritage (2015c) *Assessment of condition*. Available online at: http://www.snh.gov.uk/protecting-scotlands-nature/protected-areas/site-condition-monitoring/assessment-of-condition/

Scottish Natural Heritage (2015d) *The Proportion of Scotland's Protected Sites in Favourable Condition 2015*. An Official Statistics Publication for Scotland. Available online at: https://www.nature.scot/information-library-data-and-research/official-statistics/official-statistics-protected-sites

Scottish Natural Heritage (2015e) *Favourable condition targets*. Available online at: http://www.snh.gov.uk/protecting-scotlands-nature/protected-areas/site-condition-monitoring/favourable-condition-targets/

Scottish Natural Heritage (2015f) *Personal correspondence from SNH following review*

Scottish Natural Heritage (2018) *The Proportion of Scotland's Protected Sites in Favourable Condition 2018*. An Official Statistics Publication for Scotland. Available online at: https://www.nature.scot/information-library-data-and-research/official-statistics/official-statistics-protected-sites

Further information

Site condition monitoring:
http://www.snh.gov.uk/protecting-scotlands-nature/protected-areas/site-condition-monitoring/

Climate change impacts on Scotland's natural environment:
http://www.snh.gov.uk/climate-change/impacts-in-scotland/

Case studies of progress towards favourable condition:
https://www.nature.scot/professional-advice/safeguarding-protected-areas-and-species/protected-areas/site-condition-monitoring/condition-target

Acknowledgements

Bob Bryson and Brian Eardley (SNH) for the supply of and advice regarding SCM data

Appendix One: Indicator metadata and methodology

Table 1: Indicator metadata

	Metadata
Title of the indicator	NB19 Proportion of notified habitats and species in 'positive' condition
Indicator contact: Organisation or individual/s responsible for the indicator	Anna Moss (CXC, University of Dundee)
Indicator data source	SNH Site Condition Monitoring
Data link: URL for retrieving the indicator primary indicator data.	https://www.environment.gov.scot/data/data-analysis/protected-nature-sites/

Table 2: Indicator data

	Indicator data
Temporal coverage: Start and end dates, identifying any significant data gaps.	SCM data includes site assessment results from 1995 until present.
Frequency of updates: Planned or potential updates	SCM: Features are monitored on a six-year rolling programme
Spatial coverage: Maximum area for which data is available	All notified features in Scotland
Uncertainties: Uncertainty issues arising from e.g. data collection, aggregation of data, data gaps	
Spatial resolution: Scale/unit for which data is collected	Notified feature site level
Categorical resolution: Potential for disaggregation of data into categories	Feature and report category; feature and pressure name
Data accessibility: Restrictions on usage, relevant terms & conditions	

Table 3 Contributing data sources

Contributing data sources Data sets used to create the indicator data, the organisation responsible for them and any URLs which provide access to the data.

Table 4 Indicator methodology

Indicator methodology The methodology used to create the indicator data
This indicator aims to examine the success of the management of these features by monitoring the proportion of Scotland's notified habitat and species features which are in 'positive condition'. The term positive condition is used to include habitat and species features which have been assigned to one of four condition categories by SNH (SNH, 2015c): • **Favourable Maintained** - the attribute targets set for the natural features have been met, and the natural feature is likely to be secure on the site under present conditions; • **Favourable Recovered** - the condition of the natural feature has recovered from a previous unfavourable condition, and attribute targets are now being met; • **Unfavourable Recovering** - one or more of the targets have not been met on the site, but it has begun to show, or is continuing to show, a trend towards favourable condition; • **Unfavourable Recovering due to Management (URDTM)** – a temporary status for where remedial management has been put in place to address all the known causes of unfavourable condition until such time SCM assessment can verify the condition, or identifies further work which may be required to further improve condition. NB this indicator does not include in 'positive condition' those features assessed as being '**Favourable Declining**' as it has been identified that the condition of these features will worsen unless remedial action is taken. In this respect this indicator differs from official statistics on 'favourable condition' URDTM figures have been derived from those features where the 'Summary condition' is identified as 'Recovering' but the 'Assessed condition' is 'Unfavourable'.

Appendix Two:

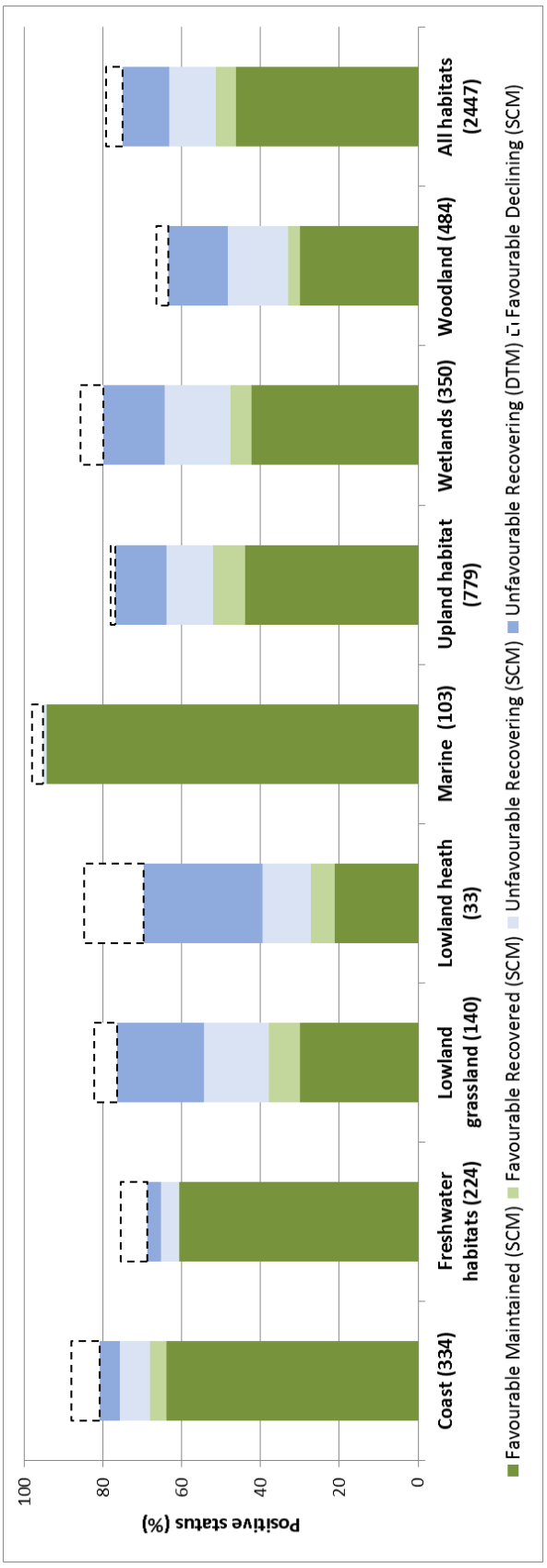

Figure A1 Proportion (%) of notified habitat features in positive condition (May 2018). DTM- 'Due to management'; SCM- 'Site Condition Monitoring'. Total number of habitat features in brackets. (Source: SNH May 2018)

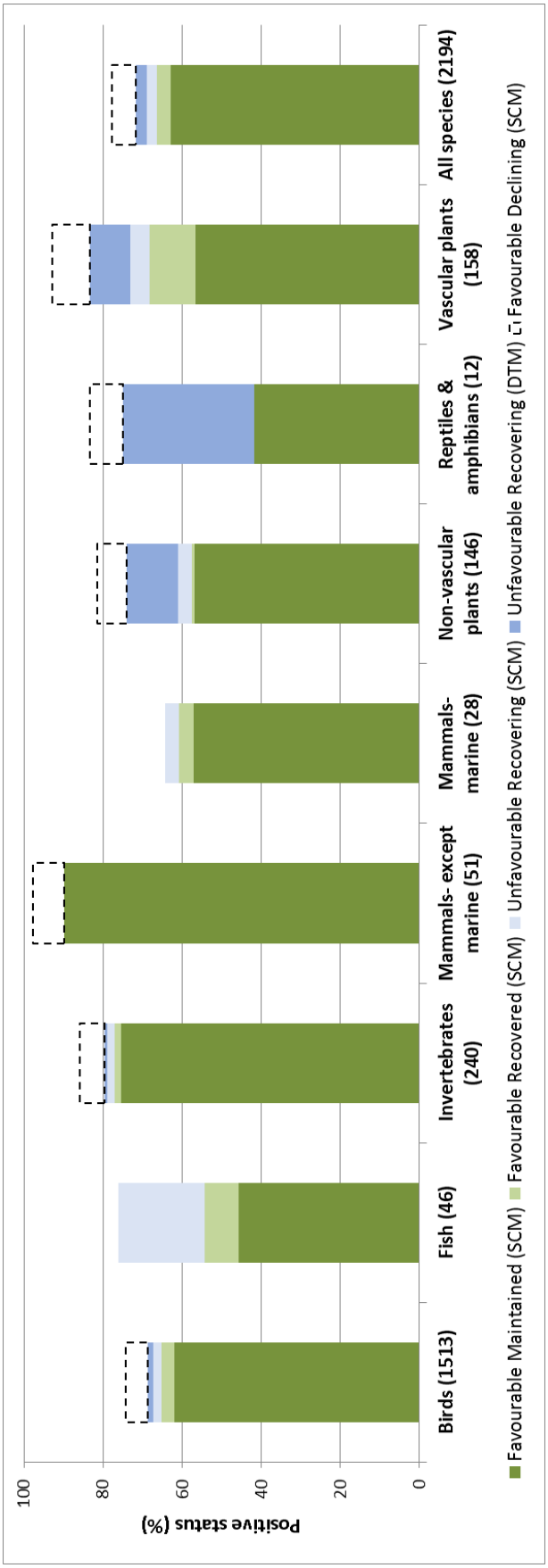

Figure A2 Proportion (%) of notified species features in positive condition (May 2018). DTM- 'Due to management'; SCM- 'Site Condition Monitoring'. Total number of habitat features in brackets. (Source: SNH May 2018)

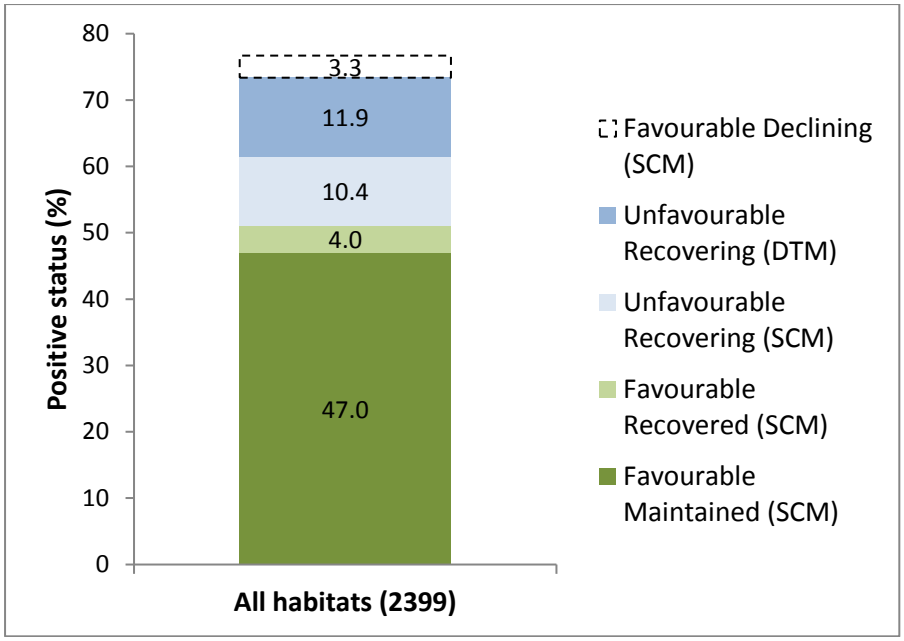

Figure A3 Proportion (%) of all notified habitat features in positive condition (March 2015). DTM- 'Due to management'; SCM- 'Site Condition Monitoring'. Total number of habitat features in brackets. (Source: data as supplied by SNH March 2015)

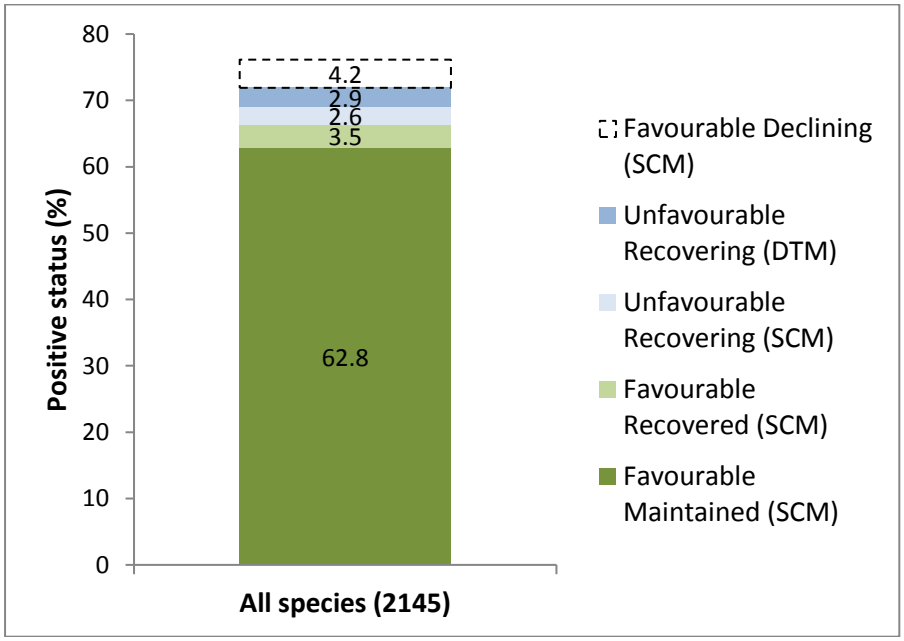

Figure A4 Proportion (%) of all notified species features in positive condition (March 2015). DTM- 'Due to management'; SCM- 'Site Condition Monitoring'. Total number of species features in brackets. (Source: data as supplied by SNH March 2015)