

State of Nature 2016 – supplementary information

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State of Nature 2016 – datasets and data sources

The datasets included in our assessment met the following criteria: two or more, comparable estimates of species abundance or distribution made between 1960 and the present, with a broad geographic coverage across the species' UK range; Results published in scientific or grey literature or if not, the methodology for data collection and/or analysis published; Start and end estimates for each species at least ten years apart. For many species, the available monitoring data, although valuable for a wide variety of purposes, did not meet the above criteria and so could not be used at this time to produce species trends. Only data that met these criteria were collated, presented in Tables 1 and 2 and used as part of the analysis. No attempt was made to quantify available population trends that did not meet the criteria.

Table 1: Datasets included in State of Nature 2016

Dataset	Taxonomic group	Measurement	Reference/data source
Wildbird Index	Birds	Relative abundance	https://www.bto.org/science/monitoring/developing-bird-indicators *
SCARRABS		Relative population size	http://www.rspb.org.uk/whatwedo/projects/details.aspx?id=362095
Rare Breeding Bird Panel		Relative abundance	http://www.rbbp.org.uk/
Breeding Bird Survey			https://www.bto.org/sites/default/files/u16/downloads/reports/bbsreport13.pdf *
Waterbird Index			https://www.bto.org/sites/default/files/wituk-2013-14.pdf *
UK Butterfly Monitoring Scheme	Butterflies	Relative abundance	http://butterfly-conservation.org/files/soukb-2015.pdf
Rothamsted Insect Survey	Moths	Relative abundance	http://butterfly-conservation.org/files/1.state-of-britains-larger-moths-2013-report.pdf
Butterfly Conservation (unpublished data)	Moths	Relative abundance	http://butterfly-conservation.org/110/recording-and-monitoring.html
Frescalo	Moths	Relative frequency of occurrence	http://butterfly-conservation.org/files/soukb-2015.pdf
Biological Records Centre data (unpublished data from the recording schemes on right)	Ants	Relative frequency of occurrence	Bees, Wasps and Ants Recording Society http://www.bwars.com/
	Bees		Bees, Wasps and Ants Recording Society http://www.bwars.com/
	Carabids		Ground Beetle Recording Scheme http://www.brc.ac.uk/scheme/ground-beetle-recording-scheme
	Centipedes		British Myriapod and Isopod Group http://www.bmig.org.uk/ Centipede Recording Scheme http://www.bmig.org.uk/page/centipede-recording-scheme

Biological Records Centre data (unpublished data from the recording schemes on right)	Craneflies		Dipterists Forum & Crane-fly Recording Scheme http://www.dipteristsforum.org.uk	
	Dragonflies		British Dragonfly Society; Dragonfly Recording Network http://www.british-dragonflies.org.uk/content/dragonfly-recording-network	
	True flies		Empididae and Dolichopodidae Recording Scheme http://www.dipteristsforum.org.uk/	
	Hoverflies		Hoverfly Recording Scheme http://www.hoverfly.org.uk/	
	Millipedes		British Myriapod and Isopod Group http://www.bmiq.org.uk/ Millipede Recording Scheme http://www.bmiq.org.uk/page/millipede-recording-scheme	
	Orthoptera		Orthoptera Recording Scheme http://www.orthoptera.org.uk/	
	Moths		National Moth Recording Scheme http://www.mothscount.org/text/27/national_moth_recording_scheme.html	
	Soldierflies		Soldierflies and Allies Recording Scheme http://www.dipteristsforum.org.uk/f14-Larger-Brachycera.html	
	Spiders		Spider Recording Scheme & British Arachnological Society http://britishspiders.org.uk/wiki2015/index.php?title=Main_Page	
	Trichoptera		Riverfly Recording Schemes: Trichoptera http://www.brc.ac.uk/schemes/RRS/trichoptera.htm	
	Wasps		Bees, Wasps and Ants Recording Society http://www.bwars.com/	
	Lichens		British Lichen Society http://www.britishlichensociety.org.uk/	
Bryophytes		British Bryological Society http://www.britishbryologicalsociety.org.uk/		
Breeding Bird Survey	Mammals	Relative abundance	https://www.bto.org/sites/default/files/u16/downloads/reports/bbsreport13.pdf	*
National Bat Monitoring Programme	Bats	Relative abundance	http://www.bats.org.uk/pages/nbmp_annual_report.html	*
Mammals on Roads	Hedgehog	Relative abundance	https://ptes.org/wp-content/uploads/2015/06/MoR-update-2015.pdf	*
National Dormouse Monitoring Programme	Dormouse	Relative abundance	http://surveydata.ptes.org/dormousemonitoring/	*
Gamebag census	Weasel, Stoat	Relative catch	https://www.gwct.org.uk/research/long-term-monitoring/national-gamebag-census/mammal-bags-comprehensive-overviews/	

Species specific surveys	Otter	Total area of occupancy	Various national otter surveys e.g. http://jncc.defra.gov.uk/pdf/EA_England%204th_Otter_Survey.pdf
	Water vole	Relative range	Water vole and Mink Survey 96-98 Vincent Wildlife Trust http://www.vwt.org.uk/publication_category/water-vole/
	Polecat	Total population size	The Polecat Survey of Britain 2004-2006: A Report on the Polecat's Distribution, Status and Conservation. Vincent Wildlife Trust http://www.vwt.org.uk/publications/the-polecat-survey-of-britain-2004-2006-a-report-on-the-polecats-distribution-status-and-conservation-3/
	Pine marten	Total population size	Expansion zone survey of pine marten (<i>Martes martes</i>) distribution in Scotland, Distribution of the pine marten (<i>Martes martes</i>) in southern Scotland in 2013 http://www.snh.org.uk/pdfs/publications/commissioned_reports/520.pdf
	Badger	Total number of social groups	Judge, J., et al. (2014). Density and abundance of badger social groups in England and Wales in 2011–2013. <i>Scientific reports</i> , 4. http://www.nature.com/articles/srep03809
	Natterjack toad	Total number of spawn strings	Amphibian and Reptile Conservation unpubl. Data http://www.arc-trust.org/Pages/Category/science-data
	Sand lizard	Total area of occupancy	Amphibian and Reptile Conservation unpubl. Data http://www.arc-trust.org/Pages/Category/science-data
Plant Atlas	Vascular plants	Change index	Hill MO, et al. (2004) PLANTATT – http://nora.nerc.ac.uk/9535/1/PLANTATT.pdf Centre for Ecology & Hydrology, Huntingdon.
Countryside Survey	Vascular plants	Change index	CEH unpubl. Data http://www.countryside-survey.org.uk/

***Smoothed times series:**

Where smoothed time series were available these were used (datasets where smoothed trends were available are marked with *). Long time series of species abundance data can show alternating patterns of increase and decrease, and it can be difficult to separate patterns of genuine change from annual fluctuations. Methods to model smoothed trend lines are being increasingly used. In these cases, total change was calculated using the abundance estimate of the penultimate year expressed as a proportion of abundance in the first year, as the final year of smoothed trends can be erratic ([Buckland et al 2005](#)) (For more detail on modelling smoothed trends see [Brereton & Roy 2014](#)).

Table 2: Marine datasets used in State of Nature 2016

Taxonomic group	Sub-group	Survey	Spatial extent; Sampling unit
Fish	General	Bottom Trawls (NS-IBTS/EVHOE, SWC-IBTS) http://ocean.ices.dk/Project/IBTS/	UK; IBTS units
		MBA standard trawl http://portal.oceannet.org/search/light/catalogue/dassh.ac.uk_MEDIN_2.3_ec5913f96461a0e641b6e13ddf8c94a3.xml	SW Eng
	Deep water fish	Marine ecosystem research portal http://www.marine-ecosystems.org.uk/	UK
Mammals	Seals	UK Seal Monitoring Programme http://www.smru.st-andrews.ac.uk/	UK; country
	Cetaceans	Cetacean Offshore Distribution and Abundance in the European Atlantic (CODA) http://biology.st-andrews.ac.uk/coda/ Small Cetacean Abundance in the North Sea (SCANS) http://biology.st-andrews.ac.uk/scans2/inner-background.html	UK; SCANS areas
Birds	Seabirds	SMP http://jncc.defra.gov.uk/page-1550	UK; UK, country
Zooplankton, Phytoplankton		Continuous Plankton Recorder (CPR) https://www.sahfos.ac.uk/	UK; SAHFOS blocks
Algae	Brown algae	Yesson, C. et al. Estuarine, Coastal and Shelf Science 155 (2015): 167-175. DOI: 10.1016/j.ecss.2015.01.008	UK

Red Lists used in the State of Nature 2016

At a global level, the IUCN co-ordinates the process of assessing which species are threatened with extinction and have developed assessment criteria to make the process as transparent and consistent as possible. These criteria are based on a variety of parameters, including the rate of change in species abundance or distribution, total population size and the number of populations. How threatened a species is may vary across its range and often regional or national Red Lists are produced, documenting which species are threatened at different spatial scales. We have brought together all the national Red Lists, for either the UK or Great Britain that have been produced using the latest guidelines from the IUCN, or non-IUCN criteria (birds).

Taxonomic group	Red List Source
Invertebrates	<p>A review of the millipedes (Diplopoda), centipedes (Chilopoda) and woodlice (Isopoda) of Great Britain. Lee P et al. (2015) A review of the millipedes (Diplopoda), centipedes (Chilopoda) and woodlice (Isopoda) of Great Britain. Species Status no. 23. Natural England Commissioned Reports No. 186 http://publications.naturalengland.org.uk/publication/4924476719366144</p> <p>A review of the scarce and threatened beetles of Great Britain Part 1 & Part 2 Hyman P S revised and updated by Parsons, M S. (2002) UK nature conservation, No. 3. Published by JNCC. http://jncc.defra.gov.uk/pdf/Pub92_Review_of_Scarce_&_Threatened_Coleoptera_of_Great_Britain_Part-1_(1)_PRINT.pdf http://jncc.defra.gov.uk/PDF/Pub92_Review_of_Scarce_&_Threatened_Coleoptera_of_Great_Britain_Part-1_(2)_PRINT.pdf</p> <p>A review of the scarce and threatened beetles of Great Britain: The leaf beetles and their allies Hubble DS (2014). A review of the scarce and threatened beetles of Great Britain: The leaf beetles and their allies. Species Status No. 19. Natural England Commissioned Reports No. 161 http://publications.naturalengland.org.uk/publication/6548461654638592</p> <p>A review of the scarce and threatened Coleoptera of Great Britain Part (3)- Water beetles of Great Britain Foster GN (2010). A review of the scarce and threatened Coleoptera of Great Britain Part (3)- Water beetles of Great Britain. Species Status 1. Joint Nature Conservation Committee, Peterborough. http://jncc.defra.gov.uk/PDF/JNCC_WEB_Waterbeetle%20Review%20No1%20Part3%20Aug%202010_2.pdf</p> <p>A review of the beetles of Great Britain: The Darkling Beetles and their allies Alexander KNA et al. (2014) A review of the beetles of Great Britain: The Darkling Beetles and their allies Species Status No.18. Natural England Commissioned Reports No. 148 http://publications.naturalengland.org.uk/publication/5862553594888192</p> <p>A review of the beetles of Great Britain: The Soldier Beetles and their allies Alexander KNA (2014). A review of the beetles of Great Britain: The Soldier Beetles and their allies. Species Status No. 16. Natural England Commissioned Reports No. 134 http://publications.naturalengland.org.uk/publication/6314340407836672</p>

<p>Invertebrates (cont)</p>	<p>The Butterfly Red List for Great Britain Fox R et al (2010). A new Red List of British Butterflies, Species Status 12. Joint Nature Conservation Committee, Peterborough. http://jncc.defra.gov.uk/pdf/Web_Butterfly_Red_List_SpeciesStatNo12FINAL.pdf</p> <p>A review of the Trichoptera of Great Britain Wallace ID (1991). Research & survey in nature conservation, No. 32. Published by JNCC. http://jncc.defra.gov.uk/pdf/Pub91_Review_of_the_Trichoptera_of_Great_Britain_PRINT.pdf</p> <p>The Odonata Red Data List for Great Britain Daguet CA et al. (2008). The Odonata Red Data List for Great Britain. Species Status 11. Joint Nature Conservation Committee, Peterborough. http://jncc.defra.gov.uk/pdf/pub08_speciesstatus11.pdf</p> <p>A review of the Orthoptera (Grasshoppers and crickets) and allied species of Great Britain Sutton PG (2014). A review of the Orthoptera (Grasshoppers and crickets) and allied species of Great Britain. Species Status No. 21. Natural England Commissioned Reports No. 187 http://publications.naturalengland.org.uk/publication/5368778738106368</p> <p>A review of the scarce and threatened bees, wasps and ants of Great Britain Falk SJ (1991). A review of the scarce and threatened bees, wasps and ants of Great Britain. Research & survey in nature conservation, No. 35. Published by JNCC. http://jncc.defra.gov.uk/pdf/Pub91_Review_of_threatened_bees_wasps_ants_PRINT.pdf</p> <p>A review of the scarcer Neuroptera of Great Britain Kirby P (1991) A review of the scarcer Neuroptera of Great Britain. Research & survey in nature conservation, No. 34. Published by JNCC. http://jncc.defra.gov.uk/pdf/Pub92_Review_of_the_Scarcer_Neuroptera_of_Great_Britain_PRINT.pdf</p> <p>A review of the scarce and threatened Ephemeroptera and Plecoptera of Great Britain Bratton JH (1991) A review of the scarce and threatened Ephemeroptera and Plecoptera of Great Britain. Research & survey in nature conservation, No. 29. Published by JNCC. http://jncc.defra.gov.uk/pdf/Pub90_Review_of_the_Scarcer_Ephemeroptera_and_Plecoptera_PRINT.pdf</p> <p>A review of the scarce and threatened stoneflies (Plecoptera) of Great Britain Macadam C (2014) A review of the scarce and threatened stoneflies (Plecoptera) of Great Britain. Species Status No. 20. Natural England Commissioned Reports No. 174 http://publications.naturalengland.org.uk/publication/5404611030548480</p>
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<p>Invertebrates (cont)</p>	<p>A review of the scarce and threatened Hemiptera of Great Britain Kirby P (1992) A review of the scarce and threatened Hemiptera of Great Britain. Research & survey in nature conservation, No. 2. Published by JNCC. http://jncc.defra.gov.uk/pdf/Pub92_Review_of_scarce_and_threatened_hemiptera_of_Great_Britain_PRINT.pdf</p> <p>A review of the Hemiptera of Great Britain: The Aquatic and Semi-aquatic Bugs Cook A (2015) A review of the Hemiptera of Great Britain: The Aquatic and Semi-aquatic Bugs. Species Status No. 24. Natural England Commissioned Reports No. 188 http://publications.naturalengland.org.uk/publication/5132432324952064</p> <p>A review of the scarce and threatened flies of Great Britain Part 1-3 Falk SJ (1991) Research & survey in nature conservation, No. 39. Published by JNCC, 1991. & updates: Falk SJ (2005) A review of the scarce and threatened flies of Great Britain Part 1-3. Published by JNCC. Part 1: http://jncc.defra.gov.uk/pdf/Pub92_Review_of_scarce_&_threatened_flies_of_Great_Britain_(Part-1)_PRINT.pdf Part 2: http://jncc.defra.gov.uk/pdf/pub05_speciesstatus_nematoceraandaschizav4_web.pdf Part 3: http://jncc.defra.gov.uk/pdf/pub05_speciesstatus_empidoideav3_v44web.pdf</p> <p>A Review of the Non-Marine Mollusca of Great Britain Seddon MB (2014) A review of the Non-Marine Mollusca of Great Britain: Species Status No. 17. NRW Evidence Report No: 14, 84pp, Natural Resources Wales, Bangor. http://naturalresources.wales/media/2487/species-status-review-of-the-non-marine-mollusca-of-great-britain.pdf</p>
<p>Vascular plants</p>	<p>The Vascular Plant Red Data List for Great Britain. Cheffings CM & Farrell L (Eds), Dines TD et al. (2005). The Vascular Plant Red Data List for Great Britain. Species Status 7: 1-116. Joint Nature Conservation Committee, Peterborough. http://jncc.defra.gov.uk/pdf/pub05_speciesstatusvpredlist3_web.pdf</p> <p>A Vascular Plant Red List for England. 2014 Stroh PA et al. (2014). A Vascular Plant Red List for England. Botanical Society of Britain and Ireland, Bristol. http://www.bsbi.org.uk/England_Red_List_1.pdf</p>
<p>Fungi & Lichens</p>	<p>A Conservation Evaluation of British Lichens and Lichenicolous Fungi Woods RG & Coppins BJ (2012). A Conservation Evaluation of British Lichens and Lichenicolous Fungi. Species Status 13. Joint Nature Conservation Committee, Peterborough. http://jncc.defra.gov.uk/pdf/Lichens_web_Edits%2020%20Aug.pdf</p> <p>Red List of Fungi for Great Britain Boletaceae Ainsworth AM (2013) Red List of Fungi for Great Britain Boletaceae. Species Status No. 14. http://jncc.defra.gov.uk/pdf/SpeciesStatus14_web.pdf</p>

Fungi & Lichens (cont)	A revised list of nationally rare bryophytes Preston C (2010) A revised list of nationally rare bryophytes, Field Bryology 100, 32-40 http://rbg-web2.rbge.org.uk/bbs/Activities/field%20bryology/FB100/FB100%20Preston.pdf
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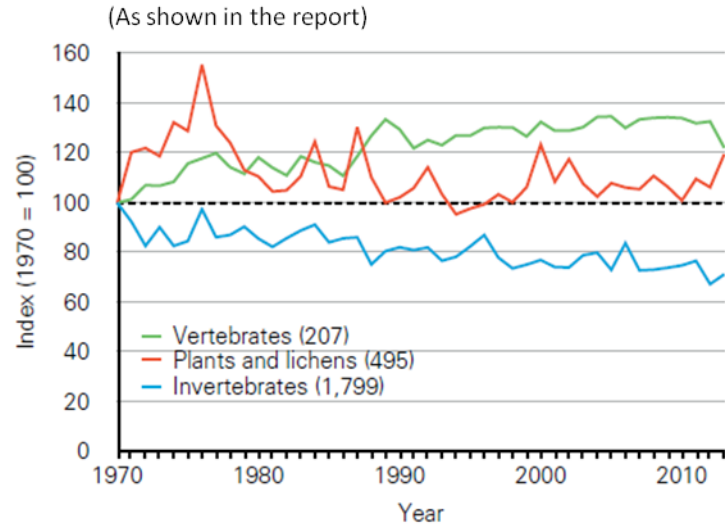
Red Lists used in the State of Nature 2016 – Northern Ireland

In the case of Northern Ireland, we have used all-Ireland Red List assessments for species occurring in Northern Ireland, as this allowed the consideration of a broader taxonomic scope than data from Northern Ireland alone. Ireland specific Red Lists used listed here:

Taxonomic group	Red List Source
Invertebrates	<p>Red List of Irish Bees Fitzpatrick Ú et al. (2006) Regional Red List of Irish Bees, Publ. Rep. to National Parks and Wildlife Service (Ireland) and Environment and Heritage Service (N. Ireland). https://www.npws.ie/sites/default/files/publications/pdf/Fitzpatrick_et_al_2006_Bee_Red_List.pdf</p> <p>Irish Red List No. 1 – Water beetles Foster GN et al. (2009) Ireland Red List No. 1 – Water beetles. National Parks and Wildlife Service, Department of Environment, Heritage and Local Government, Dublin, Ireland. https://www.npws.ie/content/publications/irish-red-list-no-1-water-beetles</p> <p>Irish Red List No. 2 – Non-marine Molluscs Byrne A et al. (2009) Ireland Red List No. 2 – Non-marine Molluscs. National Parks and Wildlife Service, Department of the Environment, Heritage and Local Government, Dublin, Ireland https://www.npws.ie/sites/default/files/publications/pdf/RL2.pdf</p> <p>Irish Red List No. 4 - Butterflies Regan EC et al. (2010) Ireland Red List No. 4 – Butterflies. National Parks and Wildlife Service, Department of the Environment, Heritage and Local Government, Ireland. https://www.npws.ie/sites/default/files/publications/pdf/RL_2010_Butterflies.pdf</p> <p>Irish Red List No. 6 – Damselflies & Dragonflies Nelson B et al. (2011) Ireland Red List No.6: Damselflies & Dragonflies (Odonata). National Parks and Wildlife Service, Department of the Environment, Heritage and Local Government, Dublin, Ireland https://www.npws.ie/sites/default/files/publications/pdf/RL6.pdf</p> <p>Irish Red List No. 7 – Mayflies (Ephemeroptera) Kelly-Quinn M & Regan EC (2012) Ireland Red List No. 7: Mayflies (Ephemeroptera). National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland. https://www.npws.ie/content/publications/ireland-red-list-no-7-mayflies-ephemeroptera</p>

Vertebrates	<p>Irish Red List No. 5 – Amphibians, Reptiles & Freshwater Fish King JL et al. (2011) Ireland Red List No. 5: Amphibians, Reptiles & Freshwater Fish. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland. https://www.npws.ie/sites/default/files/publications/pdf/RL5.pdf</p> <p>Irish Red List No. 3 – Terrestrial Mammals Marnell F et al. (2009) Ireland Red List No. 3: Terrestrial Mammals, National Parks and Wildlife Service, Department of the Environment, Heritage and Local Government, Dublin, Ireland https://www.npws.ie/sites/default/files/publications/pdf/RL3.pdf</p>
Plants	<p>Irish Red List No. 8 – Bryophytes Lockhart N et al. (2012) Ireland Red List No.8: Bryophytes. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland. https://www.npws.ie/sites/default/files/publications/pdf/RL8.pdf</p>

Figure 6 supplementary, State of Nature 2016, page 11



An index of change in the abundance and occupancy of 2,501 terrestrial and freshwater species, split into major taxonomic groups, including

- (i) 207 vertebrate species (green)
- (ii) 495 plant and lichen species (red)
- (iii) 1,799 invertebrate species (blue)

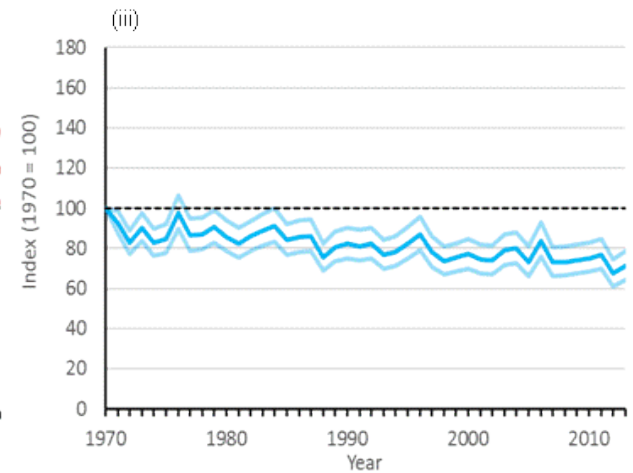
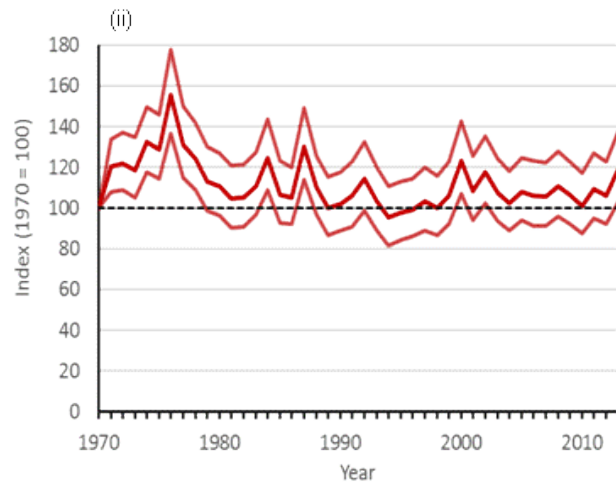
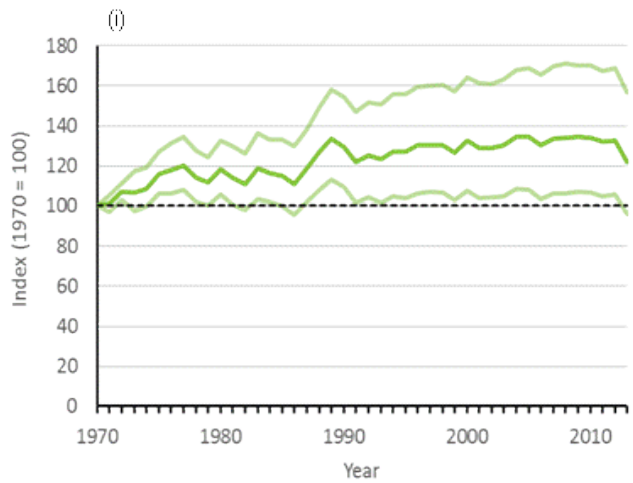
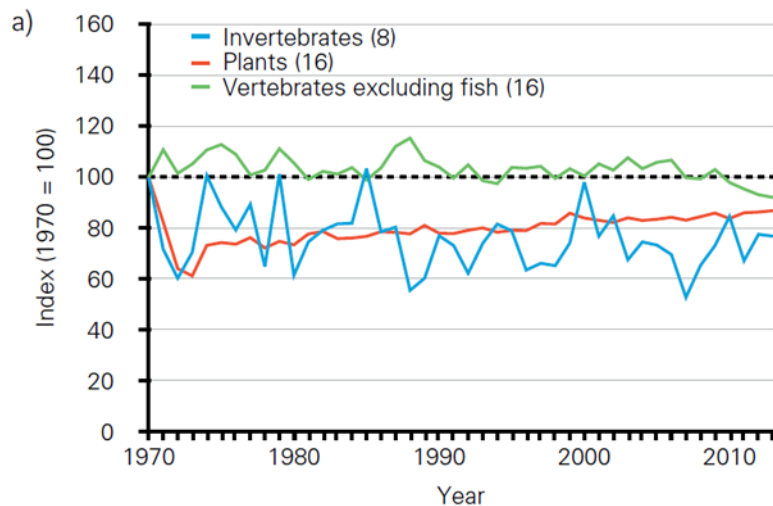


Figure 31a supplementary, State of Nature 2016, page 46

(As shown in the report)



An index of species' status based on the abundance of a) 40 marine species by taxonomic group;

- (i) 16 vertebrate species excluding fish (green)
- (ii) 16 plant species (red)
- (iii) 8 invertebrate species & species groups (blue)

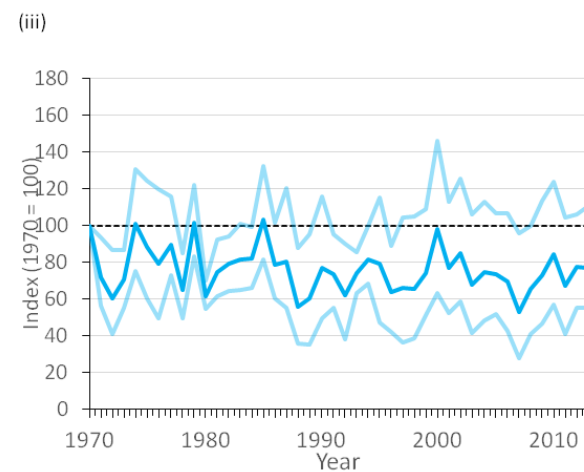
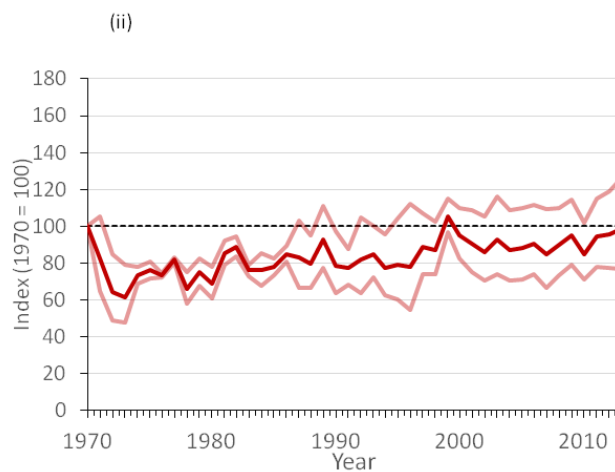
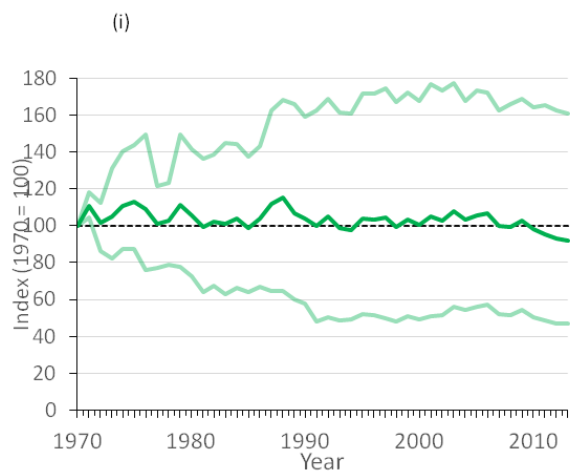
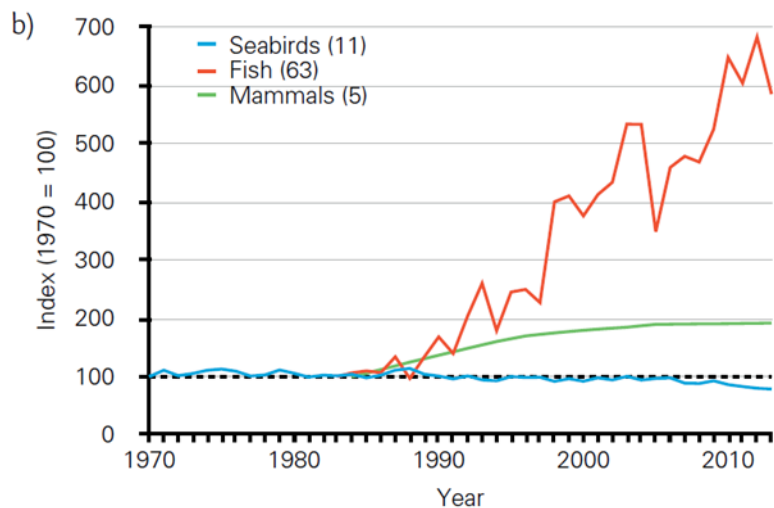


Figure 31b supplementary, State of Nature 2016, page 46

(As shown in the report)



An index of species' status based on the abundance of 79 vertebrate species, including

- (i) 11 seabirds (blue)
- (ii) 63 fish species (red) (NB axis on fish indicator different to the other graphs)
- (iii) 5 mammal species (green)

