



State of Nature 2016

Wales

From coastal dunes, rocky shores and offshore islands, through oak woods and pastures, up to peat moorlands and high mountains, the Welsh landscape is made up of a rich mosaic of habitats, despite being predominantly farmed.

The varied geology of Wales and the wet climate for which it is renowned, has enabled an abundance of bryophytes (mosses and liverworts), lichens and fungi to thrive here. In fact, Wales supports the highest diversity of bryophytes in the UK. The terrestrial habitats of Wales are home to a variety of flora and fauna, including species that are not found elsewhere in the UK. These include striking wild flowers such as the Radnor lily, the spotted rock-rose and the Snowdon lily. The latter is a vulnerable Arctic-alpine species of cold, north-facing slopes in Snowdonia.

Having a large tidal range and being situated at the boundary of three oceanic climate zones means that Wales’ seas are rich in marine life. For example, Cardigan Bay hosts one of just two semi-resident populations of bottlenose dolphins in Britain. Risso’s and common dolphins are also found in Welsh waters.

Around the coast, seagrass beds, honeycomb worm reefs and horse mussel reefs create complex habitats, which support high levels of associated biodiversity, including species like the heart urchin. Onshore, Wales’ internationally important seabird colonies are truly spectacular, with the Pembrokeshire islands of Skomer and Skokholm holding more than half the world’s population of Manx shearwaters.

Wales has a deserved reputation for its inherent sense of wildness. But when you explore more closely, its stunning landscapes, coastlines and sea cannot completely mask the fact that there have been considerable changes in Welsh wildlife in recent decades, as shown by the measures we present in this report. Wales is thought to be home to over 50,000 species¹, but the diversity of species and the extent of natural and semi-natural habitats has declined markedly, with many culturally and ecologically important species disappearing completely.

Despite the long-standing interest in nature in Wales, it is only recently that systematic monitoring has enabled changes in species’ populations to be measured, and only for a small proportion of species. Data are lacking for a number of groups, including non-vascular plants, amphibians and reptiles, and moths. Marine species are considered at a UK level and are included in the *State of Nature 2016* UK report. In this report, we are able to draw upon measures of change for vascular plants, birds, butterflies and mammals.

Well-planned, targeted and sufficiently resourced conservation action can turn around the fortunes of our wildlife. Throughout this report we showcase conservation projects that are addressing some of the key threats and problems facing Welsh wildlife, and that are fine examples of how partnership projects are bringing nature back at a range of scales.

For guidance on how to understand the graphs and results presented in this report, please turn to pages 20–21.

- Over the long term, 57% of vascular plant species declined and 43% increased. This pattern was unchanged over the short term.
- 60% of butterfly species declined and 40% increased over the long term, while over the short term, 37% of species declined and 63% increased.
- Over the long term, 40% of bird species declined and 60% increased. Over the short term, 58% of species declined and 42% increased.
- Over 5,000 of the species that are known to occur in Wales have been assessed using modern Red List criteria. 354 (7%) of these are at risk of extinction from Great Britain.
- These measures are available for the first time because of the dedicated work of expert volunteers. It is largely thanks to their efforts, and the role of the organisations supporting them, that we are able to chart how our nature is faring.

The wider context

This report is a companion to the *State of Nature 2016* report, which makes an assessment of the fortunes of wildlife across the UK, its Crown Dependencies and Overseas Territories. We encourage readers to refer to that report (available online at rspb.org.uk/stateofnature) for the wider context within which the state of nature in Wales, the pressures acting upon that nature, and the conservation responses required to help it, should be considered. Furthermore, our ability to measure change in nature is better at a UK scale – we can draw upon a greater volume of data, for more species and from more sources, as most biological monitoring and recording is conducted at the UK level.

That said, this *State of Nature 2016: Wales* report represents a step forward in our ability to report on Wales’ biodiversity. Since the first report was published back in 2013, we have developed new country-specific metrics of change for all of the UK’s four nations. The new Welsh measures, presented alongside existing national biodiversity indicators and alongside UK metrics, improve our understanding of how Wales’ nature has changed, and the scale of the challenge that faces us.

A look back

A new, objective approach to measuring the depletion of nature compared to natural, undamaged ecosystems is featured in the UK report. National measures of the Biodiversity Intactness Index (BII) provide us with one way to assess the extent of the loss of nature due to human activities going back centuries². It has been suggested that BII values below 90% indicate that ecosystems may have fallen below the point at which they can reliably meet society’s needs. Therefore the value for Wales – 82.8% – gives great cause for concern; of the 218 countries for which BII values have been calculated, Wales is ranked 49th from the bottom. This puts Wales in the lowest fifth of all the countries analysed.

This assessment of the degradation of natural ecosystems should, in fact, come as no great surprise given what we know of the loss of wildlife-rich habitat before we were able to assess the state of nature using the measures presented in this report. Little of this earlier loss has been quantified, and that which has, has usually been measured at a UK scale. However, there is evidence that demonstrates some of the past impacts upon Welsh habitats. The facts are stark:

- 90% of lowland grassland has been “improved” since the 1930s, resulting in the loss of the specialist wildlife that semi-natural grasslands support³.
- Although woodland cover tripled over the 20th century, this was from an all-time low. Only 12% of woodland in Wales is ancient and semi-natural, and much of it is degraded and fragmented. Coppicing has disappeared as a form of management³.
- Between the 1940s and late 1980s, 44% of upland heathland (including dry heath and wet heath) was lost, mainly as a result of agricultural “improvement” and afforestation, predominantly with Sitka spruce and larch⁴.
- Across Wales, approximately 12% of former floodplain and coastal levels habitats have now been built on, and a significant proportion of the rest has been heavily modified by years of fertiliser use.
- Around its coasts, Wales still has wonderful, wildlife-rich dune systems (see page 15), but it is likely that around 30% of the sand dune area has been lost since 1900³.

Hence, while *State of Nature 2016: Wales* focuses on recent and ongoing change, it should be remembered that there were dramatic changes prior to this. All the evidence suggests that the starting “baseline” used for the measures in this report is that of a country already much poorer in nature.



Wales has lost 30% of its sand dunes since 1900

Clay Rogers (rspb-images.com)

Key findings

We show trends in Welsh species over the long term (around 1970 to 2013) and the short term (2002 to 2013). It is important to bear in mind that all the evidence suggests that the starting “baseline” used for these measures is that of a country already much poorer in nature. These measures were based on quantitative trends in either abundance or distribution for 1,026 terrestrial and freshwater species. Guidance on how to interpret them is given on pages 20–21.

Trends in the abundance and distribution of species

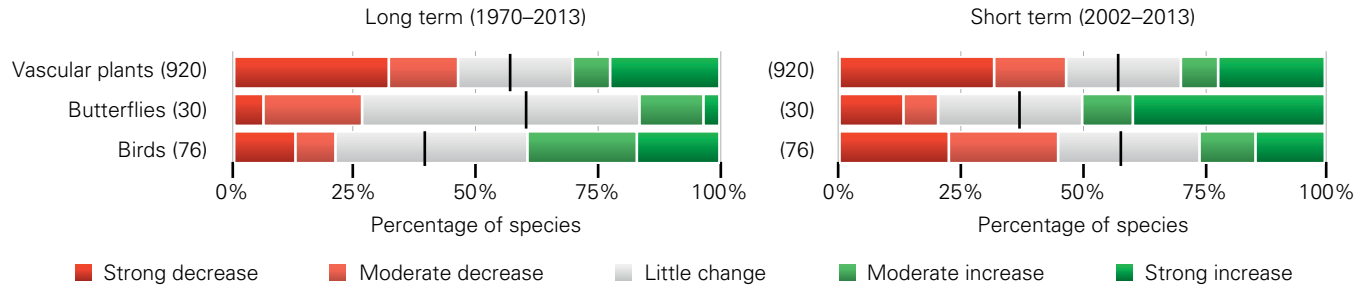


Figure 1
The percentage of species in each trend category over the long term and the short term. The line in the “little change” category shows the division between declining species on the left, and increasing species on the right. The values in brackets show the number of species assessed.

We have quantitative assessments of the change in population or distribution for terrestrial and freshwater species across three taxonomic groups: birds, butterflies and vascular plants.

- Over the long term, 57% of vascular plant species declined and 43% increased. Among these, 46% showed strong or moderate declines, 24% showed little change, and 30% showed strong or moderate increases. This pattern was unchanged over the short term.
- 60% of butterfly species declined and 40% increased over the long term. Among these, 27% showed strong or moderate declines, 56% showed little change, and 17% showed strong or moderate increases. Over the short term, 37% of species declined and 63% increased.
- Over the long term, 40% of bird species declined and 60% increased. Among these, 21% showed strong or moderate declines, 39% showed little change, and 40% showed strong or moderate increases. Over the short term, 58% of species declined and 42% increased.

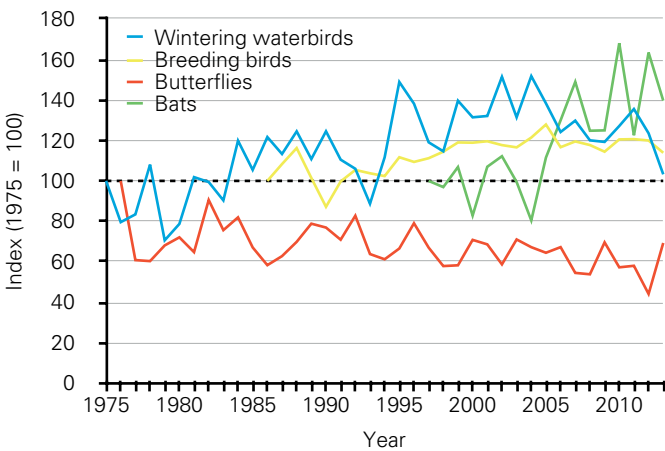
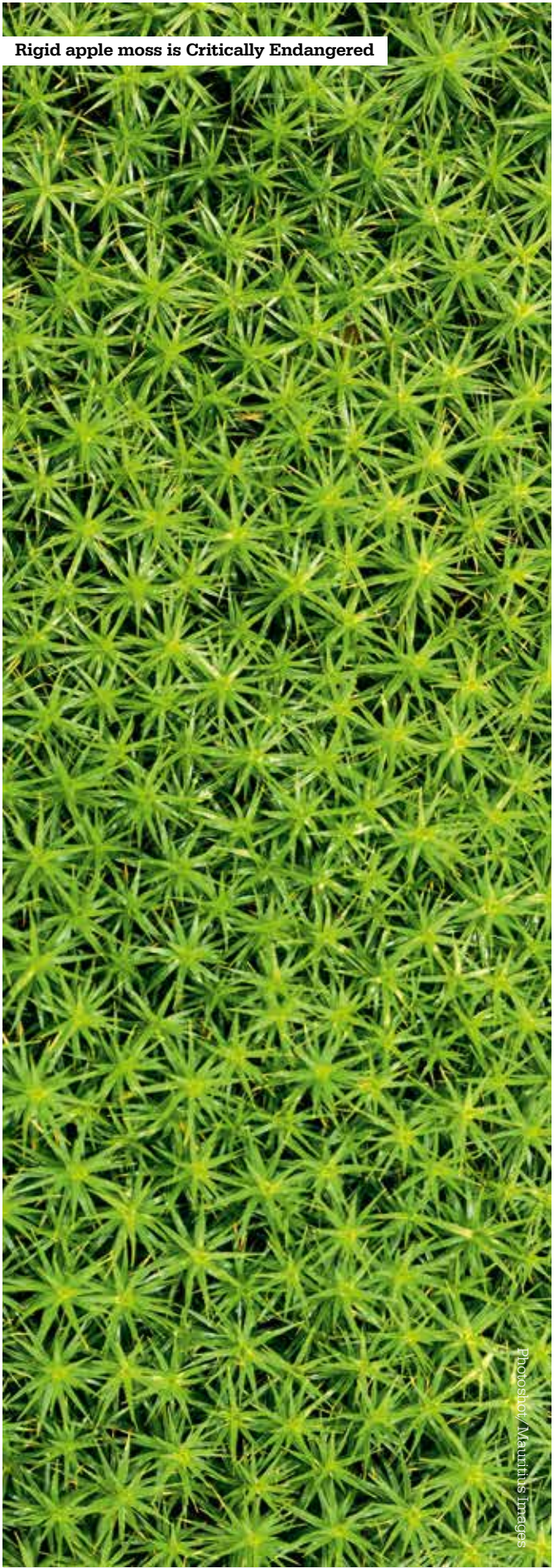


Figure 2
An index of change in the abundance of 30 butterfly species (red) from 1976–2013; 34 wintering waterbird species (blue) from 1975–2013; 52 breeding bird species, including 47 terrestrial species and 5 seabirds (yellow) from 1986–2013; and 6 common bat species (green) from 1997–2013.

- Over the long term, the indicator of butterflies declined by 31%, whereas over the short term it increased by 18%.
- Two indicators are shown for birds. The indicator of breeding birds has increased by 14% since 1986, while the indicator of wintering waterbirds has increased by 3% since 1975.
- The indicator for six common bat species has increased by 40% since 1997 and by 25% since 2002.
- The only other mammal for which suitable data are available is the polecat. polecats have been surveyed twice in Wales over the period of our report and show a 39% increase in abundance between 1994 and 2005⁵.



Welsh Red List analysis

Red Lists attempt to identify species at risk of extinction, using a standardised approach that allows for comparison across species and geographic regions.

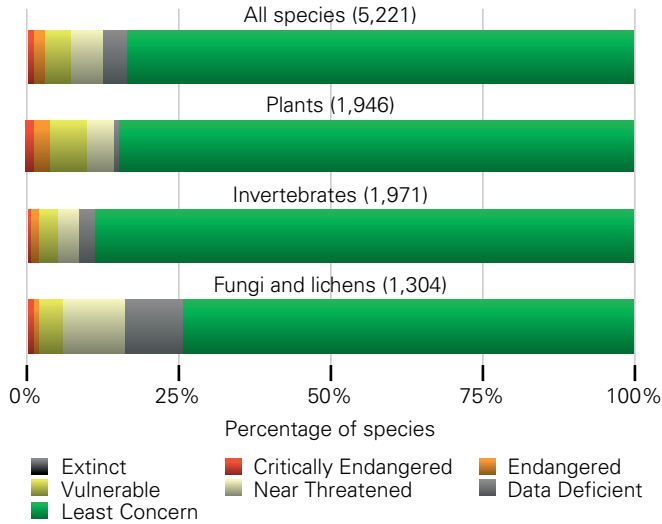


Figure 3
The percentage of species in each risk category, across all species assessed (top bar) and by broad taxonomic group, based on the likelihood of extinction from Great Britain. Species considered threatened with extinction from Great Britain are those classified as Critically Endangered, Endangered or Vulnerable in the latest IUCN Red List assessments.

- Of the 5,221 species in Wales that were assessed using modern Red List criteria, 354 (7%) are thought to be at risk of extinction from Great Britain. This includes 10% of plants, 5% of invertebrates and 6% of fungi and lichens.
- Of those species, 14 (<1%) are known to have gone extinct from Great Britain, including four lichens and three butterfly species.

The recent *Birds of Conservation Concern Wales 3* assessment⁶, which used different criteria from IUCN Red Lists, assessed 213 bird species that occur regularly in Wales. 54 of these species (25%) were red-listed.

The Red List has grown by eight since the last review in 2009, and there are more birds of upland and upland margins on the Red Lists than from any other habitat. Whinchats and merlins are the latest additions.

This assessment highlights the differences between the state of some species in Wales when compared to the UK. For example, golden plovers and choughs are on the Green List at a UK level, but remain on the Red and Amber lists in Wales, respectively.

Summary of UK key findings

Since the first *State of Nature* report was published in 2013, substantial effort has been made to improve our ability to report on how wildlife is faring across Wales and the rest of the UK. Here we present a summary of the UK findings to add further context to the Wales-specific results in the rest of the report. These measures were based on quantitative trends in either abundance or distribution for 3,816 terrestrial and freshwater species over the long term and 3,794 over the short term.

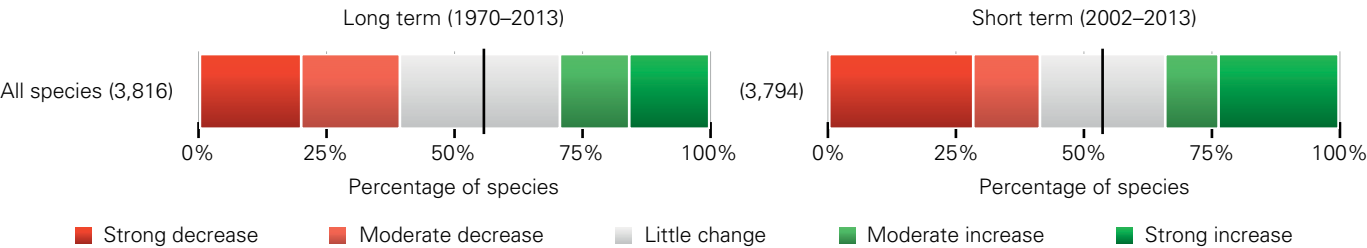


Figure 4
The percentage of species in each trend category across the UK over the long term and the short term. The line in the “little change” category shows the division between declining species on the left, and increasing species on the right. The values in brackets show the number of species assessed.

- Over the long term, 56% of species declined and 44% increased. Among these, 40% showed strong or moderate declines, 31% showed little change, and 29% showed strong or moderate increases.
- Over the short term, 53% of species declined and 47% increased. Among these, 41% showed strong or moderate declines, 25% showed little change, and 34% showed strong or moderate increases.

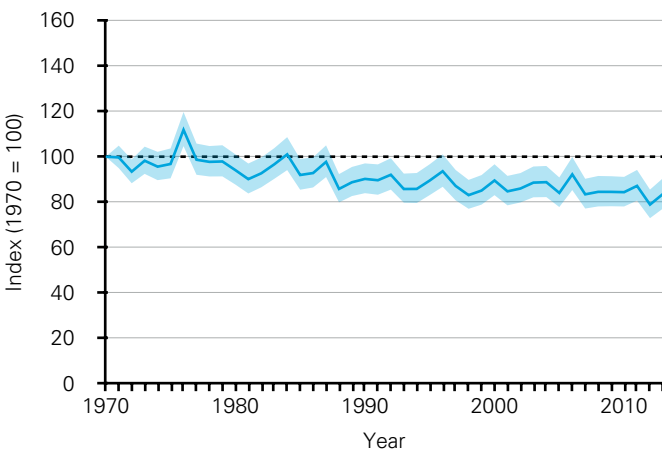


Figure 5
The Abundance and Occupancy Index shows the change in the status of 2,501 terrestrial and freshwater species, based on abundance data (899 species) and occupancy data (1,602 species).

- The Abundance and Occupancy Index has fallen by 0.4% each year, on average, over our long-term period, resulting in a 16% decline in total. Over our short-term period, the decline was 0.18% per year, and 3% in total. There was no significant difference in the rate of change over the two periods.

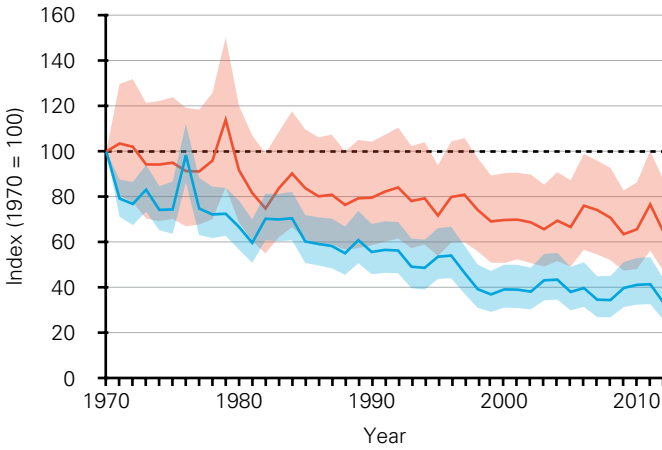


Figure 6
The UK Priority Species Indicator shows the Abundance Index (blue) for 213 priority species, and the Occupancy Index (red) for 111 priority species⁷. The shaded areas show 95% confidence intervals.

- The official UK Priority Species Indicator⁷ reports on the trends in the UK’s highest conservation priorities. The indicator has two measures, one of abundance, the other of occupancy: since 1970 they have fallen by 67% and 35% respectively.
- Over our short-term period, the indicator of average abundance fell by 12%. Over the same short-term period, the indicator of occupancy fell by 6%.

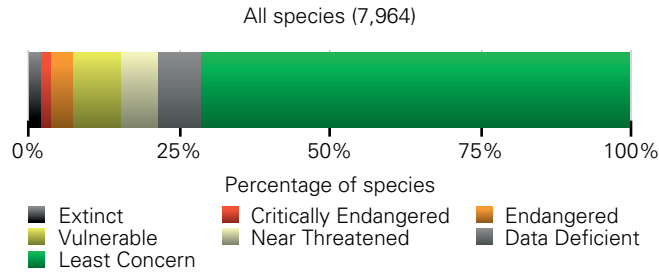


Figure 7
The percentage of species in each category, based on the likelihood of extinction from Great Britain. Species considered threatened with extinction from Great Britain are those classified as Critically Endangered, Endangered or Vulnerable in the latest IUCN Red List assessments.

- Of the nearly 8,000 species assessed using modern Red List criteria, 15% are extinct or threatened with extinction from Great Britain.

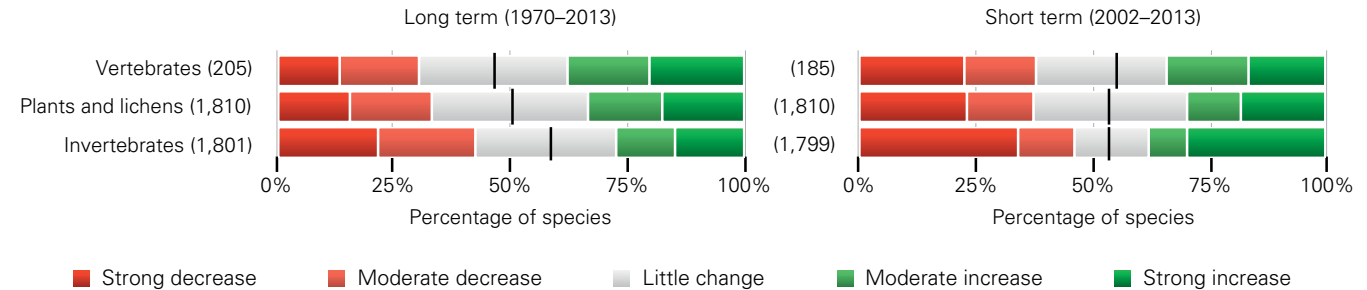


Figure 8
The percentage of species in each trend category over the long and the short term. The line in the “little change” category shows the division between declining species on the left and increasing species on the right. The values in brackets show the number of species assessed.

- Over the long term, 47% of vertebrate species declined and 53% increased. Among these, 31% showed strong or moderate declines, 31% showed little change, and 38% showed strong or moderate increases. 55% of species declined and 45% increased over the short term.
- 50% of plant and lichen species declined and 50% increased over the long term. Among these, 30% showed strong or moderate declines, 36% showed little change, and 34% showed strong or moderate increases. Over the short term, 53% of species declined and 47% increased.
- Over the long term, 59% of invertebrate species declined and 41% increased. Among these, 42% showed strong or moderate declines, 31% showed little change, and 27% showed strong or moderate increases. 54% of species declined and 46% increased over the short term.

Trends in the abundance and distribution of marine species by broad taxonomic group (not pictured)

- 34% of marine vertebrate species declined and 66% increased over the long term. Among these, 28% showed strong or moderate declines, 14% showed little change, and 58% showed strong or moderate increases. Over the short term, 46% of species declined and 54% increased.
- Over the long term, 38% of marine plant species declined and 62% increased. Among these, 6% showed strong or moderate declines, 69% showed little change, and 25% showed strong or moderate increases. 31% of species declined and 69% increased over the short term.
- 75% of marine invertebrate species declined and 25% increased over the long term. Among these, 38% showed strong or moderate declines, 49% showed little change, and 13% showed strong or moderate increases. Over the short term, 50% of species declined and 50% increased.

The state of Welsh priority species

The Environment (Wales) Act 2016 created new biodiversity duties, linked to a new overarching framework for the “sustainable management of natural resources”. Public bodies are required to plan, report on and review the actions they take for biodiversity and seek to “maintain and enhance biodiversity, and in so doing promote the resilience of ecosystems”. In complying with this, they must consider evidence and priorities, including the list of priority species and habitats published by Welsh Ministers (under section 7 of the Environment Act, which replaces section 42 of the Natural Environment and Rural Communities Act).

The UK Priority Species Indicator (Figure 6) shows that the abundance and occupancy of UK priority species declined by 67% and 35% respectively, between 1970 and 2013.

Here we present a “rapid review” assessment of the status of Welsh priority species in 2016, compared to 2007 when the priority list was drawn up. This review looked at changes based on available evidence, published data and expert opinion. Species were categorised as:

- **Declining:** where evidence demonstrates, or expert opinion concludes, a continued decline.
- **Little change/stable:** where evidence indicates that a species’ status is stable, or there is no evidence to demonstrate a change, or where there has been no change in the amount or quality of habitat available for that species.
- **Outlook improved:** when evidence demonstrates, or expert opinion concludes, improvement in a species’ conservation prospects.

Where a species occurs in Wales and in the UK, UK-level evidence was considered in cases where there was no reason to suggest any difference from the species’ status in Wales. Further details of this assessment are available at biodiversitywales.org.uk/Species-Expert-Group

575 species feature on the list of Welsh priority species, and 249 (43%) of them were assessed. The broad species groups in this summary include: 67 terrestrial invertebrates, 78 vertebrates, 55 fungi and lichens and 49 bryophytes (non-vascular plants). Vascular plant species were still being assessed when this report went to print. Marine species were not assessed in this process.

- Overall, **33%** of the priority species assessed are classified as **declining** over the last decade.
- **43%** of the species assessed were classified as **stable/little change**.

- For **24%** of the species assessed, the outlook was considered to have **improved**.

Looking in more detail at broad taxonomic groups:

- Of the 104 invertebrate species listed as priorities, 67 were assessed. **21% of these were declining**, the outlook was **improving for 25%**, and the remaining **54% showed little change** in their status.
- 83 vertebrate species appear on the list of priority species and we assessed 78 of them. **37% of these were declining** and the outlook was **improving for 21%**. The remaining **42% showed little change** in their status.
- Of the 87 fungi and lichens listed as priorities, 55 were assessed. **29% of these were declining**, the outlook was **improving for 27%** and the remaining **44% showed little change** in their status.
- 52 bryophytes feature on the priority species list and we assessed 49 of them. **47% of these were declining**, the outlook was **improving for 24%** and the remaining **29% showed little change** in their status.



The outlook is improving for the Welsh clearwing moth

Patterns of change in Welsh nature

In addition to the measures of population change presented in this report, we can draw on a range of other sources of information, in particular those that have mapped the distribution of species, to tell us how nature has changed in Wales.

The *Bird Atlas 2007–11*⁸ collected over 19 million records of 502 bird species in Britain and Ireland. The maps generated from this data can be compared with those from previous atlases in 1968–72⁹ and 1988–91¹⁰, allowing us to see whether species’ ranges have expanded, contracted or shifted over the intervening periods.

In Wales, breeding species were split fairly evenly between those expanding, stable or contracting. Unsurprisingly, species of conservation concern have fared poorly; of the 12 woodland birds listed as conservation priorities¹¹, eight have declined in range since the first breeding bird atlas. The ranges of two of these birds – the willow tit and lesser spotted woodpecker – declined by over a quarter.

The ranges of farmland birds have also contracted; those of grey partridges, yellow wagtails, tree sparrows and turtle doves have more than halved, with turtle doves no longer breeding regularly in Wales. Similarly, the breeding ranges of curlews, golden plovers, ring ouzels, red grouse and black grouse have contracted in the Welsh uplands.

Extinctions

The ultimate measure of our impact on nature is the extinction of species; Wales has lost 86 species of plants (including flowering plants, mosses, liverworts and lichens) since the 17th century. Patterns of loss vary across Wales; in the east, a species has been lost every 1–4 years compared with every 5–7 years in the west¹². This pattern is also reflected in other taxonomic groups, with birds like corn buntings, nightingales and turtle doves once predominantly found in the east of Wales, now slipping towards officially being declared extinct in the country.

Recoveries

On the opposite end of the scale, the ranges of a number of species have recovered in the last 20 years, following declines in the longer term. The *Bird Atlas* illustrates recoveries in species such as the coal tit and nightjar, and Welsh bats appear to be faring well. The National Bat Monitoring Programme¹³ provides trends for seven of Wales’ 12 species of bat; all appear to be stable or increasing, although these positive results should be considered in the context of severe declines previously, particularly in the second half of the 20th century.

Pressures and threats

Across the UK, the net loss of biodiversity described in the first *State of Nature* report appears to be ongoing, with no statistically significant difference between our long and short-term measures. Despite some success in Wales, such as the recovery of otters and red kites, the loss of biodiversity and the declines in the favourable conservation status of many habitats, species and designated sites is continuing, even though Welsh, UK and international legislation and policies to combat this are in place.

For example, we have seen the near disappearance of water voles; curlews have declined across their range in Wales; and golden plovers have been lost from a number of areas. Alongside these larger and more noticeable species, declines of invertebrates and lower plants are less well recognised.

The continued loss of habitats and declines of species are a result of persistent and in some cases intensifying pressures. A number of global pressures outlined by the third UN Global Biodiversity Outlook¹⁴ are important in Wales:

- **Habitat loss and degradation, such as the loss of blanket bog;**
- **Fragmentation and isolation of habitats for many reasons, such as inappropriate development;**
- **Human population increases;**
- **Climate change;**
- **Excessive nutrient input and other forms of pollution;**
- **Over-exploitation and unsustainable use, including agricultural pressures;**
- **Invasive alien species, for example rhododendron in Snowdonia.**

Where upland moorlands are severely degraded, or where large tracts of eroding peat are exposed, soil carbon is already being washed or evaporated out. In these areas, the growth of Sphagnum moss has been suppressed and heather plants have largely disappeared or are very stunted. This has climate change implications; a 1% loss of soil carbon per year could increase net Welsh carbon emissions by 10%¹⁵.

It is essential that we take urgent action to reverse the decline in nature and achieve our national and international commitments to halt biodiversity loss. These include the current targets set under the Convention on Biological Diversity (the Aichi targets)¹⁶. Wales has recently introduced important legislation that captures this commitment as part of a public sector duty to deliver sustainable development. One of the seven goals set out in the Well-being of Future Generations (Wales) Act 2015 is for “a resilient Wales: a nation that maintains and enhances a biodiverse natural environment with healthy, functioning ecosystems that support social, economic and ecological resilience and the capacity to adapt to change (for example climate change)”.

Conservation work is helping green-winged orchids



David J Slater (ispb-images.com)

How are we helping nature in Wales?

This report highlights the pressures acting on Welsh wildlife. It showcases projects across the country that are working to address these pressures through a range of approaches, including species recovery programmes, landscape-scale partnerships and enhanced community involvement. We also highlight the positive action being taken in partnership to find sustainable solutions to the many problems facing our wildlife.

Protecting the best places for nature is a key part of our conservation response, and designated sites, such as Special Protection Areas, cover 12% of Wales. However, this total falls short of the global target of at least 17% of land area managed for nature¹⁷. It is also important to note that a protected area designation does not ensure that a site is safe from pressures, or that it is managed effectively.

Habitats that receive protection and positive management through the reserve network include substantial areas of broadleaved woodland, heathland, grassland, and marine and coastal habitats. In addition to the species featured here in our case studies, other key target species that benefit from conservation in Wales include the puffin, Manx shearwater, pied flycatcher, grizzled skipper, harvest mouse, dormouse, lesser horseshoe bat, otter, water vole, golden hair lichen, globeflower, greater butterfly orchid and green winged orchid.

We have chosen to showcase projects that feature most of Wales’ key habitats. However, they reflect only a sample of the ongoing conservation work across Wales. The projects demonstrate just how effective conservation can be when targeted correctly, but also highlight the problems we must tackle given the scale of the threats facing nature and the limited resources available for conservation action.

Helping species to recover

There are times when a species has suffered such a catastrophic decline that the only option remaining is targeted, species-focused action to return it to its former range. Many questions must be considered beforehand, not least assessing why and how a species became locally extinct in the first place, and ensuring that those threats are no longer prevalent¹⁸. This sort of positive decision not only secures or restores a species’ range, but it can reactivate beneficial land management in an area, raise awareness about conservation issues, and include the local community in a unique nature experience.

Case study

Returning pine martens to Wales

Pine martens became extinct in much of England and Wales by the early 20th century, as a result of woodland clearance and persecution on game estates and farms¹⁹. Scattered records have been reported over the past century, but no natural recovery occurred²⁰. However, there is reason for optimism that persecution pressures have been reduced significantly²¹, habitat loss has been halted and there are sufficient protected areas to allow the species to survive here once again.

Meanwhile, the Scottish population has been faring well^{22,23}, and numbers have increased sufficiently to provide a source population for a release in Wales.

Consequently, the Vincent Wildlife Trust (VWT) felt that the time was right for the first native carnivore release in the UK²⁴. Working with several partners and funders, VWT released 20 animals at carefully selected sites during the autumn of 2015, with plans to release a further 20 animals in 2016. The hope is that these 40 pine martens will not only create a self-sustaining population in the immediate area, but that over time their numbers will increase sufficiently to spread to other forests in Wales and across the border into England.

Such a high-profile project will help to ensure the longevity and protection of

the woodland that will become the pine martens’ home. It is also hoped that boosting a native carnivore population will have wider implications for the ecosystem.

Anecdotal evidence from Ireland suggests that increasing pine marten numbers might be reducing numbers of grey squirrels, to the benefit of our native red squirrels. If bringing back the pine marten helps to restore a wider balance in woodland ecology, the positive outcomes of the project will be much greater than simply benefitting one iconic species.

Nida Al-Fulaij
People’s Trust for Endangered Species



Returning pine martens could help to restore diversity in woodland ecology

Kevin Sawford (ispb-images.com)

Restoring special places for nature at a landscape scale

Species recovery needs good quality habitat and is most effective when this can be provided across numerous sites in a landscape, creating networks of suitable habitat and joining up species' populations. Such restoration work depends on both landowner co-operation and input, and the hard work of volunteers during the lifetime of any funded project and beyond, as we explain in the following examples of landscape-scale conservation.

Case study Conserving fritillaries across landscapes

Following a decline of 88% in Wales over the last 20 years, the pearl-bordered fritillary survives at just 12 sites, mostly in Montgomeryshire. It is threatened by the abandonment of grazing, which can result in denser vegetation, and conversely, by over-grazing by sheep in some areas. Both of these changes lead to a loss of plant diversity; this includes violets, which pearl-bordered fritillary larvae feed on, and other flowering plants, which the adults rely on²⁵.

Thanks to a partnership project by Montgomeryshire Wildlife Trust, Butterfly Conservation and Natural Resources Wales (NRW), the future is looking brighter for the pearl-bordered fritillary. Habitat has been carefully managed at key sites, and from 2009 to 2011, adult butterflies and pupae were released at Llanymynech Rocks nature reserve.

Monitoring shows a positive long-term trend for the pearl-bordered fritillary in Wales, demonstrating how successful the management has been. However, this population trajectory is extremely fragile, as the condition of the remaining fritillary sites will deteriorate rapidly if management is not sustained.

Another butterfly that has undergone dramatic declines is the marsh fritillary. Between 1976 and 2014 it declined by 79% in the UK²⁶, and it has become extinct over a large part of its former range in England, Wales and Northern Ireland. This butterfly is typically associated with extensive grazing by cattle and ponies, which creates the varied sward required for breeding²⁷. A project is underway to bring back beneficial grazing on a neglected area of hillside at Seven Sisters in south Wales.

Butterfly Conservation is working with Neath Port Talbot, NRW and landowners to create habitat links between the marsh fritillary populations, and over 100 hectares of land are now being grazed sympathetically for the butterfly.

Marsh fritillaries have colonised new land, and local communities can now see what was perceived as waste ground being put to good use again.

Tammy Stretton
Montgomeryshire Wildlife Trust

Russell Hobson
Butterfly Conservation

Richard Smith
Butterfly Conservation
South Wales branch



Sites must be carefully managed to cater for all the needs of fritillary butterflies

Pearl-bordered fritillary



Phil Corley (Butterfly Conservation)

Reversing environmental damage

As well as habitat restoration across the lowland landscape, the Welsh uplands are in need of conservation attention. Large-scale projects to restore peatlands are underway in several upland river catchments, and much of the work involves undoing misguided efforts to “improve” drainage from earlier decades. Very simple actions can be implemented on a broad scale and show results quickly, as we explain here.

Case study

Restoring precious blanket bog

The Migneint-Arenig-Dduallt (Migneint) Special Area of Conservation covers 5,300 hectares (ha) of Snowdonia and makes up roughly 10% of the total area of blanket bog in Wales. Much of the Migneint’s blanket bog is nationally important sub-montane heather and hare’s-tail cottongrass bog, and is found within the National Trust’s 8,000-ha Ysbyty Ifan Estate.

Between the 1930s and 1970s, drainage ditches were dug all over the blanket bog in an attempt to increase farming productivity. However, the anticipated gains did not materialise as the drains had only a very local effect on the water table. They also gradually became deeper and sheep got trapped in them, often dying as a result.

In addition, the ditches had a dramatic effect on peat, which is the product of dead vegetation that is unable to decompose due to the absence of oxygen in the wet, acidic conditions of the bog. The drainage

ditches dried the bog surface out, exposing the peat to oxygen and allowing it to decompose. This released large quantities of carbon into water as dissolved organic carbon, and into the atmosphere, contributing to climate change²⁸.

Through collaborative projects funded by EU LIFE and the Welsh Government’s Ecosystem Resilience Fund, a huge amount of work has gone into blocking the drainage ditches. With the support of local farmers over a period of five years, thousands of dams were built to block over 400km of ditches. At one stage, eight 12-tonne diggers were creating a series of small dams every few metres, carefully lifting vegetation to one side and replacing it once the ground had been profiled.

Ditch blocking had an instant effect – water levels rose and peat loss was slowed – and the bog is recovering well. Within three years there has been a wonderful growth of bog mosses behind the peat dams, creating the right conditions for

the deposition of new peat. Not only is this good news for the blanket bog and the wildlife that lives there, it’s good news for people too; healthy blanket bogs mitigate against climate change and help to alleviate flooding.

From the farmers’ point of view, ditch blocking has resulted in an improvement in grazing, with more grasses, sedges and rushes becoming established. Leggy heather is also less dominant, which reduces the risk of damaging wildfires, and sheep are able to move safely through the bog without getting trapped.

Anecdotal evidence suggests that flooding of lower-lying land has declined, and water quality has also improved. One of the local farmers reported that the river water is much clearer these days: he can see the stones at the bottom of the river beneath the bridge in Ysbyty Ifan, something that had never been possible before.

Dewi Davies, National Trust



Richard Chellis (Alamy Stock Photo)

Drainage ditches have been blocked in the Migneint area, helping to restore the blanket bog

Restoring dynamic coastal habitats

Coastal habitats are dynamic and experience extreme pressure from humans. For example, dune systems are a constantly changing environment, with areas of shifting sand, but also they include more consolidated habitats such as grassland and wetlands. Human influence can result in stabilisation, making those species that depend on the ephemeral grassland very vulnerable. The pressure of human use can also be very high, especially near to coastal towns. Plantlife has started a project in South Wales to restore some of these ephemeral dune habitats. Their approach employs big, earth-moving interventions, and is proving effective.

Case study

Turning back the clock at Kenfig

Kenfig is one of the last remnants of the huge dune systems that once stretched along the coast of southern Wales from the River Ogmore to the Gower Peninsula. The large expanse of sand dunes at Kenfig leads down the coast to Sker Point, with views across Swansea Bay to the Gower.

Its special features include extensive sand dune habitats and standing waters, with a mixture of associated coastal habitats, such as saltmarsh, intertidal areas, swamp, woodland and scrub. These support a variety of plants and fungi, including about half of the UK’s fen orchid population, as well as important populations of petalwort and sea stock.

Among the many other beautiful wild flowers to be found at Kenfig, there

are pyramidal, bee, early purple, early marsh and common spotted orchids, broad-leaved helleborine and large colonies of marsh helleborine.


In partnership with Natural Resources Wales and Bridgend County Borough Council, Plantlife is turning back the clock to restore an area of these dunes to the state many will remember from their childhood: shifting hills of golden sands and wispy marram grass, where pioneer species like petalwort can find a niche that has been lost for so long.

Following topographical and hydrological surveys, areas were selected for destabilisation. This involved using heavy machinery to break down the “crust” of fixed grassland and create open areas

of sand and new scrapes (damp hollows) amongst the dunes, where the water table is close to the surface. The fen orchid is already responding well – it is up from 44 to 396 plants in just two years. Our volunteers will continue to monitor the impact of the projects.

This simple and cost-effective work has now been extended to rejuvenate dunes in Carmarthern Bay, which is home to nearly 20% of Wales’ sand dunes.

Colin Cheesman
Plantlife



Scott Hand (Countryside Council for Wales)

Dune restoration requires management on a large scale

Protecting our spectacular sealife

The seas around Wales support amazing wildlife, from anemones and sponges, to dolphins and basking sharks. But they face pressures from human activities, including commercial fishing, pollution and development, such as for the renewable energy industry²⁹. The Welsh islands are famed for their seabird colonies, but are equally important for the grey seal, a species found on both sides of the Atlantic, but for which the British Isles has a global responsibility. The RSPB monitors populations in order to detect any changes in trends and animal behaviour.

Case study

Monitoring the grey seals of Ramsey Island

The grey seal is one of the many marine species studied by RSPB reserve staff and visiting researchers on Ramsey Island each year. Approximately 4% of the UK population of Atlantic grey seals breed in Wales and most of these are found in Pembrokeshire. A third of all the pups born in Pembrokeshire each year are born on Ramsey, so it's an important site for their conservation.

The number of pups born on Ramsey, and in Pembrokeshire as a whole, has increased substantially over the last 25 years. Similarly, the grey seal population across the UK has recovered since seals were first afforded legal protection in 1914 and hunting during the breeding season was banned in the 1970s³⁰.

As well as breeding on the island, large numbers of seals use Ramsey's beaches as a refuge during their annual post-breeding moult. In excess of 300 individuals can be seen hauled-out on these pebble beaches over winter. Ramsey is a Site of Special Scientific Interest (SSSI) and lies within the Pembrokeshire Marine Special Area of Conservation, and the grey seal is a qualifying feature for both designations.

Monitoring has been carried out by the RSPB's resident wardens for 25 years³¹, and in 2015 the estimated number of pups born topped 750 for the first time. Cliff-top monitoring of the main rookeries (breeding areas) is carried out every third day between August and November, and involves counting and ageing pups, allowing long-term changes in breeding phenology to be investigated³². Photographing breeding females has allowed researchers to recognise and identify the same cows each year, providing information on site fidelity



Ramsey Island is a key breeding site for grey seals

and the movement of animals outside of the breeding season.

Our marine mammals continue to face numerous threats in an over-exploited and increasingly pressurised marine environment; entanglement in marine litter and fishing nets are potentially lethal risks faced by seals in the Irish Sea³³. Ramsey Sound is also a trial site for tidal turbine technology and the potential impacts on resident marine life are as yet unknown. Monitoring seabirds, cetaceans and seals in the vicinity will allow us to respond in the unlikely event that any issues arise.

The waters around Ramsey are popular for eco-tourism boat trips and the creation and ongoing development of a marine code of conduct for all water users³⁴ is a major achievement. Adherence to this voluntary code is essential to avoid disturbance to seals and cetaceans in west Wales. The continuation of Ramsey's long running seal survey is a priority if we are to ensure Ramsey remains a sanctuary for grey seals in the future.

Lisa Morgan
RSPB Ramsey Island warden

Managing the exploitation of natural resources

Commercial fishing is not only a pressure on our marine species; it also affects the European eel, a fish that spends part of its life at sea, but also a key part of it in our rivers and a range of other wetland habitats. Despite declines in its population, it is still fished commercially and the reasons for its decline are not fully understood. The solution to this problem is still unclear, but increasing our understanding of the requirements of eels at different stages of their life cycle, and tackling commercial exploitation, may be key to the survival of this species.

Case study

A slippery slope: tackling the decline of the European eel

The latest global IUCN Red List assessment lists the European eel as being Critically Endangered. The number of adult eels leaving rivers has declined by 50–60% over the last 45 years³⁵, while glass eels (an early life stage) have declined by up to 95% over the same period. The population of eels has failed to recover and remains at a historic low.

Due to their complex lifestyle, eels are exposed to a range of natural and human pressures. Key issues are thought to include barriers and obstacles affecting the migration of young eels into freshwater habitats and the movements of silver eels back to the sea to breed; damage from water abstraction and hydro-schemes; wetland habitat loss and degradation; over-fishing; and the impacts of climate change³⁵.

In 2012, the Environment Agency reported that the anthropogenic effect of commercial fisheries is far greater than


previously thought or acknowledged, although this is not accepted by all. A more sustainable approach to commercial eel fisheries could play a major part in combating illegal exports of all life stages of the eel, and there is a range of organisations and partnerships working across Europe to achieve sustainable levels of eel fishing, with the aim of ensuring population recovery.

The UK's main glass eel fishery is based in the Severn River Basin District³⁶ and remains a major cause for concern; it is difficult to know how many silver eels leave this catchment, as systematic data are not collected³⁷. There are concerns that the River Severn glass eel fishery continues to be used as the basis for aquaculture and re-stocking in the UK and across Europe, without consideration for the numbers left to mature in the catchment. The view that the glass eel resource needs to be "shared around" could have a negative impact on the

ecosystem and ecosystem services of the Severn itself – particularly removing glass eels and elvers (the next life stage) from the river system at the edge of or even beyond the tidal range.

Since 2013, far more glass eels and elvers have been re-stocked in the Severn than was previously the case. However, current approaches still tend to view the eel as a commercial species rather than a keystone species in complex aquatic ecosystems, and this issue needs to be taken very seriously. In the last few years, elvers have been re-stocked at Llangorse Lake and other locations in the upper Wye and Severn catchments, although the effect this will have on the long-term success of the species and its role in the aquatic environment of Wales is not yet known.

Julian Jones
Radnorshire Wildlife Trust



A sustainable approach to eel fisheries is required at all life stages, from river to sea

The vital role of volunteers in Welsh nature conservation

The species' trends we present at the start of this report are dependent on the volunteer surveyors who participate in monitoring programmes; without them and the data they collect, we would lack the vital evidence that underpins conservation work. Volunteers who help with monitoring on specific habitat restoration projects, with national recording schemes and with on-the-ground management work are all equally important. This is especially so if funding ceases and the efforts of volunteers become necessary to maintain the status quo, let alone achieve further improvements.

Many of the conservation projects already described depend on volunteers, but the following case studies give further detail on the role of volunteers, and how projects can recruit and retain volunteers for the future.

Case study

The role of Local Environmental Records Centres in volunteer surveys and data gathering

In 2007, Wales became the first of the UK's nations to have complete coverage by Local Environmental Records Centres (LERCs). Each of the four centres³⁸ work to collate existing biological data, to encourage volunteers to participate in biological recording and to sustain and support local biological recording communities.

During 2015, the four LERCs formed a consortium – known as Local Environmental Records Centres Wales Limited – to cement the ethos of partnership working, to share best practice and skills, and to provide a simpler means of serving the needs of national partners.

Between them, the four Welsh LERCs now hold over 9 million biological records. A range of ways exist to access these data, including the LERC Wales Data Access Tool³⁹, which allows the public access to non-sensitive local and national species' distribution information. Registered users can gain full access to these data.

Coarse-level data (and full-resolution data on invasive non-native species) are also available via the NBN Gateway. The Welsh LERCs are working with partnerships across Wales to ensure their comprehensive data are fully utilised in a range of national applications, including monitoring schemes and national sustainability indicators. Work is well

underway on the next generation LERC Wales online biodiversity data portal, which will provide a focal point for the delivery of a wide range of products and services.

In addition to collating and providing access to biodiversity data, the Welsh LERCs have a critical role in building and sustaining a community of biological recorders across Wales. Each LERC provides an annual programme of species identification training sessions, which focus on poorly-recorded taxonomic groups or on building capacity to support ongoing surveys.

LERCs also lead and attend a number of field recording days, known as Bioblitzes, each year, and produce newsletters, organise Recorders' Forum events and maintain strong social media interaction to engage with wider audiences.

LERCs provide technical advice to recorders, helping them to manage and share their data, and also provide online data entry portals which have collectively gathered almost 100,000 records in the past two years.

Adam Rowe
South East Wales Biodiversity
Records Centre

Case study

Using people power to monitor bats

We know that bats declined dramatically over the last century and although some species have started to show signs of recovery in recent years, bats still face many threats. Monitoring our bat populations is vitally important to understand how they are faring.

Run by the Bat Conservation Trust (BCT) since 1997, the National Bat Monitoring Programme (NBMP) is the longest running, purpose-built, multi-species monitoring programme for mammals in the UK. Thanks to data collected from field and waterway surveys, hibernation surveys and roost counts at summer maternity roosts, we are able to produce statistically robust bat population trends⁴⁰.

Volunteers are crucial to the success of the NBMP, and the BCT is indebted to all who contribute. In 2014, over 182 volunteers took part in NBMP surveys in Wales, contributing an estimated 6,314 hours of their time, valued at £60,000. To help volunteers develop their skills and ensure surveys are conducted in a standardised way, a network of regional trainers run workshops teaching volunteers surveying techniques.

The first trends for seven different bat species in Wales were produced in 2013⁴¹. Populations of both the Daubenton's bat and greater horseshoe bat have increased in Wales, but stayed relatively stable in England, suggesting that these species are doing better in Wales. Longer-term monitoring and increased survey coverage are needed to give us more robust trends for more species in Wales.

The NBMP is a partnership between the BCT and the Joint Nature Conservation Committee, supported and steered by Natural Resources Wales and other country agencies.

Steve Lucas, Bat Conservation Trust

Water vole surveyor



Nick Dpton (aspb-images.com)

How to interpret this report

We have included this section to help you understand the different measures presented in the *State of Nature 2016* UK and country reports and how they should be interpreted.

WHAT DATA HAVE WE USED FOR WALES?

- We have quantitative assessments of the change in population or distribution in Wales for 1,026 terrestrial and freshwater species. For the UK summary, we present trends in species' abundance and occupancy for 3,816 native terrestrial and freshwater species.
- These trends came from a wide range of sources.
- Details of the datasets behind our analyses, and the species they covered, are given online at rspb.org.uk/stateofnature

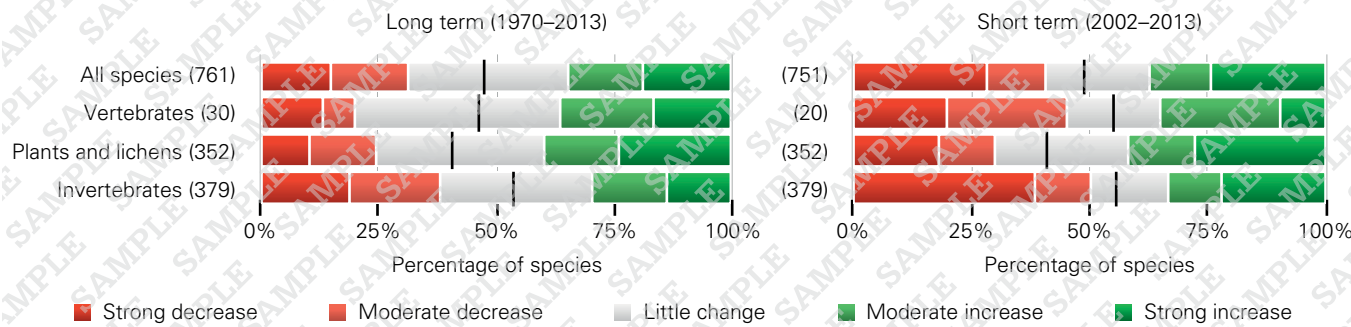
WHAT TIME PERIOD DOES THIS REPORT COVER?

- For Welsh and UK results we show trends in our species from around 1970 to 2013 (our long-term period) and from 2002 to 2013 (our short-term period).

Please note that due to the change in species composition, and in some cases data sources, our measures are not directly comparable with those presented in the first *State of Nature* report.

Categories of change

Each species was placed into one of five trend categories based on annual percentage changes. Due to differing data availability, the species composition of the long and short-term measures varied; in general, we had data for fewer species over the short-term period.



Results reported for each figure include:

- The overall percentage of species that increased and decreased in each time period. The vertical line in the white “little change” segment of the graph shows the division between declining species on the left, and increasing species on the right (this is broadly equivalent to the metric reported for the first *State of Nature* report).
- The percentage of species that showed strong or moderate changes, and those showing little change, in each time period.

Thresholds for assigning species' trends to the five categories are given in the methods section of the UK report, on page 75.

WHAT ARE THE GRAPHS TELLING ME?

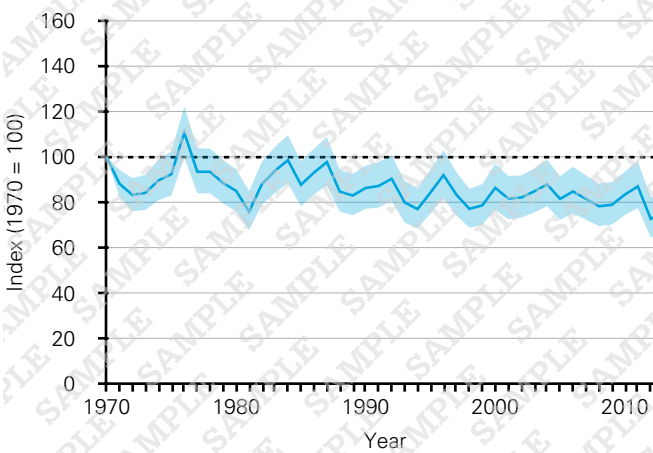
In each section of the report we present the relevant results for Wales or the UK to show the following:

- **Categories of change**
The percentage of species in each trend category.
- **Change over time**
The change in the status of species, based on abundance over the last 50 years in Wales. The UK results show this change based on abundance and occupancy data.
- **Extinction risk**
An assessment for each species occurring in Wales, of the likelihood of extinction in Great Britain.

Further details on how these measures were calculated, and caveats around how they should be interpreted, are given on pages 74–77 of the UK report (available at rspb.org.uk/stateofnature).

Change over time

These graphs combine abundance data (based on a species' population size) across species into geometric mean indicators for taxonomic groups for which data are available. In the case of the UK, the indicator also combines occupancy data (the proportion of 1-km² grid cells occupied by a species). This relies on the assumption that proportional changes in occupancy and distribution are equivalent (for more detail, see page 76 of the UK report).



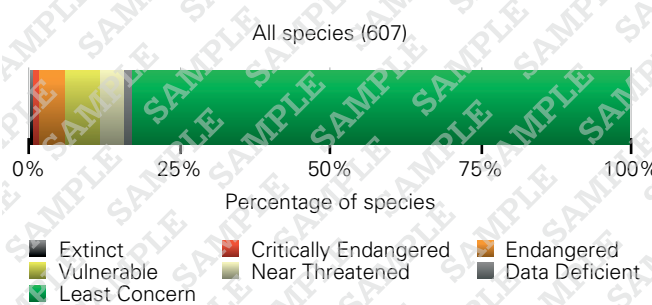
Results reported for each figure include:

- Total percentage change in the indicator over the long term and the short term.
- Annual percentage change over the long term and the short term.
- At the UK level, we assessed change over the period by comparing the rate of change of the indicators between the *prior* (~1970–2002) and *recent* (2002–2013) time series, and report the test statistic (t) and the level of significance (p).

Extinction risk

We summarised the Great Britain Red Lists to present the proportion of species in each threat category overall, and by different taxonomic groups. We interpret existing Great Britain Red Lists, based on those species occurring in Wales and in the UK.

These figures represent the ultimate threat of extinction from Great Britain. While the proportion of species listed as Least Concern is considerable, the number of species that are considered threatened with extinction from Great Britain and Ireland is worthy of note.



Results reported for each figure include:

- The overall percentage of species that occur in Wales, and were assessed, that are regarded as threatened with extinction from Great Britain. This includes species that have been classified as Critically Endangered, Endangered or Vulnerable in the latest IUCN Red List assessments.



Seven-spot ladybird

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Conservationists and scientists from the State of Nature partners and other organisations have provided data, analyses, case studies and guidance, and have given their time to review drafts during the production of *State of Nature 2016: Wales*. In particular, we wish to thank Julie Boswell, Annie Smith, Peter Jones and Elwyn Sharps. We would also like to thank all the photographers for the use of their images.

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Finally, we wish to thank the thousands of dedicated volunteer recorders who collect much of the data upon which our knowledge of the state of nature is based. Many are supporters of the organisations within the State of Nature partnership and contribute to systematic monitoring and recording schemes (for full details of the schemes, please visit rspb.org.uk/stateofnature). Without their efforts, our knowledge of the health of Welsh nature would be just a fraction of what it is. We hope we can continue to work together with these volunteers to improve our knowledge, and thus provide an increasingly robust basis for informing future conservation efforts. Additionally we would like to thank all of the volunteers who are involved in the many conservation projects underway around Wales, which aim to address the issues facing our wildlife. Without them, the challenge would be much greater.

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The State of Nature 2016: Wales report is a collaboration between the conservation and research organisations listed below:

