

# Natural Heritage Reporting and Indicators

Statutory requirements  
Corporate justification  
User community needs

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# Environmental Audit Links

## Statutory Requirements



### **Natural Heritage (Scotland) Act 1991**

**Aims and purpose**      foster understanding

**General functions**      research & dissemination of knowledge

### **Environmental Information Regulations**

**Openness**      public access

**Delivery**      21st Century Government



# Corporate Strategy



## A Natural Perspective

A Corporate Strategy for  
Scottish Natural Heritage  
for the next 10 years

Working with Scotland's people to care  
for our natural heritage



# Research Strategy



## Research and Technical Support Strategy

Scottish Natural Heritage's  
Strategy for Research and  
Technical Support: 2000-2005

Working with Scotland's people to care  
for our natural heritage





# Corporate Strategy



**Caring for the natural world** Natural diversity and processes  
Landscape and natural beauty  
Integrated approaches  
Our priority is: Trends and changes

*to improve understanding of the way the natural heritage works*

*by documenting changes and trends in it, and explaining these and their causes widely*



# Research Strategy



**Understanding the state of the natural heritage**

Site condition monitoring

National Parks

Monitoring change & perceptions

5-yearly reporting

UK and EU context

**Our priority is:**

*support for a comprehensive report on the State of the Natural Heritage to be published at 5-yearly intervals*

*putting in context Scotland's natural heritage at the UK and EU level*



# Research Strategy



*support for audit reports based on themes,  
geographical areas and issues*

*development of natural heritage and  
sustainability indicators*

**Understanding the causes  
and nature of change**

**Environmental change**

Ecosystem processes

Socio-economic influences

Enjoyment


Public attitudes & education

**Our priority is:**

**Good practice in care and  
management**

Restoration and enhancement





*To sum-up, we shall:*

***Document changes and trends, explaining these and their causes:***

- a) report 5-yearly on the State of the Natural Heritage***
- b) place in context at the UK and EU level***
- c) audit by theme, geographical area and issue***
- d) define natural heritage and sustainability indicators***



# Environmental Audit Priorities



## Importance

~~Vital to corporate & service~~  
~~Important to knowledge base~~  
~~Relevant to context findings~~

## Urgency

~~Anticipate operational & financial consequences~~  
~~Political & corporate blame~~  
~~Beyond corporate & financialness~~

## Feasibility

~~Data available & opportunity exists~~  
~~Collaboration & preparation (skills & knowledge)~~  
~~Considerable (obstacles)~~



# Current Activities



Global Environmental Concerns

Countryside Change

Alien Species (terrestrial & freshwater)

**The Seas Around Scotland**

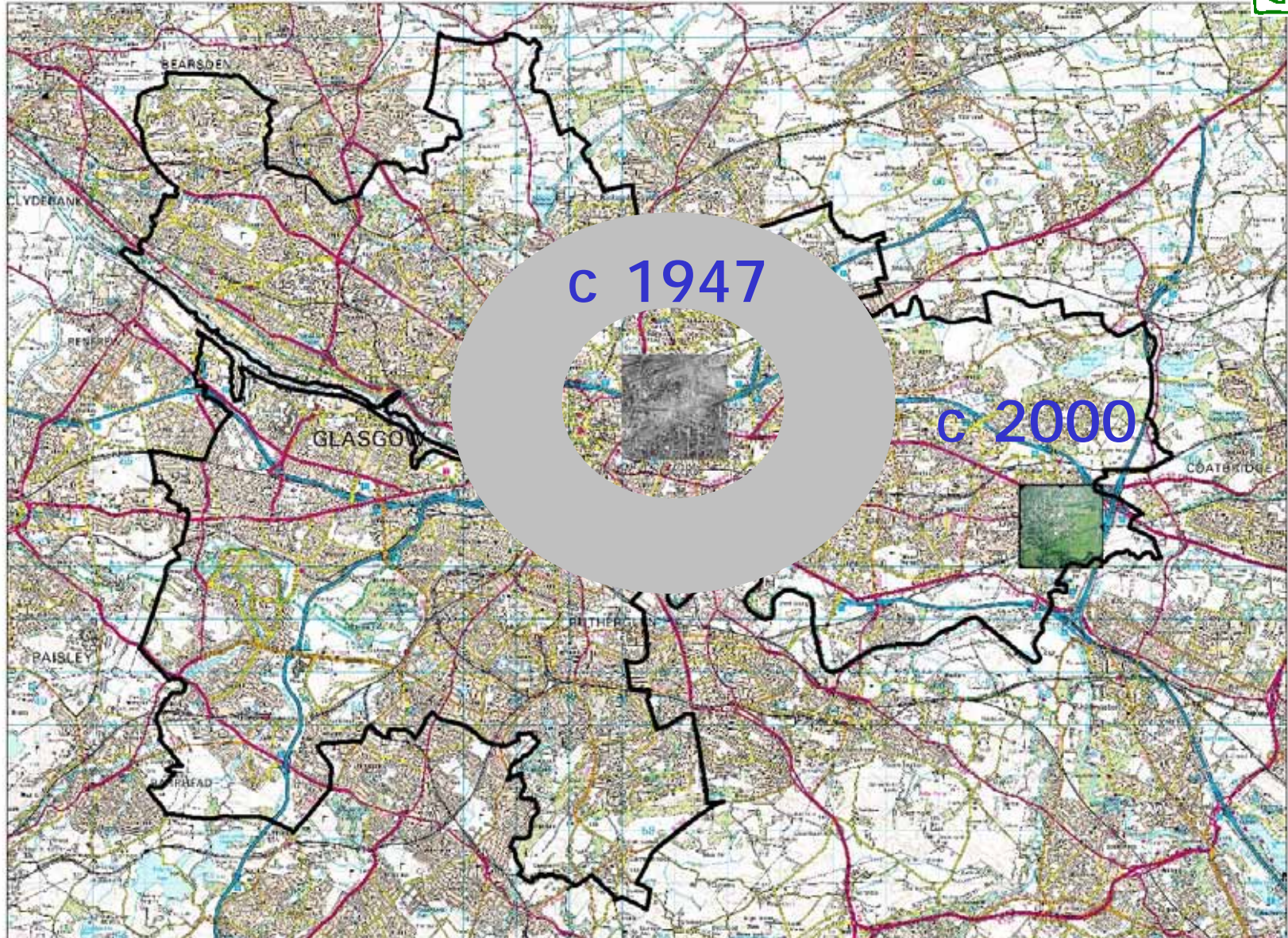
Fresh waters

Settlements

What do the outputs look like?

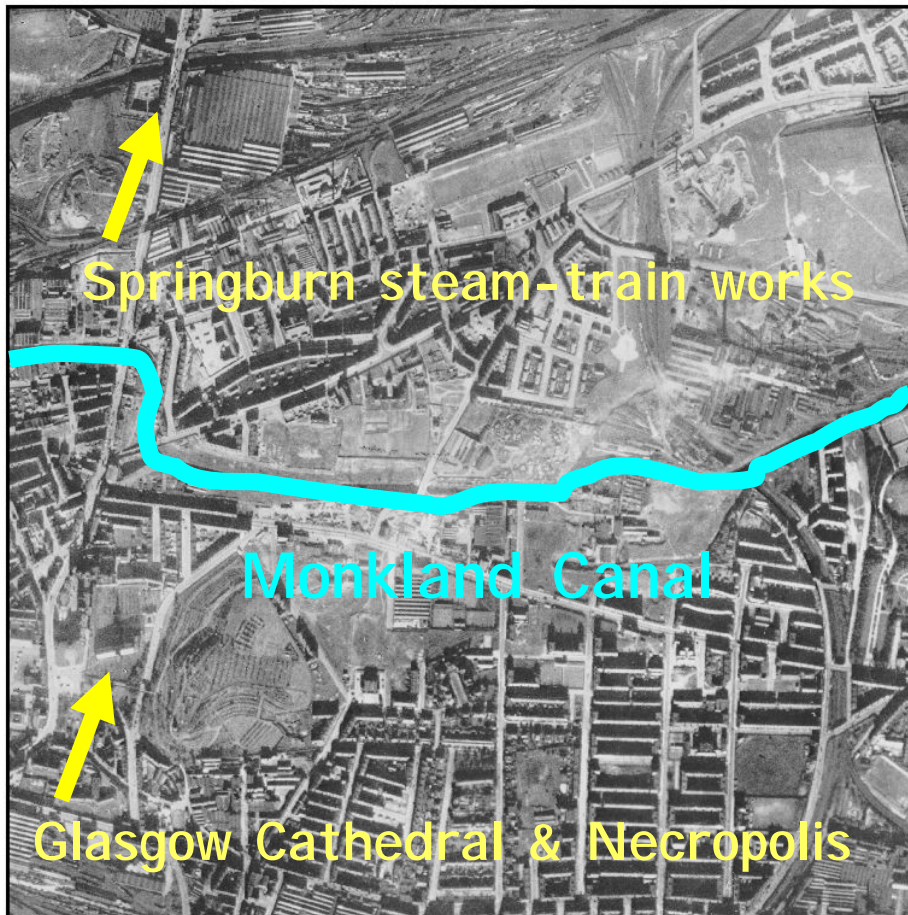


# Change revealed by aerial photography

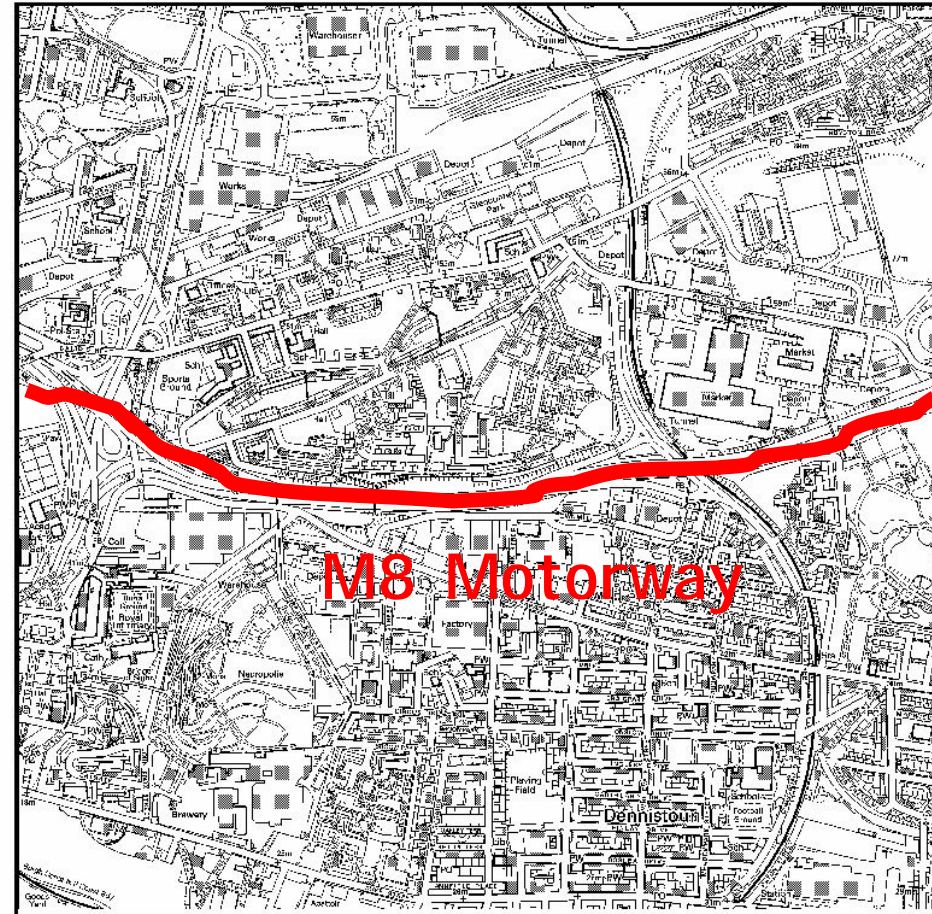




# Change revealed by aerial photography



c 1947

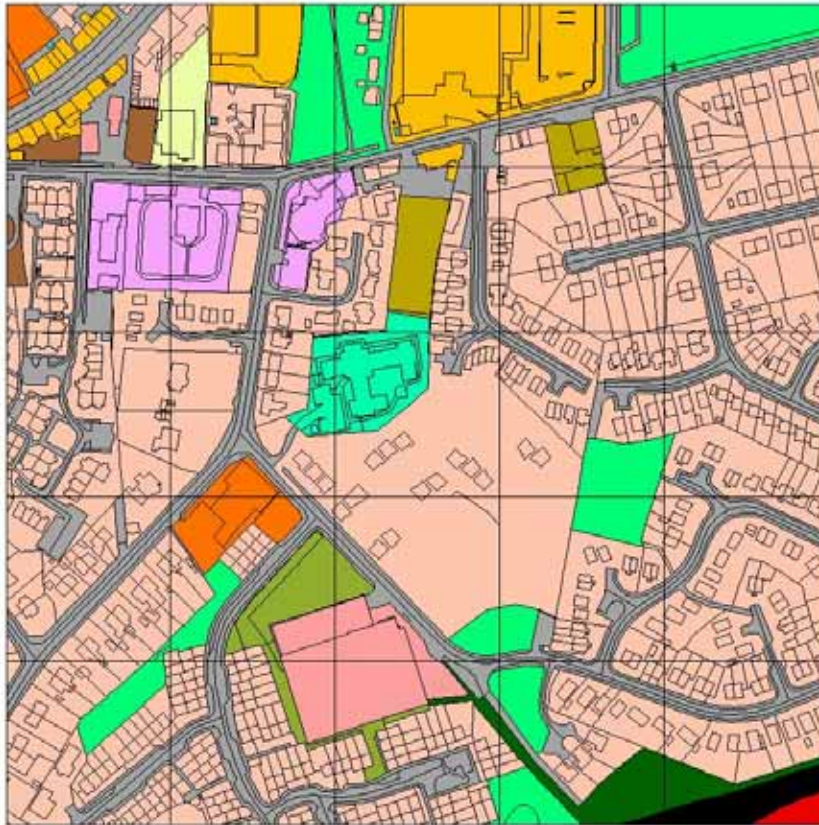


c 2000



# Mapping greenspace

Source: The Geoinformation Group



Land Use			Scrub		Railways		Institutional buildings		Offices		Utilities
	Improved pasture		Outdoor recreation		Residential		Religious buildings		Retailing		Derelict land
	Broadleaved woodland		Roads		Institutional and communal accommodation		Industry		Storage and warehousing		



# East Lothian

# North Berwick

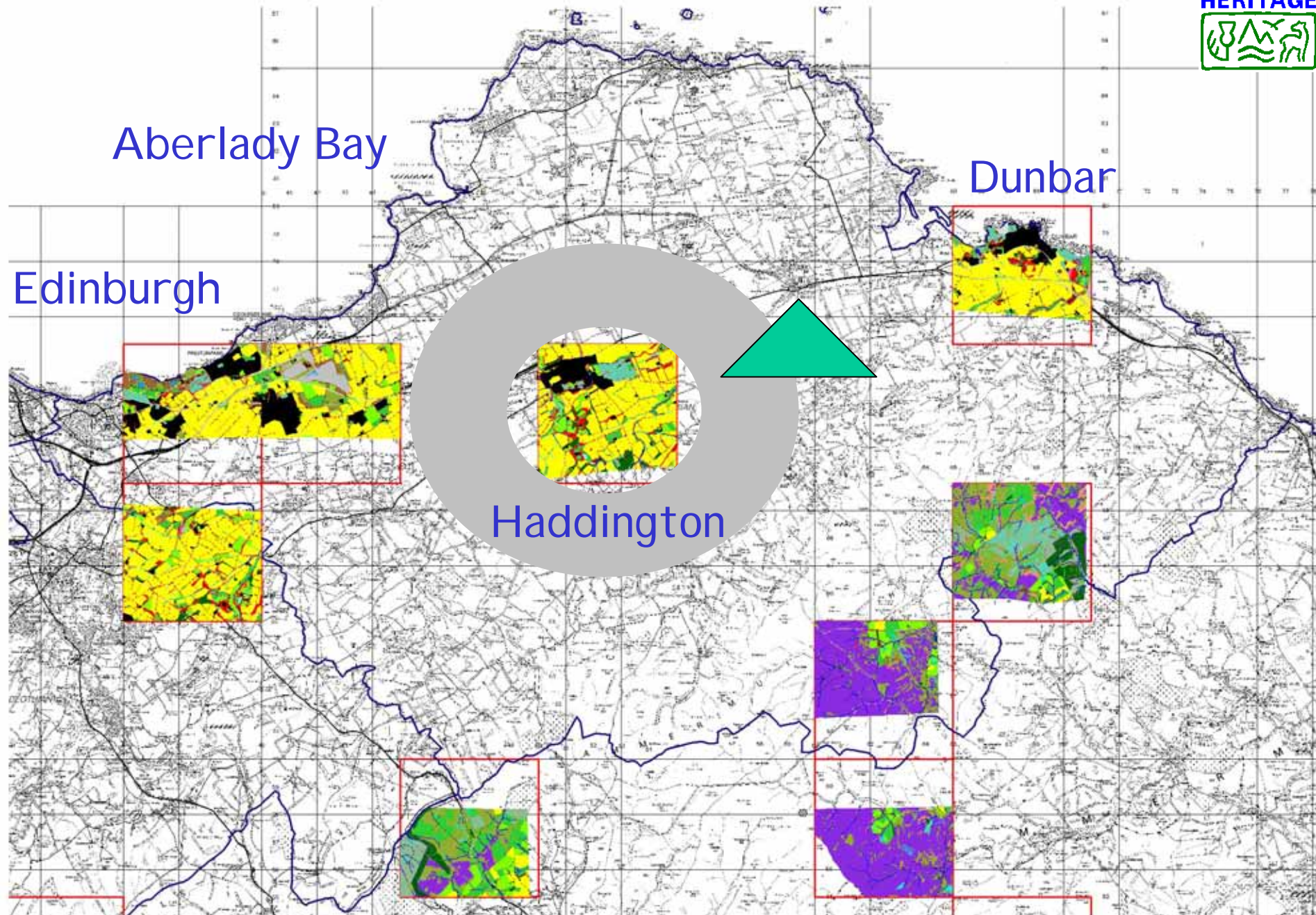


## Aberlady Bay

## Dunbar

## Edinburgh

## Haddington





parkland



g

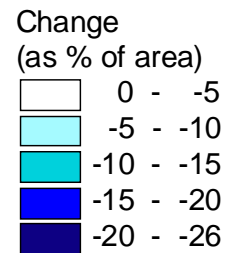
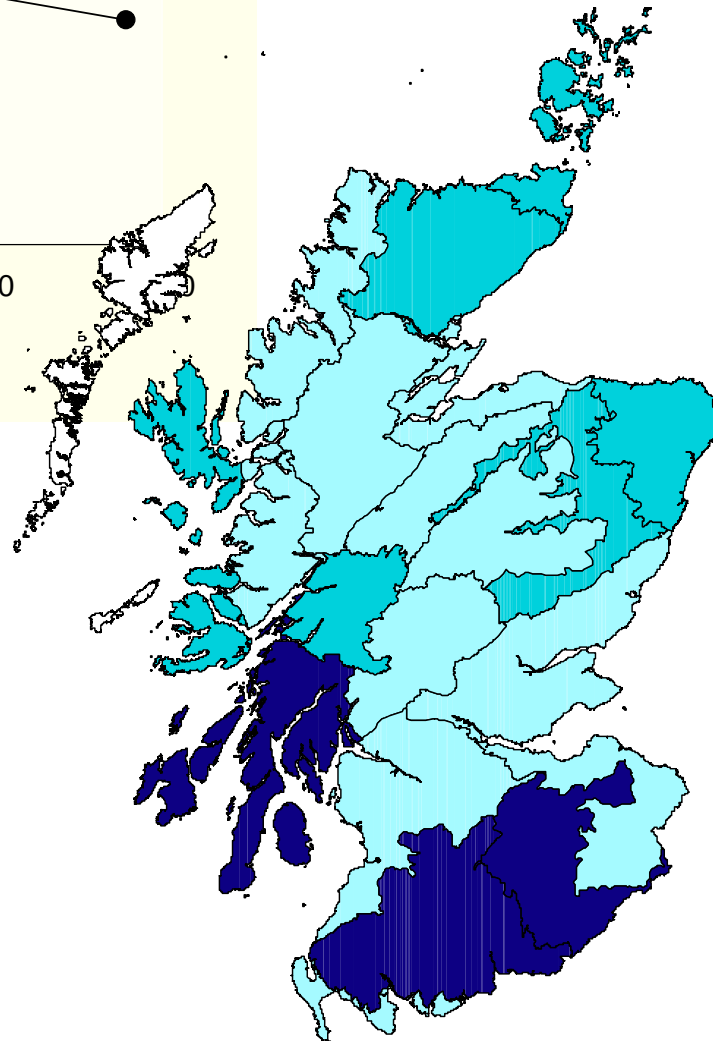
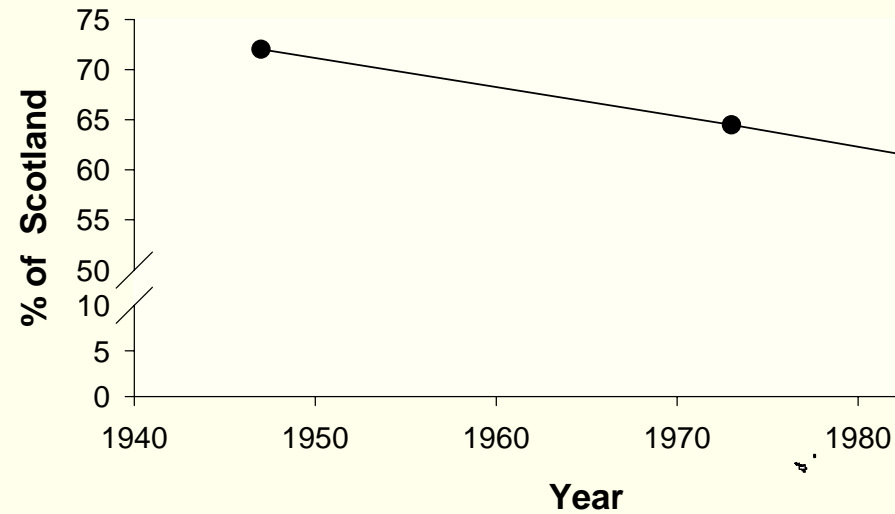
Tall Scrub (0.6)  
Transport Corridor (67.0)

hedgerow removal



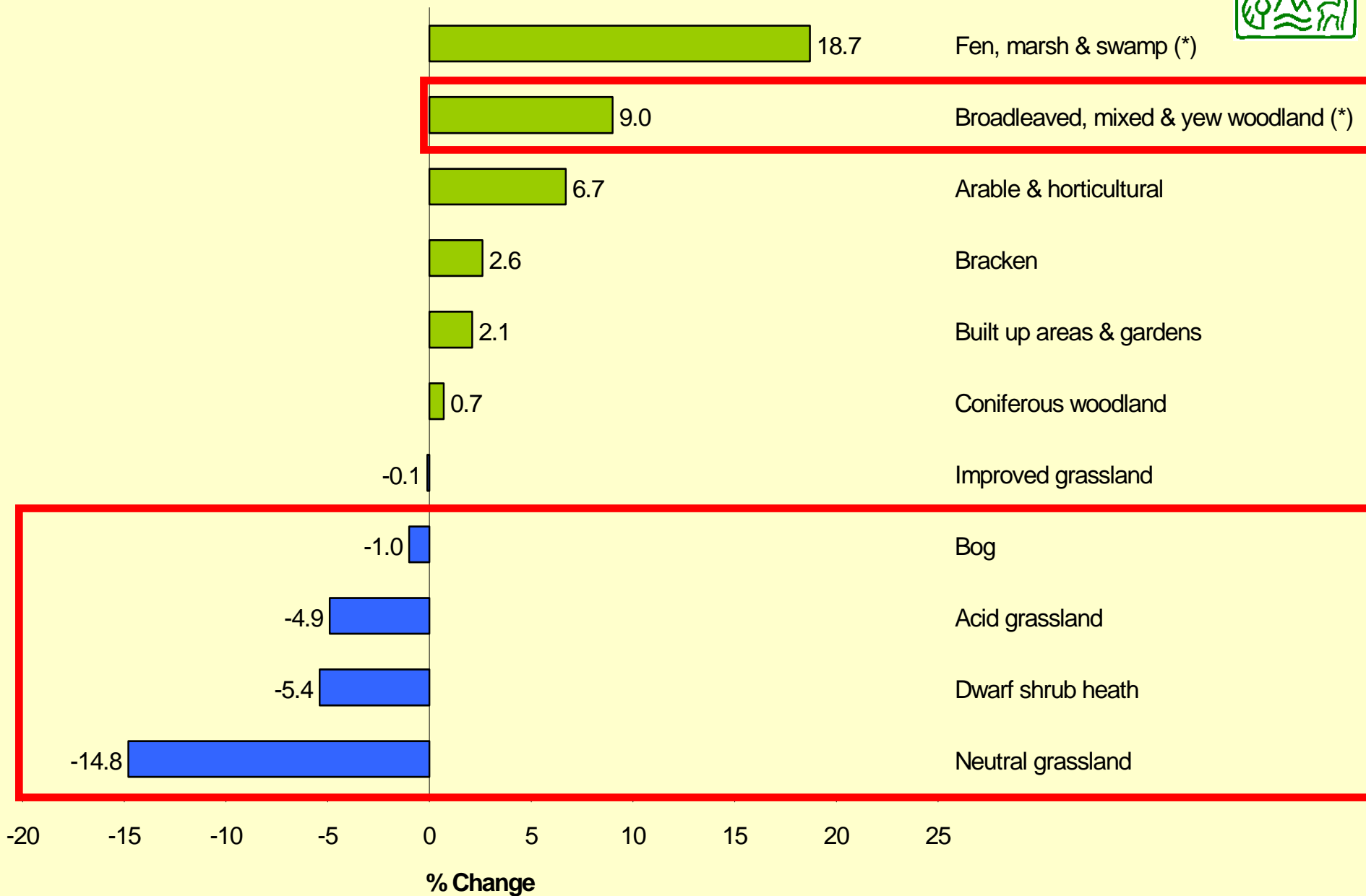


# Semi-natural habitats 1940s - 1980s





# Broad habitats 1990 - 1998





# Since the 1950s throughout the UK



Natives and archaeophytes (pre AD 1500)	decreased
Neophytes (introduced after AD 1500)	increased
Northern species	retreated
Southern species	advanced
Species of base-poor conditions	declined
Species of base-rich conditions	increased

Dunbar is the richest 10km square in Scotland, with 619 species  
Arable, estuary, saltmarsh, coastal dune, upland, ravine woodland

**Greatest relative declines among arable species**

**UK survey of flowering plants and ferns (1999)  
New Atlas of the British and Irish Flora**



# Trends in terrestrial and freshwater species

- Widespread butterfly species have tended to expand in range while scarce species have contracted.

- In recent decades land mammal, freshwater fish and rare vascular plant species have declined.

- Land bird species have shown mixed fortunes ...

... but the majority of seabird, wader and wildfowl species have increased in abundance.

Group	Period	Trend		
Rare and endemic vascular plants	1990 - 1996	40% ↓	29% ↔	31% ↑
Butterflies	To 2000	19% ↓	62% ↔	19% ↑
Freshwater fish	To 2000	50% ↓	35% ↔	15% ↑
Breeding seabirds	1967 - 1987	22% ↓	17% ↔	61% ↑
Wintering wildfowl	1966 - 1998	22% ↓	11% ↔	67% ↑
Wintering waders	1969 - 1998	9% ↓	0% ↔	91% ↑
Breeding land birds: <i>Range size</i>	c. 1970 to c. 1990	31% ↓	50% ↔	19% ↑
Breeding land birds: <i>Abundance</i>	1994-1999	16% ↓	63% ↔	21% ↑
Land mammals	To 2000	42% ↓	31% ↔	27% ↑
Species given legal protection	To 1997	36% ↓	48% ↔	16% ↑
Introduced plant species	1950s to 1987-88	2% ↓	86% ↔	13% ↑



# Trends in marine species

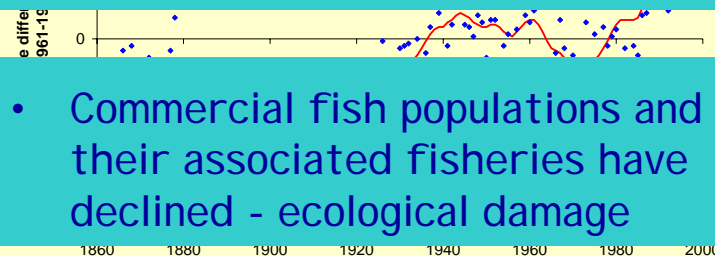
- Most breeding seabird species increased in abundance during the '70s and '80s, but some have benefited from fishery discards

- Gross pollution reduced, but diffuse pollution and enrichment remain problematic

- Trends consistent with climate change are becoming evident

- Seal populations doing well, but threatened again by PDV

- Commercial fish populations and their associated fisheries have declined - ecological damage

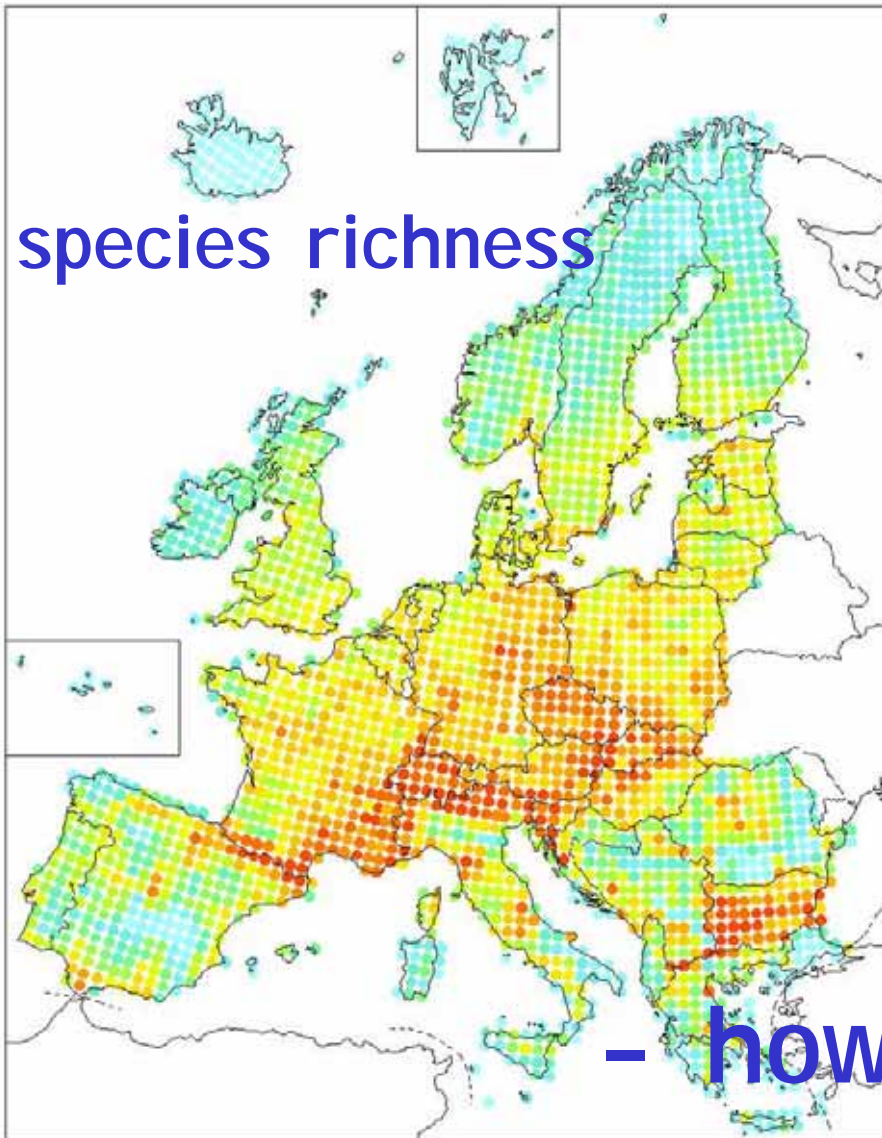


Theme	Period	Trend		
<b>Cetacea Abundance</b>	c.1986-2000	3 Species ↓	2 Species ↑	
<b>Strandings</b>	1992-2000		↔	
<b>Breeding seabirds</b>	1967-1987	22% ↓	17% ↔	61% ↑
<b>Environment Quality Coastal, estuarine</b>	1996-1999			↑
<b>Mariculture</b>				↑
<b>Farmed salmon production and sites</b>	1979-1999			↑
<b>Farmed shellfish production</b>	1986-1999			↑
<b>Climate Change</b>				0.6mm/yr ↑
<b>Seawater level, Aberdeen</b>	1862-1999			
<b>Storminess: wave height</b>	1969-1999			2.5-7.0 mm/yr ↑
<b>Mean sea temperatures</b>	1980-1998			0.5 – 1.0°C ↑
<b>Basking Shark: North Atlantic fishery</b>	1946-1996	90% ↓		
<b>Common Seal</b>	1989-2000		↔	
<b>Grey Seal</b>	1984-1997			6% per year ↑
<b>Commercial fish landings: populations</b>	1989-99	9 ↓	3 ↔	2 ↑
<b>Fishing mortality: populations</b>	1989-99	8 ↓	5 ↔	0 ↑
<b>Spawning stock biomass: populations</b>	1989-99	6 ↓	2 ↔	5 ↑

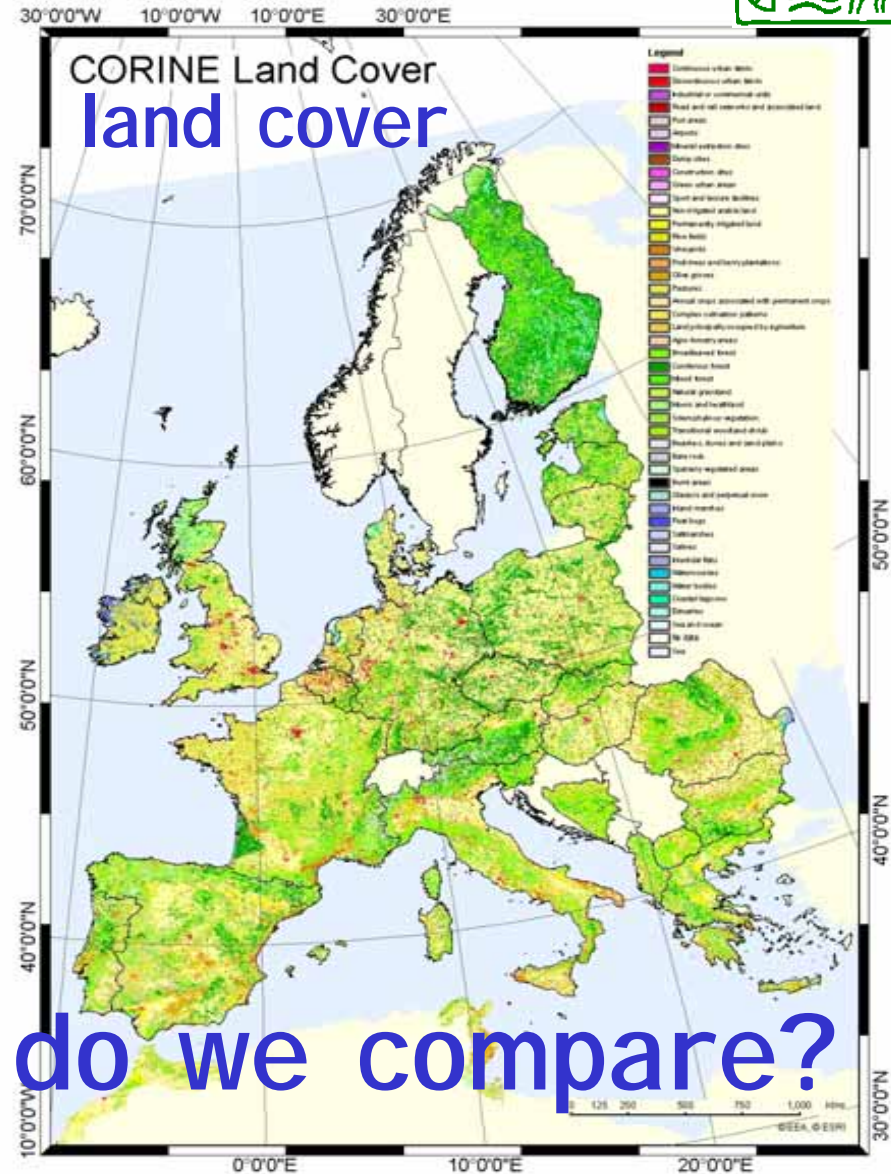


# Our place in Europe

species richness



- how do we compare?





# User Community Needs



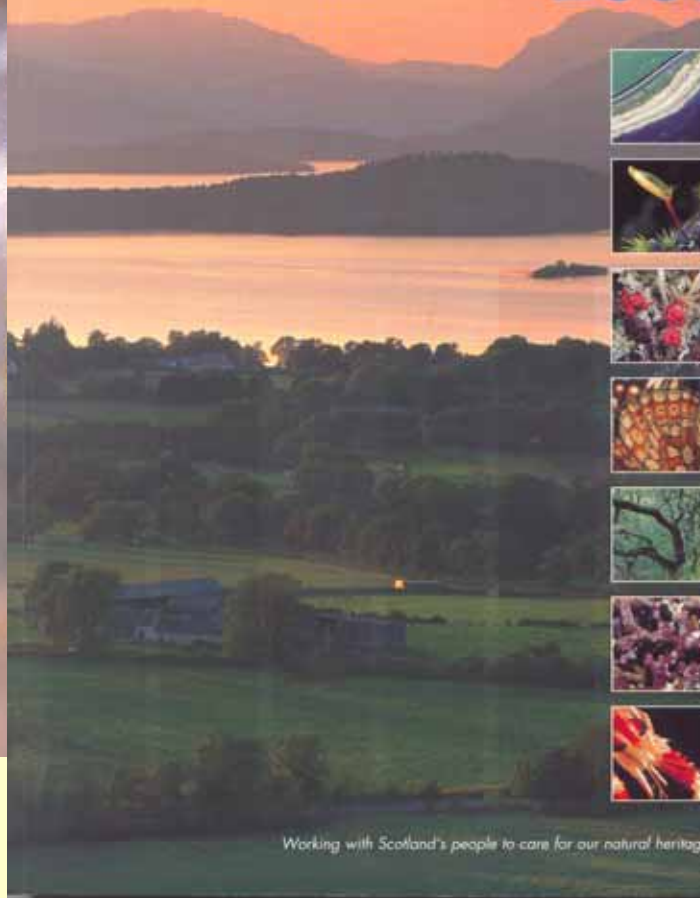
# Publications



SCOTTISH  
NATURAL  
HERITAGE



## Natural Heritage Trends SCOTLAND 2001



## THE STATE OF SCOTLAND'S ENVIRONMENT AND NATURAL HERITAGE



*Edited by Michael B. Usber,  
Edward C. Mackey  
and James C. Curran*

THE STATIONERY OFFICE



# Internal - trends on the intranet



http://10.200.1.39/midge/asp/user/hits/get.asp?page=http://10.200.1.39/midge/uploads/Chief Scie - Microsoft Internet Ex...

File Edit View Favorites Tools Help

Back Forward Stop Search Favorites History Print W

Address http://10.200.1.39/midgebytes/menu/default.asp?usr=SHENRY%20Mike&unt=Environmental%20Audit

UNITS RUNNING SNH NATURAL HERITAGE SEARCH DIRECTORIES ONLINE HOME HOW TO

## Natural Heritage Trends

The Natural Heritage Trends series is a collection of topic-based trend profiles. Each profile documents the best available information on rates and directions of change (temporal and spatial) in terrestrial, fresh water and marine environments. For an overview of the series go to [Natural Heritage Trends Introduction](#). Where possible, inter-related trends (which might be of interest collectively, or originate jointly from a particular study) have been brought together and presented in the form of a trend summary.

If you'd like to be notified when new or updated profiles become available, email [trends@snh.gov.uk](mailto:trends@snh.gov.uk)

For available trend summaries and profiles please select a category from the list below.

### Biodiversity

- Species
- Land cover: 1947-1988
- Broad habitats: 1990-1998
- Earth Sciences
- The UK Biodiversity Action Plan

### The Countryside

- Access and Recreation
- Landscape

### Natural Heritage Settings

- Greenspace in and around settlements
- Farmland
- Forest and woodland
- The uplands
- Fresh waters

### The Sea

- The marine environment
- Scottish marine fisheries

### Global Pressures

- A changing climate
- Climate change impacts on habitats and species
- Air pollution

: New Species profiles; Local Nature Reserves (Updated)

Local intranet

## information



### NATURAL HERITAGE TRENDS

#### AIR POLLUTION

Air pollution in Scotland is a local and an international concern. The social issues of urban air pollution have received prominent attention, but the potential impacts of air pollution in rural areas and on the natural heritage are less well known. Air pollution may lead to degradation of habitats, loss of species, a reduction in agricultural and forestry productivity, and damage to fish stocks.

The climate and geography of Scotland leads to marked gradients in air pollutant concentrations from the relatively unpolluted areas of the north-west, remote from pollutant sources, to the more polluted regions of the Forth and Clyde lowlands.

Air pollutants which can pose a threat to the natural heritage and the problems with which they are associated include:

- acidification of soils and fresh waters from acidifying pollutants dominated by sulphur and nitrogen compounds (Box 1 and 2);
- eutrophication of natural ecosystems by nitrogen compounds (Box 3); and
- damage to vegetation from photochemical oxidants (summer smog) dominated by ground level ozone (Box 4).

These pollutants present country-scale problems. Other pollutants, such as heavy metals, are more local in nature, or are restricted to urban areas.

The pollutant emissions which influence Scotland come from both domestic and European sources. The geographical position of Scotland at the north-west fringe of the European continent provides a source of largely clean air and rain from the west. Only with easterly or southerly winds do heavily polluted air masses reach Scotland from industrial areas in Europe, as occurred in 1986 following the Chernobyl accident. The rapid transport of pollutants by wind (typically 800 km per day) leads to the exchange of large quantities of pollutants across national boundaries.

The long range transport of pollutants in Europe has been the subject of extensive research, and methods to assess the threat to natural ecosystems have been developed for individual countries including the UK (CLAG, 1997) and at the European scale (EMEP, 2000). The scale of damage to natural ecosystems by acidifying pollutants led to an international protocol in 1985 to reduce the main contributor (sulphur) to the problem. Since then, further protocols have been negotiated and gradually, new agreements




*Aspidodermis longicaulis* has been adversely affected by increased deposition of nitrogen.



# External - trends on the internet

- organised by theme
- grouped by topic
- date stamped
- feedback

**Natural Heritage Trends**  
Trend Profiles - The uplands



Profile	Last Modified	Format	File Size
<a href="#">Uplands Summary</a>	26 Sep 2002	PDF	155 KB
<b>Trend profiles</b>			
<b>Land cover change 1940s-1980s</b>			
<a href="#">Blanket mire</a>	26 Sep 2002	PDF	130 KB
<a href="#">Heather moorland</a>	26 Sep 2002	PDF	129 KB
<a href="#">Rough grassland</a>	26 Sep 2002	PDF	128 KB
<b>Broad habitats 1990-1998</b>			
<a href="#">Bog</a>	26 Sep 2002	PDF	25 KB
<a href="#">Dwarf shrub heath</a>	26 Sep 2002	PDF	29 KB
<a href="#">Acid grassland</a>	26 Sep 2002	PDF	27 KB
<a href="#">Calcareous grassland</a>	26 Sep 2002	PDF	24 KB
<a href="#">Neutral grassland</a>	26 Sep 2002	PDF	27 KB
<a href="#">Bracken</a>	26 Sep 2002	PDF	24 KB
<a href="#">Plant diversity</a>	26 Sep 2002	PDF	36 KB
<a href="#">Landscape: Mountain and moorland</a>	26 Sep 2002	PDF	22 KB
<a href="#">Recreation in the uplands</a>	26 Sep 2002	PDF	39 KB

[Feedback](#)

[Join our Mailing List](#)

[Tell us what you think:](#) feedback on the scope and content of the series is most welcome.

[Join our mailing list:](#) receive notification of new and updated profiles.



Sustainable  
development is  
not 'out there'  
waiting to be  
discovered and  
mapped

## Indicators

By adopting the right set of indicators we  
can help to crystallise what that concept is,  
set priorities, monitor progress and shape  
future action and decisions



# Natural Heritage Indicators



*We need to synthesise signals of change into  
a clear interpretation of the state of the  
natural heritage*

*which is relevant to SNH purposes and which  
provides an authoritative public account.*



# Natural Heritage Indicators



## **Review of best practice and internal discussion (draft paper)**

Policy relevant	Outcomes / target levels / early-warning
Analytically sound	Data described / sources referenced
Easy to understand	Clear interpretation for non-specialist
Based on existing data	Best available data / frequent updates
Appropriate scale	Applicable / consistent



# Natural Heritage Indicators



Corporate Strategy	Themes & priorities
NH Futures	Objectives (Zones)
NH Trend	Potential data availability
Indicator	Representative of each theme
Appropriate scale	Nationally applicable / consistent



# Natural Heritage Indicators

## Examples

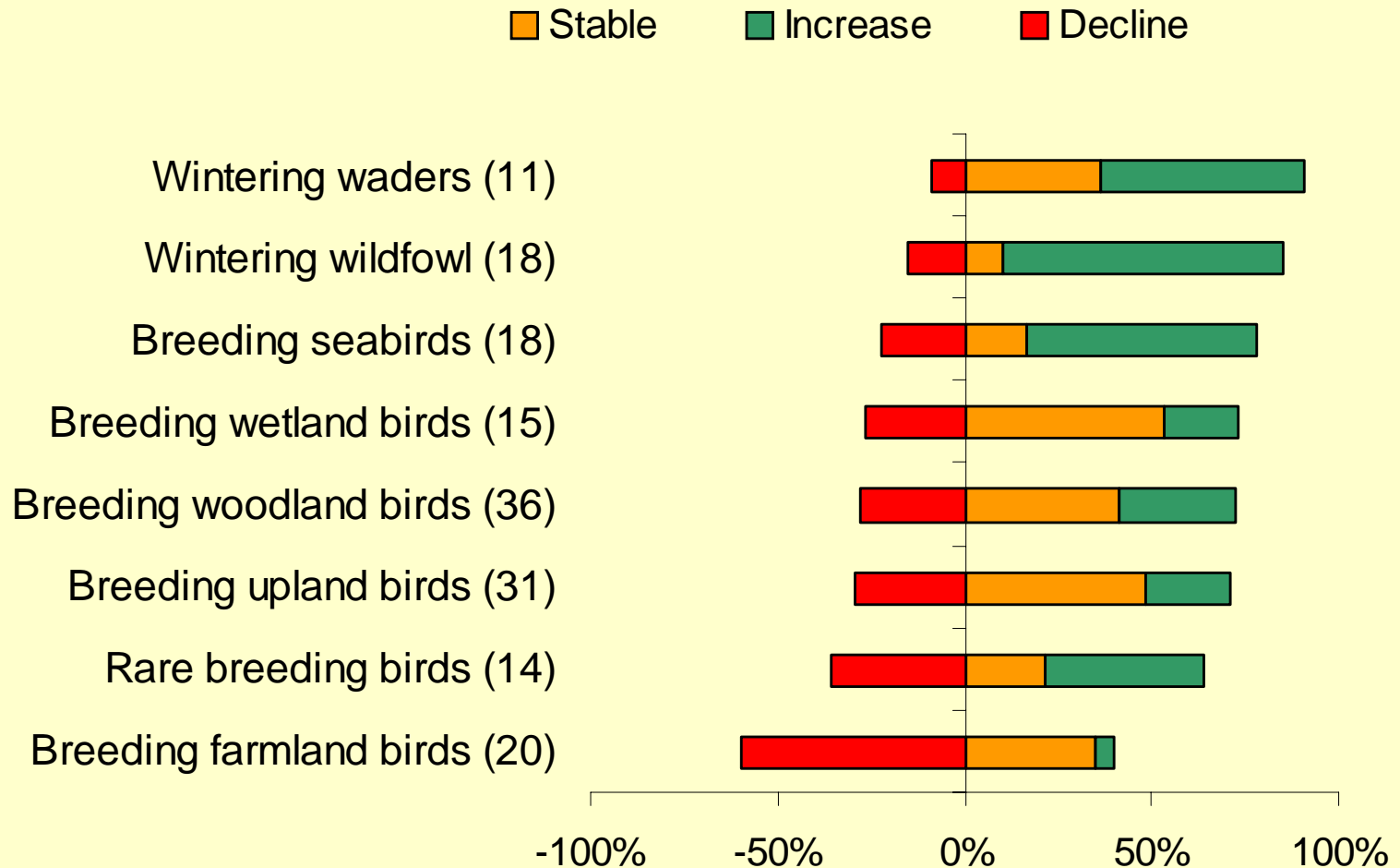


Caring for the natural world	BAP outcomes
	Condition of notified interest on sites
	Landscape change
	Wild birds x settings
	Informal recreation
	Path networks
Attractive places to live	Greenspace
	Awareness / public attitudes
Sustainable use	Grazing intensity in the uplands
	Forest & woodland networks
	Ecological status of fresh waters
	Status of marine fish stocks



# Bird population trends: long-term

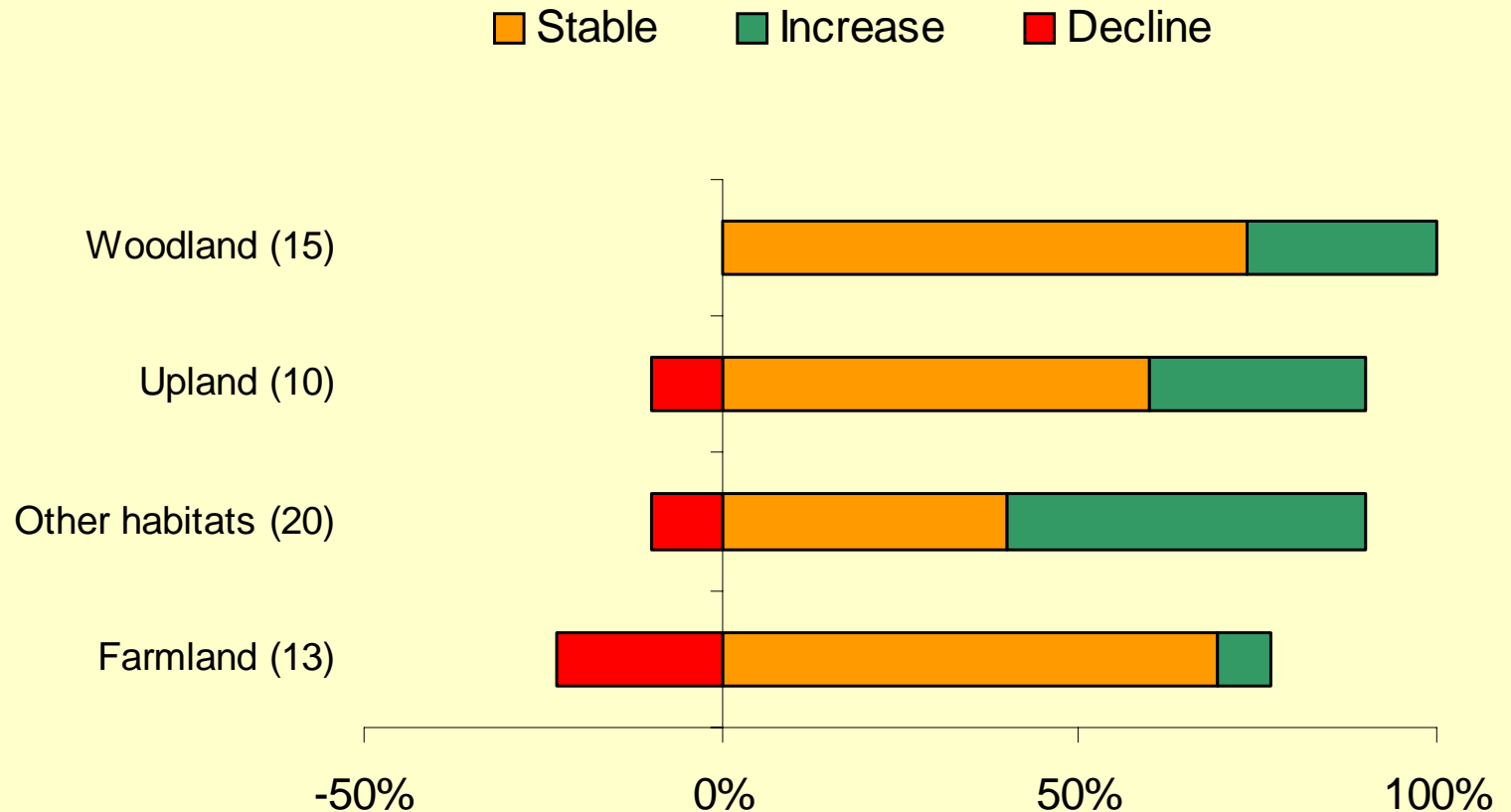
## Changes in range or abundance: 1960s-70s to 1990s





# Bird population trends: short-term

## Changes in abundance: 1994-2000





# Steer from SAC



Approach	Welcome, essential, urgent
Coverage	Not just rarities but also widespread change
Pragmatic	Develop a manageable list
Outcomes	Do we make a difference?
Scope	Remit - inc. landscape, physical processes

***GO FOR IT!***



# Natural Heritage Audit Next Steps



**National Strategy**

**Evidence-based policy**

**Collaborative working**

**CEH-MLURI**

**Academic community**

**Develop**

**DPSIR framework**

**Ecosystem processes**

**Physical, landscape, enjoyment**

**Harmonisation**

**Reporting obligations**

**Joint working with SEPA**

**Trends analysis**

**Deliver annual series**