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A Future for Nature

National Ecological Networks

6 February 2013

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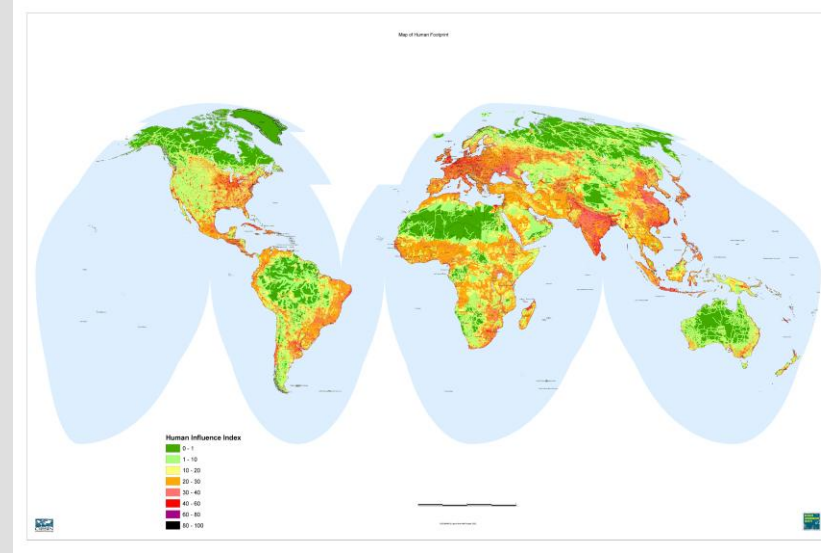


Conservation and the future

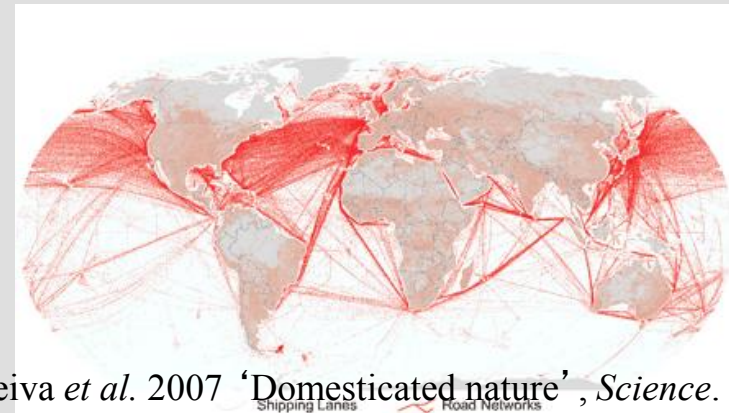
- Conservation is about negotiating the transition from past to future in such a way as to secure the transfer of maximum significance’ (Alan Holland and Kate Rawles 1993 ‘Values in conservation’ *Ecos* 14(1): 14-19)

Threats and Impacts

- over-harvesting, overfishing, agricultural intensification, urbanisation, toxic chemicals, ocean acidification, climate change...
- 5-20% of *c.*14 million plant and animal species on earth are threatened with extinction.
 - UNEP Global Biodiversity Assessment, UNEP 1995.
- 75% habitable earth disturbed by human activity
 - Lee Hanna et al, *Ambio* (1994)



Last of the Wild, Center for International
Earth Science Information Network
(CIESIN), Earth Institute at Columbia
University.



Kareiva et al. 2007 'Domesticated nature', *Science*.

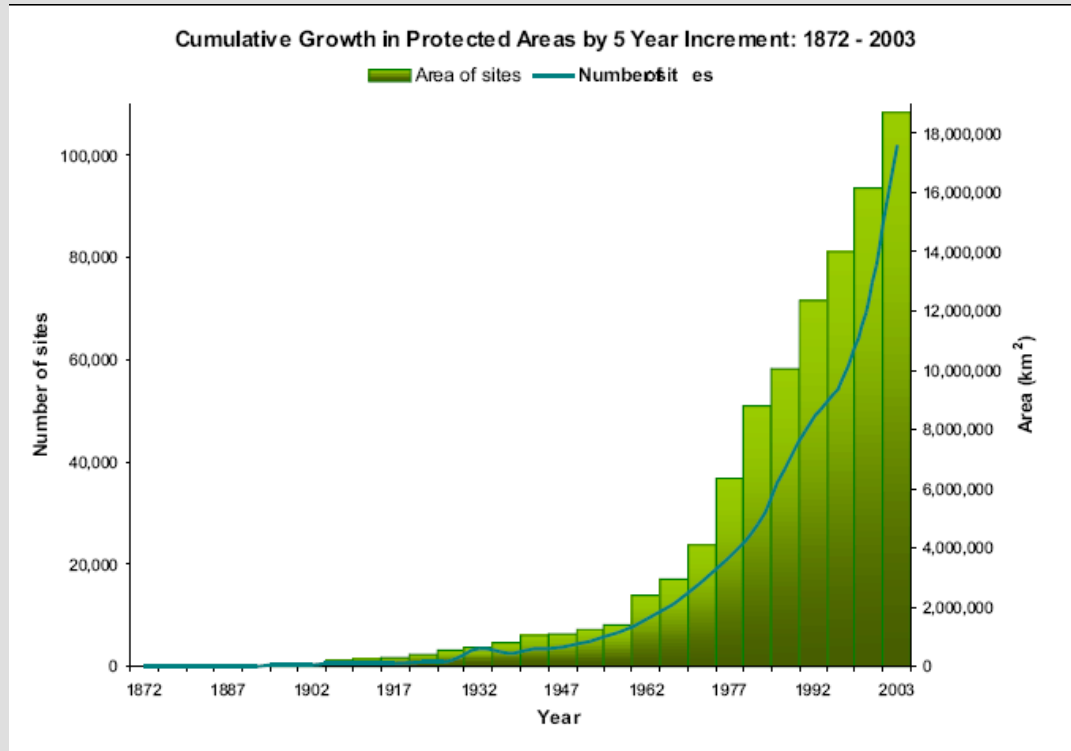
Conservation and the Past

- ‘Like the great libraries of the world, which strive to preserve history’ s written traditions, we struggle against huge forces of destruction and forgetting
 - Jonathan Swift (2002) *The Second Century*, Wildlife Conservation Society, New York



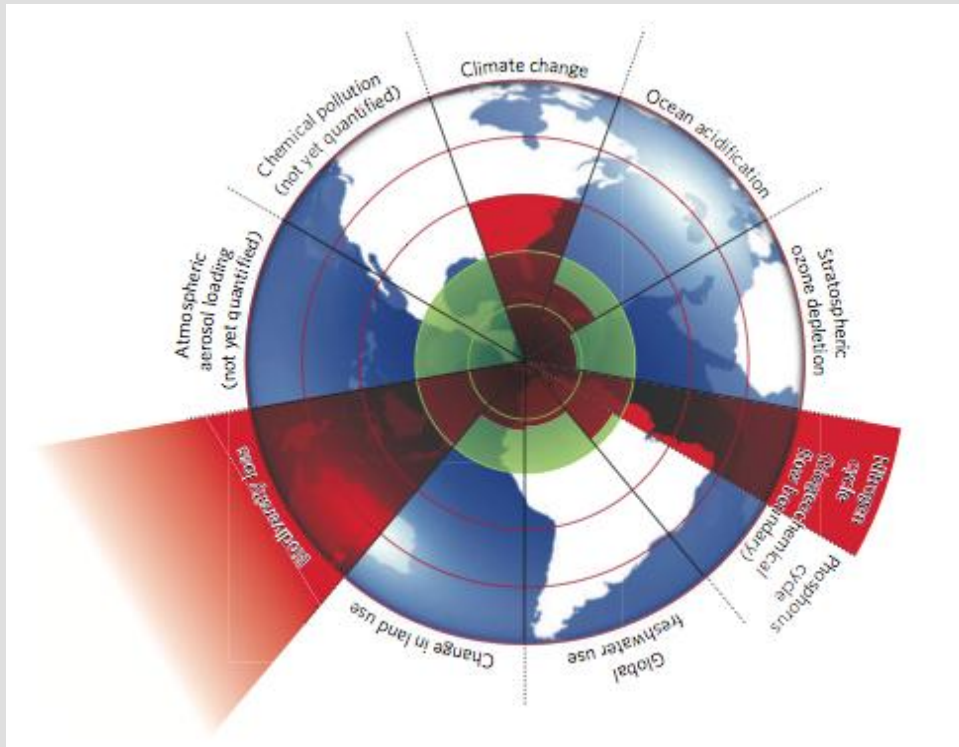
Conservation as separation: Protected Areas

- 2003 UN List: 11.5 %
global land surface





Planetary Boundaries



1. Climate Change
2. Ocean acidification
3. Stratospheric ozone layer
4. Nitrogen and phosphorus cycle
5. Global hydrological cycle
6. Land use change
7. Biodiversity
8. Atmospheric aerosol loading
9. Chemical pollution

- Johan Rockström et al. (2009a) *Nature* 461: 472-5
- Johan Rockström et al. (2009b) *Ecosystems and Society* 14(2)

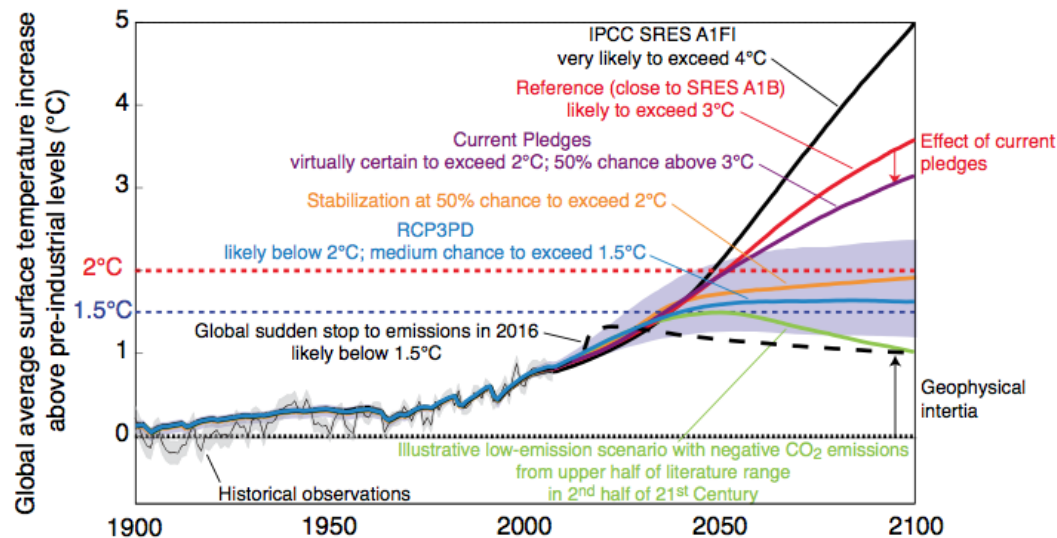
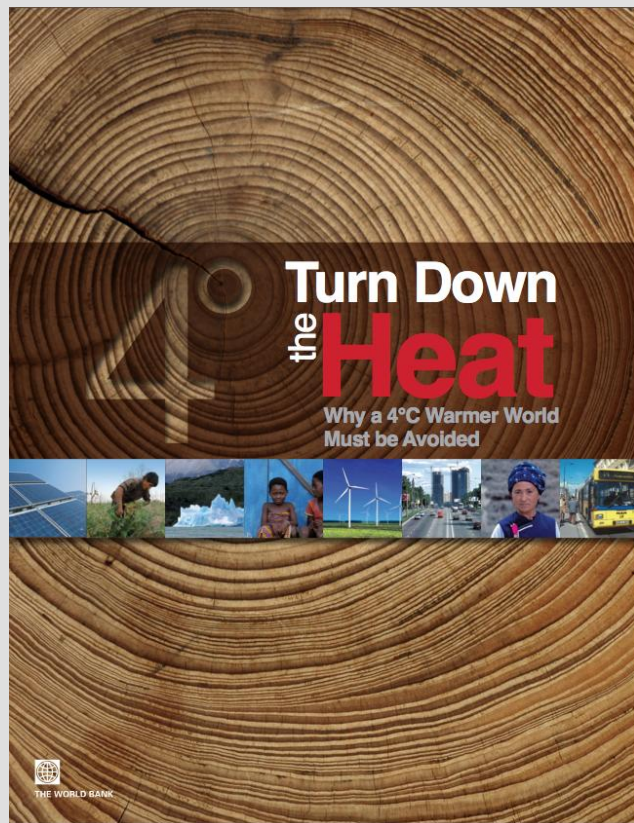
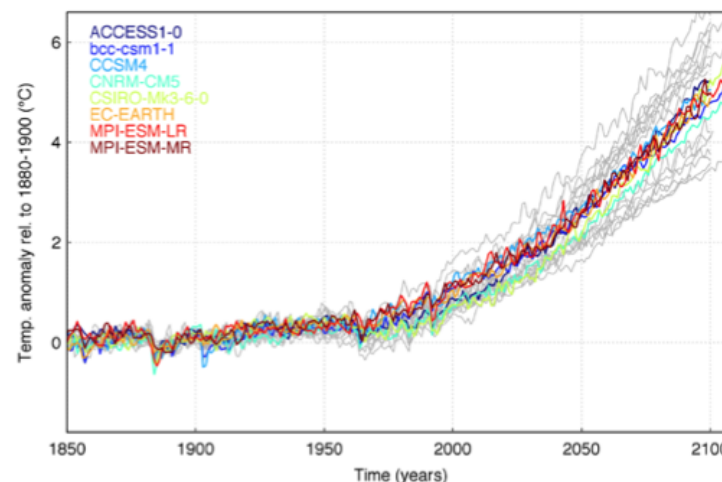


Figure 24: Simulated historic and 21st century global mean temperature anomalies, relative to the preindustrial period (1880–1900), for 24 CMIP5 models based on the RCP8.5 scenario. The colored (and labeled) curves show those simulations reaching a global mean warming of 4°C–5°C warmer than preindustrial for 2080–2100, which are used for further analysis.



4° the Turn Down Heat

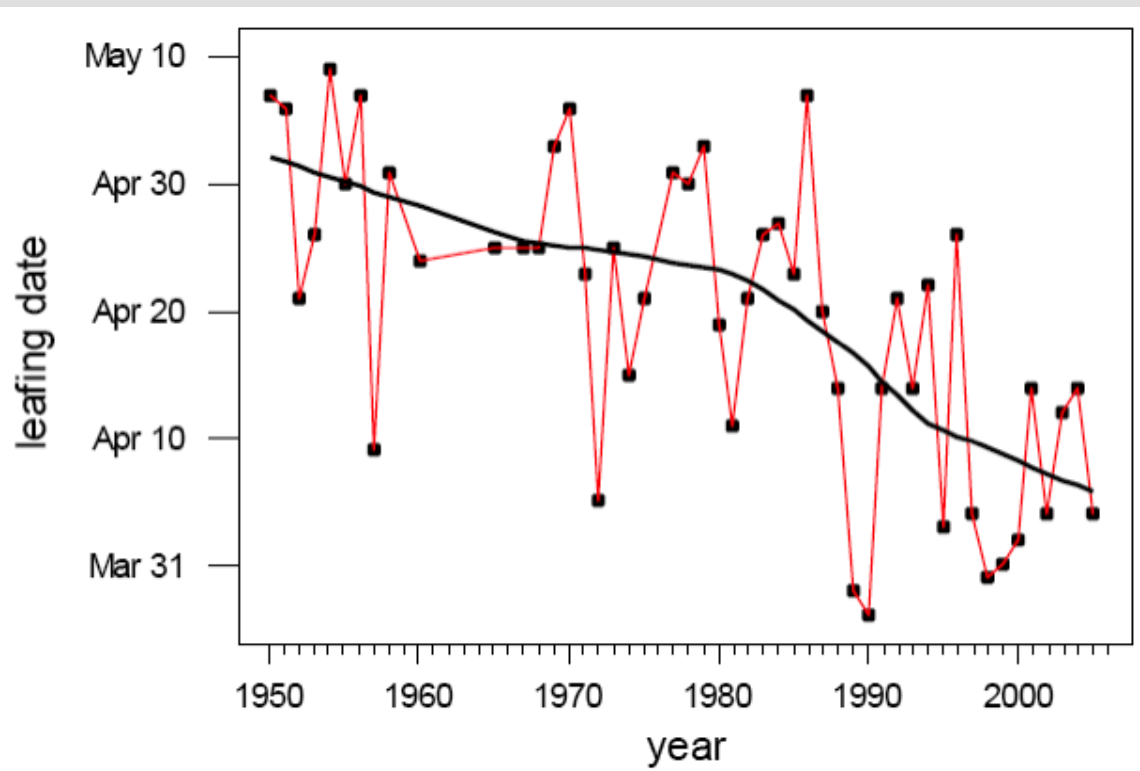
Why a 4°C Warmer World
Must be Avoided

November 2012

A Report for the World Bank
by the Potsdam Institute for
Climate Impact Research and
Climate Analytics

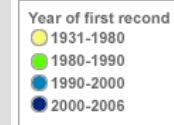
Indicators of climate change in UK

Natural History Museum

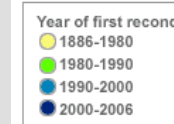


Oak leafing date Surrey 1950-2005 (UK
Phenology Network, CEH Monkswood)

CRICKET AND CLIMATE CHANGE MAPS
Spread of the long-winged conehead cricket since 1930



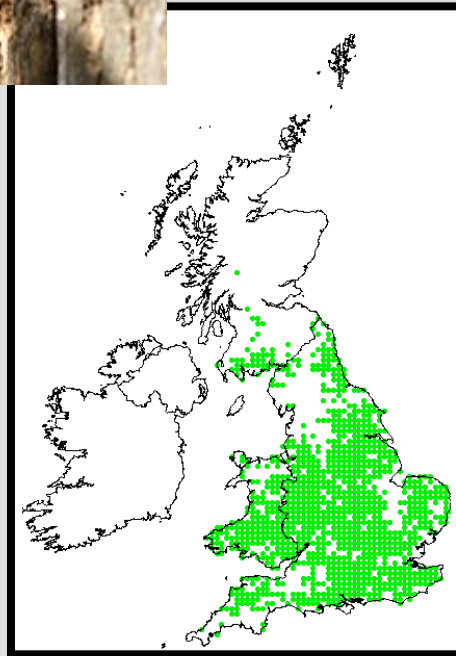
Spread of Roesel's bush cricket since 1930



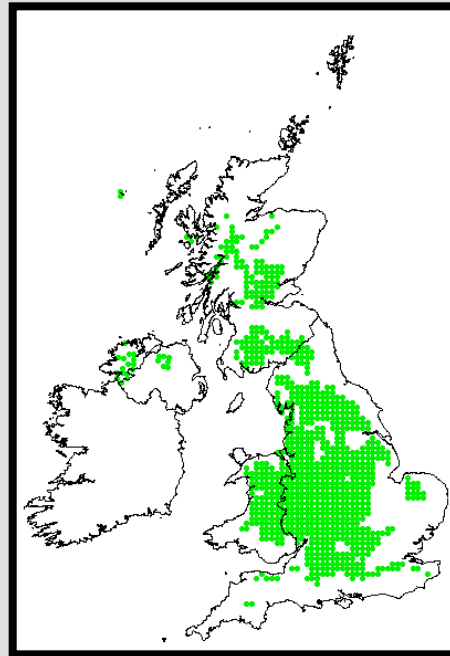
Centre for Ecology and Hydrology

SOURCE: Biological Records Centre

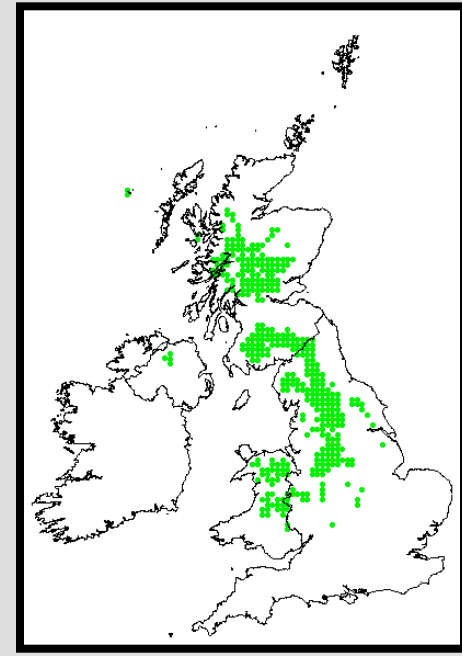
Future Distribution Change: Willow tit (*Parus montanus*)



Distribution
today



2020 under high
emissions



2050 under high
emissions

Source: The Monarch Project

<http://www.eci.ox.ac.uk/research/biodiversity/monarch.php>

Protected Areas?

- Protected areas are geographically fixed and increasingly isolated by habitat destruction, and are therefore poorly suited to accommodating range shifts due to climate change'
 - Hannah, L *et al.* (2007) *Frontiers in Ecology and Environment* 5: 131-138 (p. 131)



Conservation Landscapes

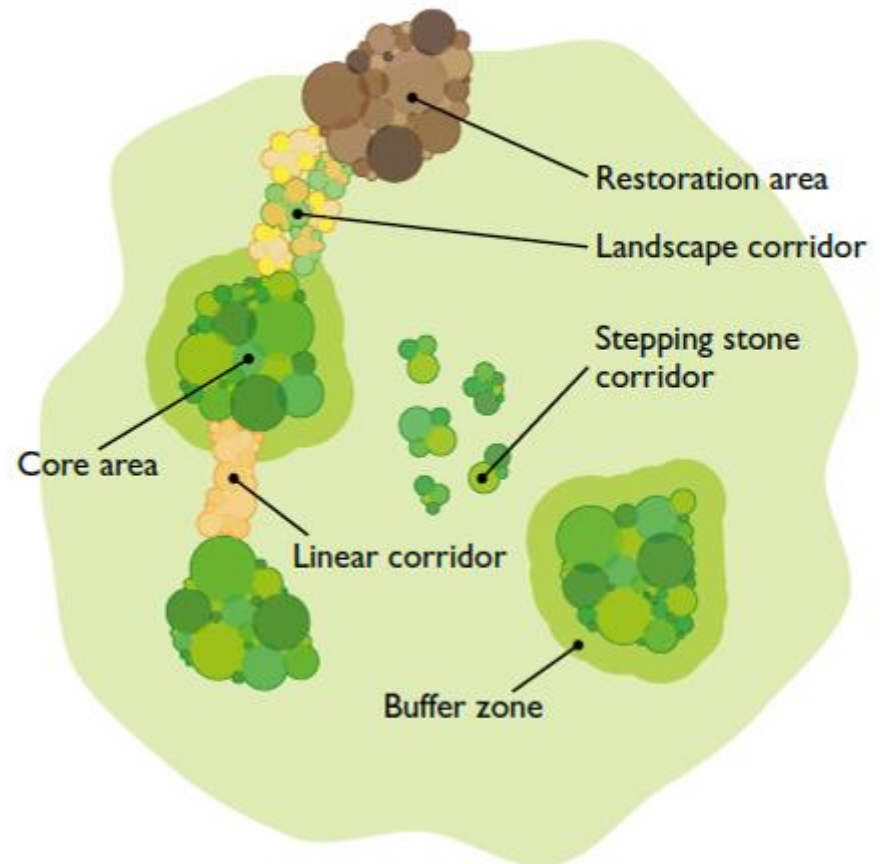
- ‘Wider countryside’ matrix: ecological networks and mosaics of habitat patches
- New conservation strategies: landscape-scale conservation



Re-connecting Conservation Landscapes

- Lawton, J. *et al.* (2010) *Making Space for Nature: A review of England's Wildlife Sites and Ecological Network.* DEFRA
- ‘more, bigger, better and joined’
- DEFRA (2011) *The Natural Choice: securing the value of nature* (Government White Paper)

The components of ecological networks



Protected Areas and Range Expansion

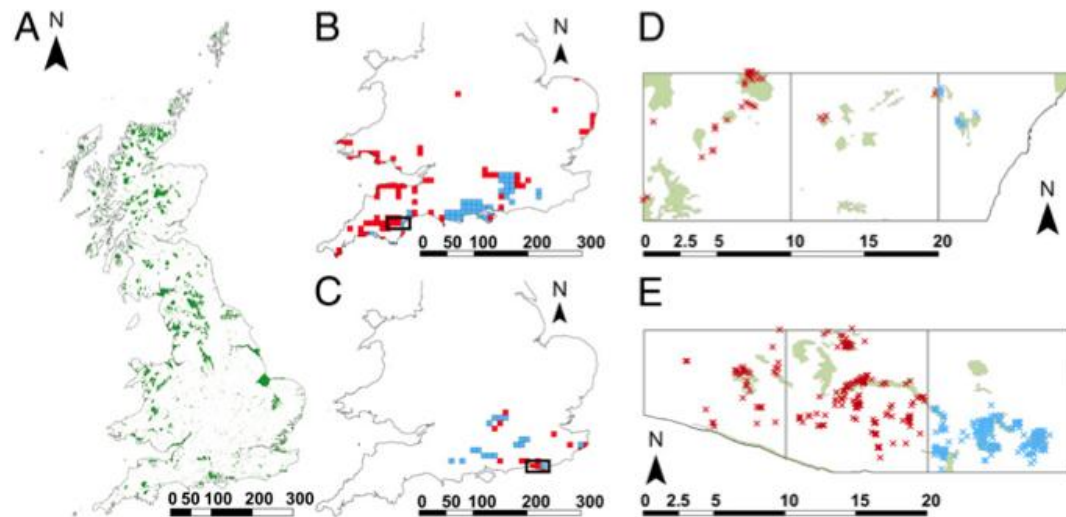


Fig. 1. (A) Locations of PAs (Sites of Special Scientific Interest) within Great Britain. (B) Dartford warbler *S. undata* distribution change, showing 10 × 10-km grid squares considered to be core (occupied before and since the end of 1991; blue squares) and colonized (occupied since 1991 only; red squares). (C) Silver-spotted skipper *H. comma* distribution change, showing 10 × 10-km grid squares considered to be core (occupied during 1970–1982 and 1995–2010; blue squares) and colonized (not occupied 1970–1982 but occupied 1995–2010; red squares). (D) Expanded view of the 10 × 10-km grid squares highlighted in B showing the location of PAs in green, the locations of *S. undata* records in core areas (blue), and the locations of records in colonized areas (red). (E) Expanded view of the 10 × 10-km grid squares highlighted in C showing the location of PAs in green, the locations of *H. comma* records in core areas (blue), and the locations of records in colonized areas (red). Scale bars are in kilometers.

- Thomas, C.D. *et al.* (2012) *PNAS* 109: 10463-8

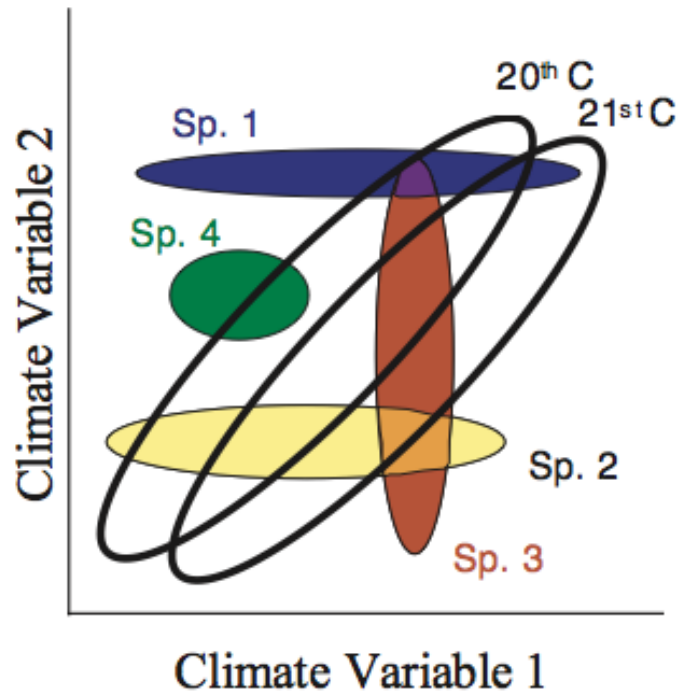
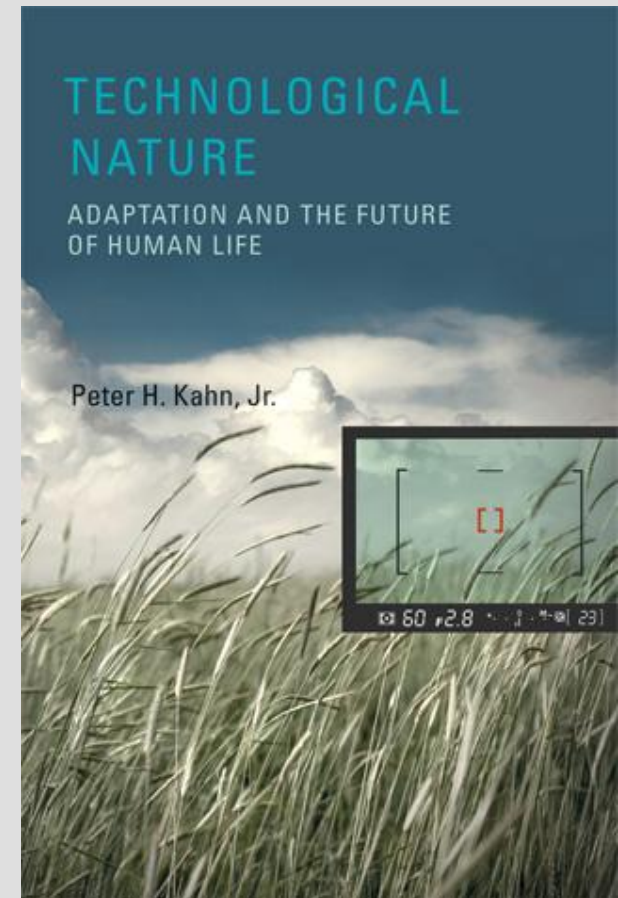


Fig. 1. Conceptual diagram showing the intersection among the fundamental niches for four species (Sp.; colored ellipses) and climatic envelopes for hypothetical 20th- and 21st-century climates (black-bordered ellipses) (8). Novel climates are the portions of the 21st-century envelope that do not overlap 20th-century climates, and disappearing climates are the portions of the 20th-century envelope that do not overlap 21st-century climates. Species cooccur only if their fundamental niches simultaneously intersect with each other and the current climatic space. Future climate change may cause a variety of ecological responses, including shifts in species distributions (species 1–3), community disaggregation (species 1 and 3), new communities forming (species 2 and 3), and extinction (species 4). This conceptual model assumes fixed niches, i.e., that climate change will outpace evolutionary adaptation (8).

John Williams *et al.*
(2007) 'Projected
distributions of novel
and disappearing
climates by 2100
AD' *PNAS* 104:
5738-5742

Technological Nature

- ‘we have begun to change our species’ long-standing experiences with nature. Now we have what I am calling technological nature: technologies that in various ways mediate, augment, or simulate the natural world’
 - Peter Kahn (2011) *Technological Nature: adaptation and the future of human life*, MIT Press



This map accompanies *Fens for the Future: A Strategic Plan for Fenland*. It has been developed for the Fens for the Future Partnership by Richard Keymer of Mere Oak Ecology and Steve Brayshaw of R S Brayshaw Ecological Consultancy

FENS FOR THE FUTURE

A Proposal for an Enhanced Ecological Network for Fenland

This map presents a proposal for the creation and enhancement of an ecological network for Fenland. The plan boundary is based on the Fens National Character Area and comprises the 'Settled Inland Fens' and the 'Open Inland Fens' where associated habitats are dependent on freshwater systems. The 'Open Coastal Marshes' and 'Drained Coastal Marshes', which are coastal in nature and whose conservation has been led by two long-standing partnerships: the *Wash Estuary Strategy Group* and the *Wash and North Norfolk Coast European Marine Site Partnership*, are omitted.

The proposed ecological network is based on the structure recommended in the Natural Environment White Paper: *The Natural Choice: securing the value of nature*, published in June 2011, which in turn is based on the Lawton Report: *Making Space for Nature: A review of England's Wildlife Sites and Ecological Network*. The proposed network comprises the following elements: core areas, corridors, stepping stones, restoration areas, buffer zones and sustainable use areas. Full descriptions of each of these are provided in the accompanying report: *A Strategic Plan for Fenland: A Proposal for an Enhanced Ecological Network*.

Core Areas

Areas of high nature conservation value which form the heart of the network. They contain habitats that are rare or important because of the wildlife they support or the ecosystem services they provide. They comprise the remaining areas of fen and the wetland habitats of the Great Washlands. They are all Sites of Special Scientific Interest (SSSI) and most have international recognition as Special Area of Conservation (SAC) and/or Special Protection Areas (SPA).

Proposed Priority Landscape Corridor

Proposed Landscape Corridors

Proposed Secondary Corridors

Landscape Corridors and Secondary Corridors improve the functional connectivity between core areas, enabling species to move between them to feed, disperse, migrate or reproduce. As it is largely a wetland system the proposed Landscape Corridors comprise the main rivers and main drains, but Secondary Corridors are also identified to provide useful additional connectivity. It is recommended that priority should be given to the development of the proposed **Priority Landscape Corridor** which connects the southern Fens and Ouse Washes to the Great Fen and to the Nene Washes.

Stepping Stones (to be identified)

Connectivity need not come from linear, continuous habitats; a number of small sit may act as Stepping Stones across which certain species are able to move between Core Areas. It is envisaged that smaller, currently isolated, SSSI and Local Wildlife Sites will be the foundation for the development of Stepping Stones.

Restoration Areas

Areas where measures are already underway to restore or create new high value habitats and species populations, and where ecological functions are enhanced. They are often located as extensions to existing Core Areas.

Buffer Zones (to be identified)

Areas surrounding Core Areas, Restoration Areas, Stepping Stones and Corridors, that protect them from adverse impacts from the wider environment. Often Restoration Areas have been planned adjacent to Core Areas and part of their function is to buffer them. However, Restoration Areas will also require buffering from adjoining intensive land uses.

Sustainable Use Areas

Areas within the wider landscape where the focus is on the sustainable use of natural resources and appropriate economic activities, together with the maintenance of ecosystem services. Set up appropriately, they will help to 'soften the matrix' outside the Proposed Ecological Network and make it more permeable and less hostile to wildlife, including self-sustaining populations of species that are dependent upon, or at least tolerant of, certain forms of agriculture. The indicative Sustainable Use Areas identified here are based on areas with the highest assemblages of key farmland birds: corn bunting, grey partridge, lapwing, turtle dove, tree sparrow and yellow wagtail.

Target Areas (some habitat restoration underway)

Target Areas (no current habitat restoration activity)

Areas identified by partners, for habitat creation and restoration. Habitat restoration projects are already taking place in some of the Target Areas, but in others restoration work is yet to get underway.

Plan Boundary

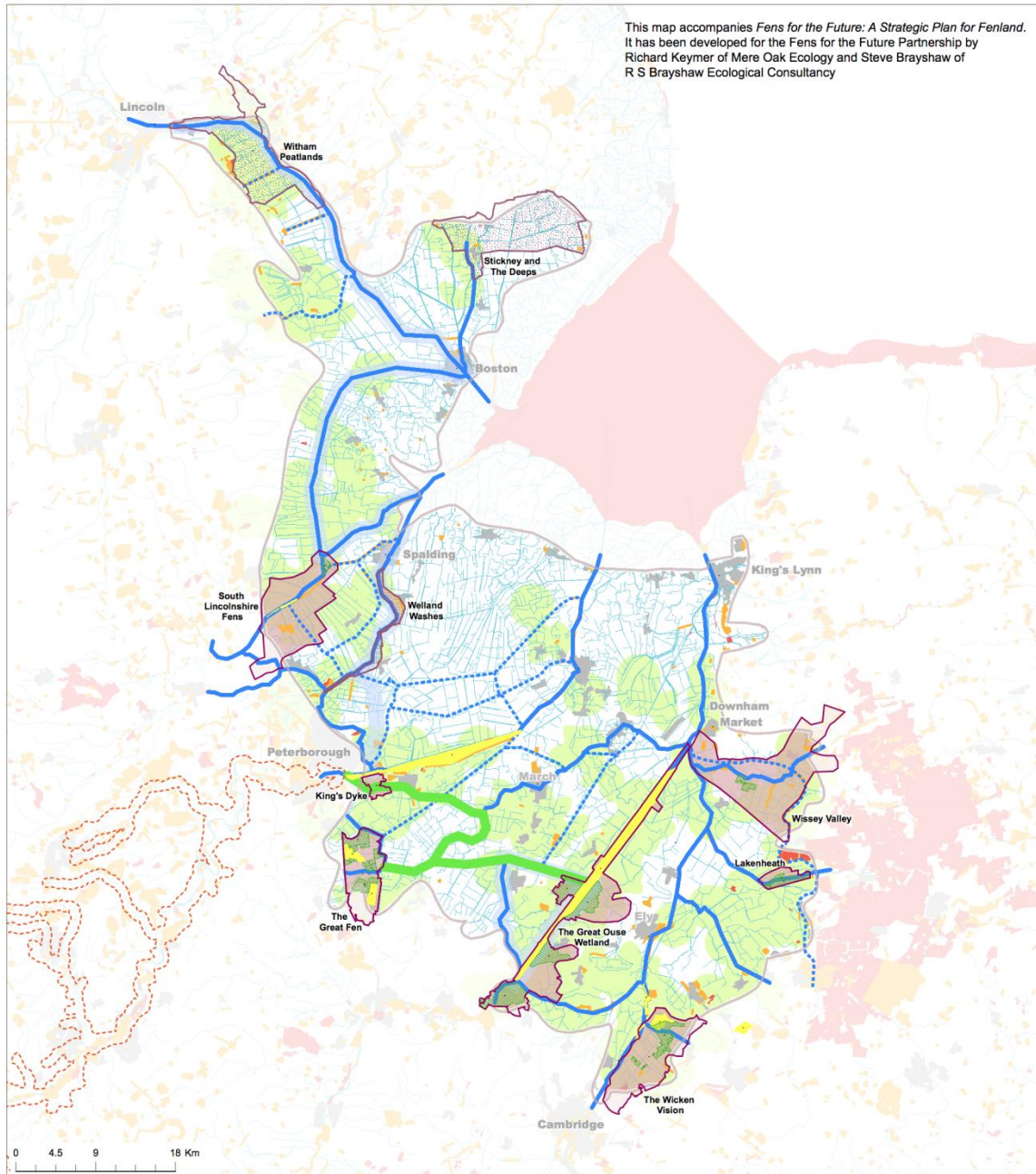
SSSI

Local Wildlife Sites

Fen Waterways Link

Nene Valley Nature Improvement Area

Note. The proposed Enhanced Ecological Network is based on existing ecological important sites and features, in particular SSSI and the main rivers and drains. Local Wildlife Sites will also be important components of an enhanced network by providing the focus for the development of Stepping Stones. Although many of these sites and features are visible on the map, many more, including some of the most extensive, are obscured by the components of the ecological network e.g. although Ouse Washes is an SSSI, but appears as a Core Area on the map. Similarly, many of the main rivers and drains are hidden under the Corridors.



NATURE IMPROVEMENT AREAS (2012)

- 1 Big Chalk
- 2 Birmingham and Black Country Living Landscapes
- 3 The Dark Peak
- 4 Dearne Valley Green Heart
- 5 Greater Thames Marshes
- 6 Hampshire Farmers Linking Landscapes
- 7 Humberhead Levels
- 8 Marlborough Downs
- 9 Meres and Mosses of the Marsh
- 10 Morecambs Bay Limestone and Wetlands
- 11 Nene Valley
- 12 Northern Devon
- 13 The Lee Catchment
- 14 South Downs Way Ahead
- 15 Wild Purbeck



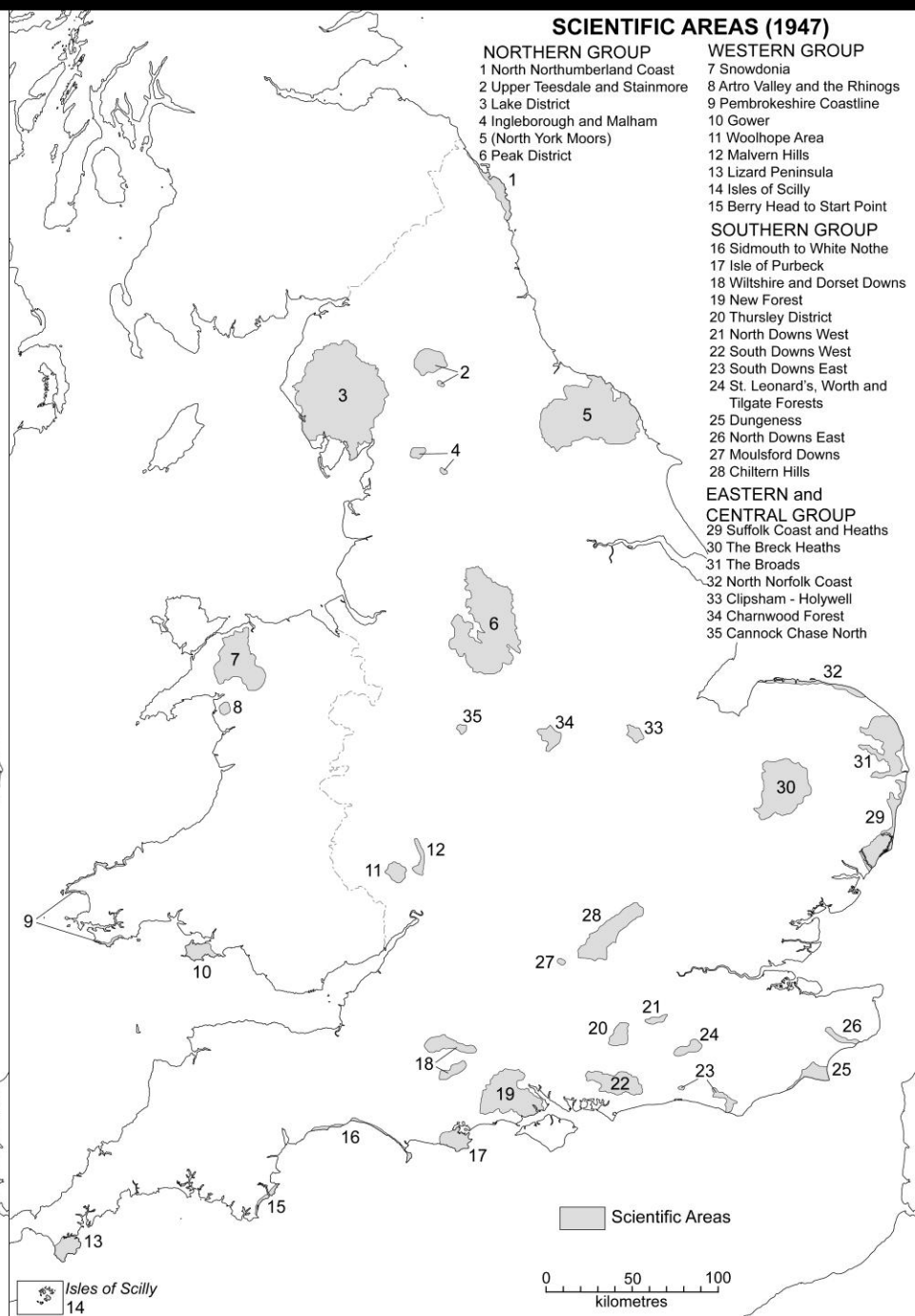
SCIENTIFIC AREAS (1947)

- ### NORTHERN GROUP
- 1 North Northumberland Coast
 - 2 Upper Teesdale and Stainmore
 - 3 Lake District
 - 4 Ingleborough and Malham
 - 5 (North York Moors)
 - 6 Peak District

- ### WESTERN GROUP
- 7 Snowdonia
 - 8 Arto Valley and the Rhinogs
 - 9 Pembrokeshire Coastline
 - 10 Gower
 - 11 Woolhope Area
 - 12 Malvern Hills
 - 13 Lizard Peninsula
 - 14 Isles of Scilly
 - 15 Berry Head to Start Point

- ### SOUTHERN GROUP
- 16 Sidmouth to White Nothe
 - 17 Isle of Purbeck
 - 18 Wiltshire and Dorset Downs
 - 19 New Forest
 - 20 Thursley District
 - 21 North Downs West
 - 22 South Downs West
 - 23 South Downs East
 - 24 St. Leonard's, Worth and Tilgate Forests
 - 25 Dungeness
 - 26 North Downs East
 - 27 Moulford Downs
 - 28 Chiltern Hills

- ### EASTERN and CENTRAL GROUP
- 29 Suffolk Coast and Heaths
 - 30 The Breck Heaths
 - 31 The Broads
 - 32 North Norfolk Coast
 - 33 Clipsham - Holywell
 - 34 Charnwood Forest
 - 35 Cannock Chase North



National Ecological Network (EHS)

Source: National Spatial Strategy (Nota Ruimte)
Gouvernemental decision, April 2004



National Ecological Network, Netherlands, 2004

Economic Landscapes



Landscapes: beyond barriers

- ‘Perhaps the greatest challenge of all is to change the way we think about protected areas. In the past they have been seen as islands of protection in an ocean of destruction. We need to learn to look on them as the building blocks of biodiversity in an ocean of sustainable human development, with their benefits extending far beyond their physical boundaries’

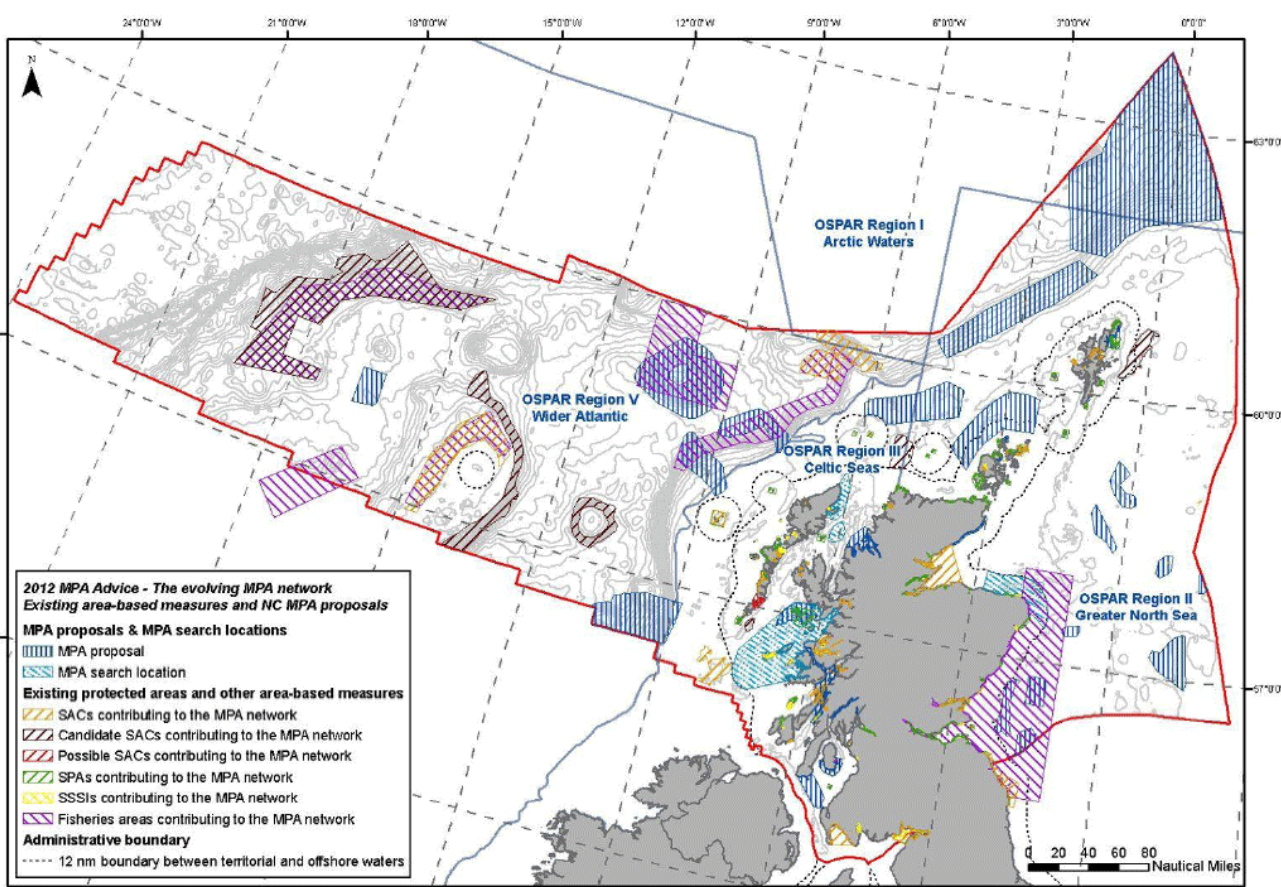
– Achim Steiner *New Scientist* 18
October 2003, p.21



Seascapes



Economic Seascapes

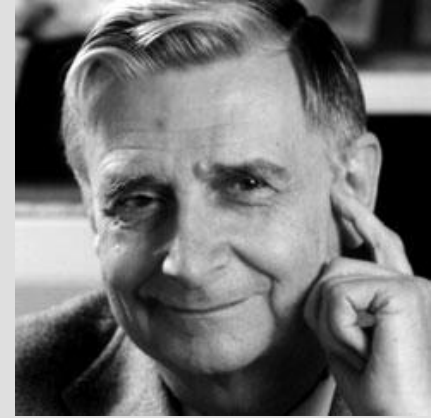


Restoration

- ‘At best, preservation can only hold on to what already exists. In a world of change we need more than that. Ultimately, we need a way not only of saving what we have but also of putting the pieces back together when something has been altered, damaged, or even destroyed’ (Jordan, 1988)

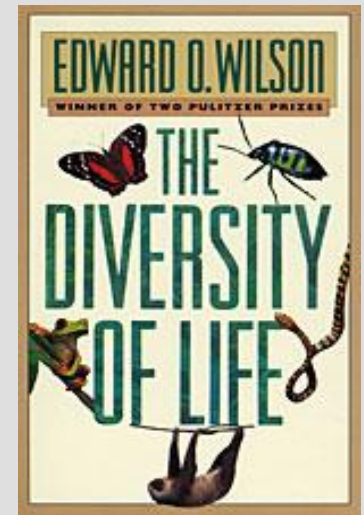


Restoration: Reweaving the diversity of life



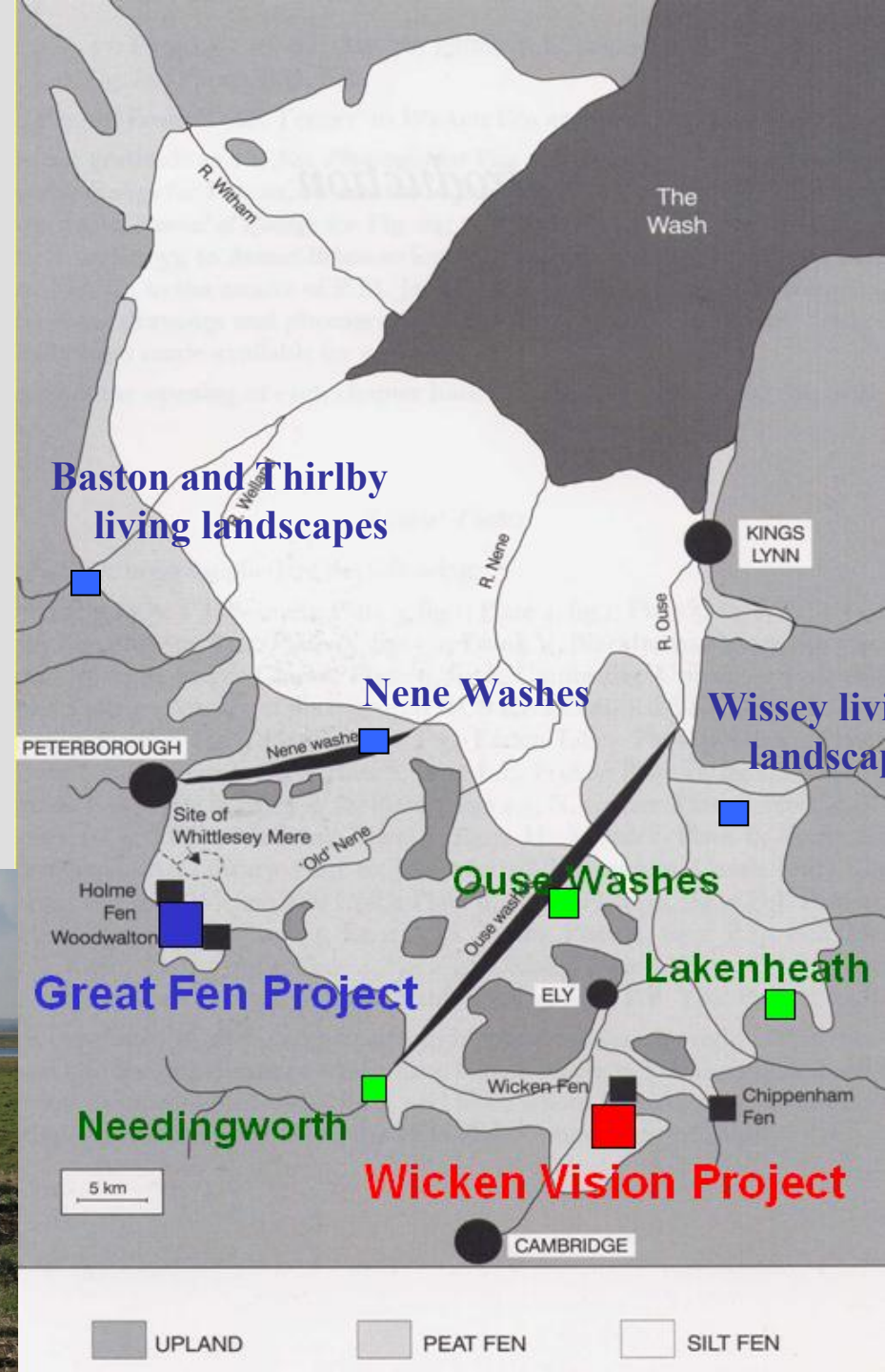
E.O. Wilson

- ‘Let us go beyond mere salvage to begin the restoration of natural environment There can be no purpose more enspiriting than to begin the age of restoration, reweaving the wondrous diversity of life that still surrounds us'. p. 335.
 - Edward Wilson (1992) *The Diversity of Life*, Harvard University Press



Landscape scale projects in the fens

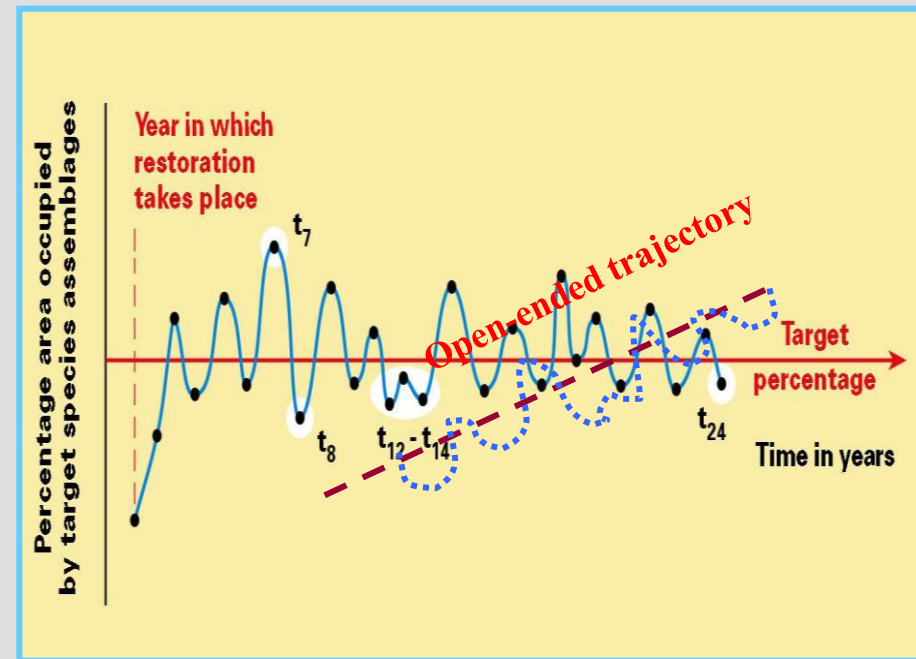
- **Wicken Vision** - 5,300ha of which 764 ha owned including NNR (National Trust)
- **Great Fen** 3,700 ha of which 2090 ha owned including NNRs (Wildlife Trust and NE)
- **Lakenheath RSPB**



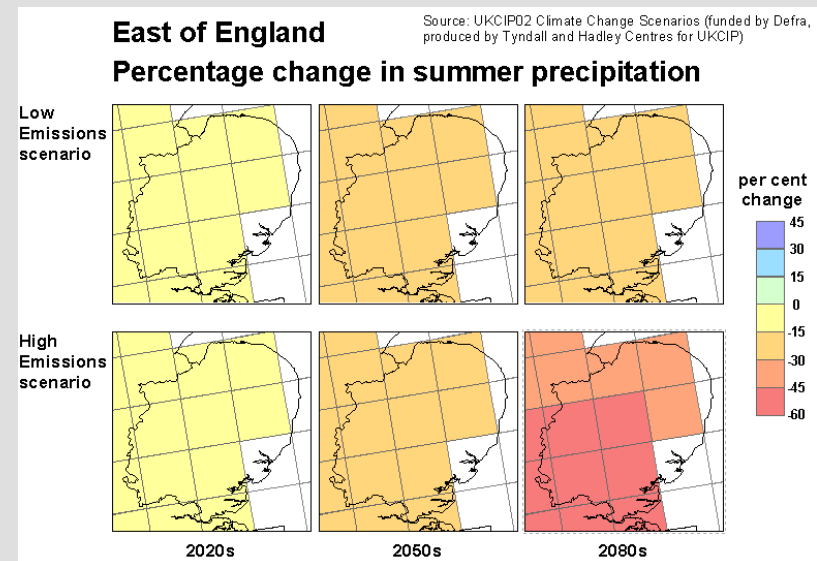
'Open-ended restoration

- Accepts novel starting point and conditions
 - No reference systems
- Accepts uncertainty and novel outcomes
 - No species or habitat targets
- Emphasizes landscape dynamics e.g. flooding
 - Low or no management
- May be a deliberate policy or *de facto* (uncertainty, funding, remoteness)

Hughes, F.M.R., Stroh, P., Adams, W.A. Kirby, K. Mountford, J.O., Warrington, S. (2011) *Journal for Nature Conservation*



Hughes, F.M.R. ,*et al.* (2011) Monitoring and evaluating large-scale, open-ended habitat creation projects. *Journal for Nature Conservation* doi:10.1016/j.jnc.2011.02.003



Open-ended Restoration: Wicken Fen, Cambridge

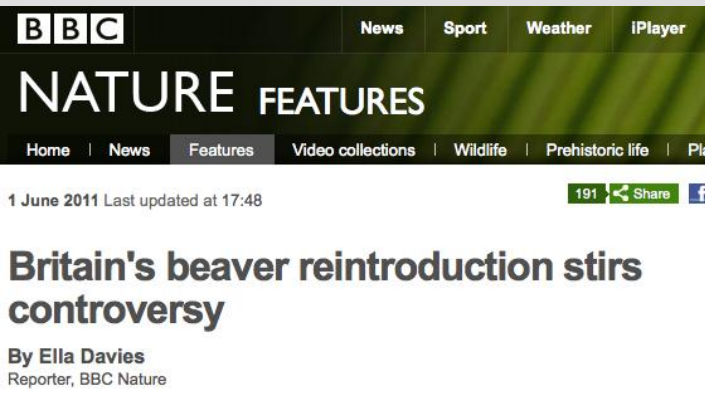


Restoring Species

- Red Kite 1989 -1994
- Beaver 2009



Simon Davidson

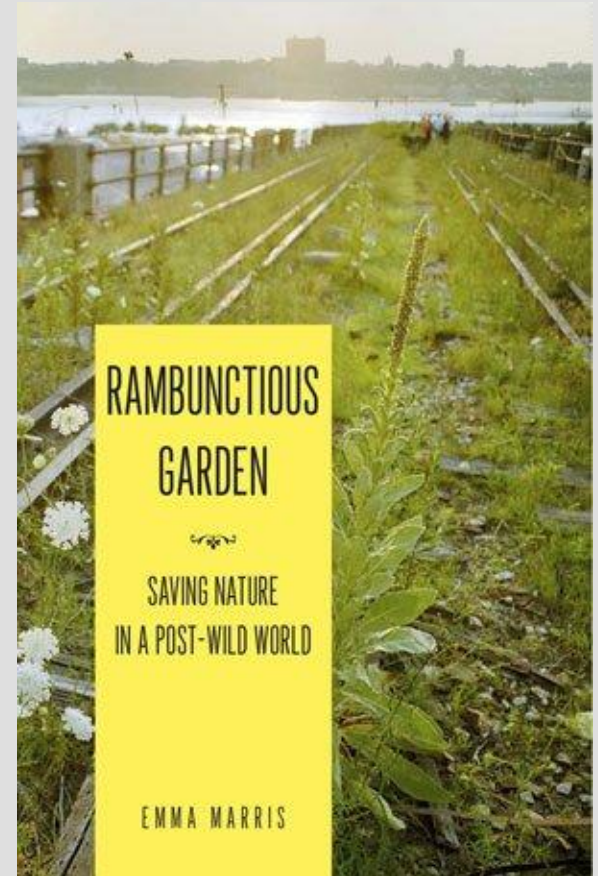


Habitat manager or wildlife menace?



Saving Nature in a Post-wild World

- *Rambunctious Garden: saving nature in a post-wild world*,
 - Bloomsbury' Emma Marris 2011
 - nature in and around human lives
- 'All existing ideas about what constitutes naturalness may need to be overhauled, particularly in the light of climate change'
 - *Authenticity in Nature*, Nigel Dudley 2011



The Welcome Alien?

- How do you define whether a species is native or alien in a rapidly changing global environment?' (Webber and Scott 2011 *Global Ecology and Biogeography Letters*)



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Environment > Wildlife

Exotic army of invading wildlife changing the nature of UK cities

Previously unseen wildlife is colonising British cities but local authorities are concerned by the increase

John Vidal
The Observer, Saturday 27 October 2012 12:37 BST
[Jump to comments \(132\)](#)



Coming to a street near you: wasp spider, fallow deer and great spotted woodpecker.
Photograph: Alamy

Have you seen a Chinese mitten crab?



- Grey-green to dark brown crab
- Long walking legs
- Squarish body up to 86 mm across
- Dense brown 'fur' on the white-tipped claws
- Habitat: rivers, brackish water estuaries, rarely along the marine inshore coast
- 4+4+4 pattern of teeth around front of shell
- Juveniles may lack 'fur' on claws



Chinese mitten crab (*Eriocheir sinensis*)

Not to be confused with:



- Lacks 'fur' on claws
- Shell shape more triangular
- Found on the sea shore and in estuaries but never in freshwater rivers

Common shore crab (*Carcinus maenas*)



- 2 long antennae
- Only 3 pairs of walking legs apparent
- Found on the sea shore but never in freshwater rivers

The broad-clawed porcelain crab (*Porcellana platycheles*)



Powerful claws
Handle with care

Alien Species

- ‘Conservationists should assess organisms on environmental impact rather than whether they are natives’ Davies et al 2011 *Nature* 474
- ‘A dynamic view of nature that recognizes that species characteristics and human valuations thereof change over time, not only reflects ongoing evolutionary processes, but also leads to a more balanced and objective approach to the management of non-native species’ (Schlaepfer *et al.* 2010, *Conservation Biology*, p.8).



Assisted Colonisation

- In situ, ex-sit trans-situ conservation (Chris Thomas)
- ‘assisted colonization might face insurmountable governance issues.....only with concerted investment in *in situ* initiatives of a sufficient scale will endangered species have a future. (Vila and Hulme 2011)
 - Hoegh-Guldberg, O. *et al.* (2008) ‘Assisted colonization and rapid climate change’. *Science* 321, 345–346
 - Thomas, C.D. (2011) ‘Translocation of species, climate change, and the end of trying to recreate past ecological communities’. *Trends Ecol. Evol.* 26, 216–221

Jurassic Park? No thanks

Montserrat Vilà¹ and Philip E. Hulme²

¹ Estación Biológica de Doñana (EBD-CSIC), Avda. Américo Vespucio s/n, Isla de la Cartuja, E-41092 Sevilla, Spain

² The Bio-Protection Research Centre, PO Box 84, Lincoln University, Canterbury, New Zealand

The End of Nature?

- Bill McKibben *The End of Nature*:
 - the end of the idea that a nature could exist that was not influenced by humankind.
- The ‘domestication of nature’ . Peter Kareiva *et al.* (2007)

‘Wilderness settles peace on the soul because it needs no help; it is beyond human contrivance’.

Edward Wilson (1992) *The Diversity of Life*, p. 335.





Africa

1. Kalahari

9.7K

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David Attenborough explores two deserts in Africa's south west, where he sees meerkats, black rhinos partying, giant insects and the greatest giraffe battle ever filmed. (R)

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TV blog

Getting the perfect wildlife shot

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Pokémon Biodiversity

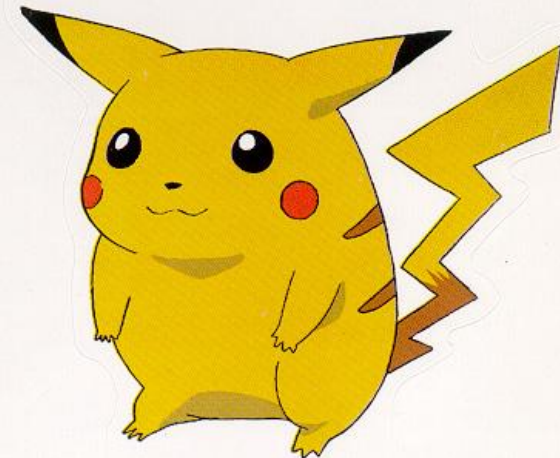
- British children leave primary school able to name 80 per cent of Pokémon characters but only 50 per cent of common types of wildlife
 - Balmford, A. et al. (2002) Why conservationists should heed Pokémon, *Science* 295: 2367

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The official Wildlife site of Scotland's national tourism organisation

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Beyond Ecological Connections



Who possesses this landscape?

The man who bought it or

I who am possessed by it?

False questions, for

this landscape is

masterless

and intractable in any terms

that are human.

Norman MacCaig *A man in Assynt*



