

information



NATURAL HERITAGE TRENDS

INTRODUCED SPECIES: TERRESTRIAL AND FRESHWATER ENVIRONMENTS

An 'introduced' species is one present in an area outside of its historically known natural range, as a result of intentional or accidental dispersal by human activities. Such species are often referred to as 'alien' or 'non-native' species, and fall into several categories (Table 1). Some non-native species, such as the pheasant *Phasianus colchicus* and brown hare *Lepus europaeus*, are long-established and considered 'naturalised'. Others, such as the hedgehog *Erinaceus europaeus*, are native to much of Scotland, but have been introduced to the Western Isles, with adverse consequences for breeding waders.

Table 1 Six categories for classifying species according to their nativeness (from Usher, 2000).

Category	Sub-divisions
Native	-
Formerly native	a. Extinct because of environmental change b. Extinct due to human activity
Locally non-native	-
Long-established	-
Recently arrived	a. Arrival suspected of being human assisted b. "Natural" means of arrival suspected
Non-native	-

The effects of introduced species on their host environment include competition with native species, habitat alteration, hybridisation, predation and the transmission of disease or parasites. Generally, such detrimental effects tend to outweigh any benefits gained, and may ultimately reduce species diversity. Thus, over the past 400 years, more global extinctions have been attributed to introduced species than to any other factor (World Conservation Monitoring Centre, 1992). Currently, nearly 20% of vertebrate species at risk of global extinction are threatened by introduced species (McNeely, 1995).

At least 926 non-native terrestrial and freshwater species have become established in the wild in Scotland, within taxonomic groups for which adequate data are available (Welch *et al.*, 2001). Of these some 824 are vascular plants constituting 43% of vascular plant species in Scotland. More than half of Scotland's freshwater fish species, and 28% of mammal species are also non-native. Probably no sizeable areas of Scotland remain entirely free of introduced species. Non-native vascular plants are particularly well established in southern and central Scotland, reflecting their origins in parks and gardens, from which they have

spread mainly into woodlands (184 species) and grasslands (301 species). By contrast, only 29 introduced plant species have been recorded in association with upland or freshwater habitats.

Trends

At least 103 introduced plant species increased their geographical range in Scotland between the 1950s and 1988 (Welch *et al.* 2001). Species showing significant increases outnumbered those showing significant decreases by a factor of 12. Of the 58 plant species that increased their range significantly, 31 are thought to have a medium or high adverse impact on native species (Figure 1).

Changes in the range size of invasive plant species during this period showed north-south contrasts (Figure 2) in that:

- the *number* of invasive species showing an increase was greatest in southern and central Scotland; and
- the *proportion* of invasive species showing an increase was greatest in northern Scotland, the Outer Hebrides, and the Western Isles.

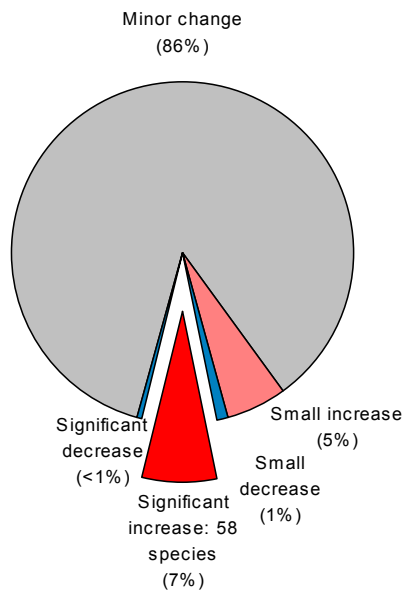
At least three Biodiversity Action Plan priority species in Scotland are partially threatened by non-native species.

- The red squirrel *Sciurus vulgaris* is now largely confined to Scotland and Ireland as a result of habitat reduction and fragmentation, and competition with the grey squirrel. Red squirrels are usually displaced within 15 years of the arrival of grey squirrels, appearing to suffer competitive exclusion by a species better adapted to fragmented British woodlands.
- A national survey in 1989-90 failed to find signs of water voles *Arvicola terrestris* in 67% of previously-occupied sites. A further survey in 1996-98 indicates that this trend had continued, with a further loss of 67.5% of remaining sites. The species' decline has been attributed to several factors, including mink predation, habitat loss, fragmentation, disturbance and pollution.
- Wilson's pouchwort *Acrobolbus wilsonii*, a leafy liverwort found in humid, wooded ravines, is thought to be partially threatened by shading and encroachment of rhododendrons at two sites in southern Argyll.

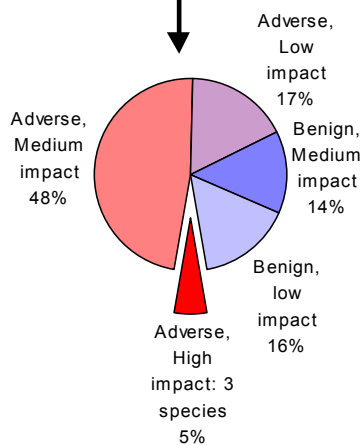
Of greater global concern is the threat posed by North American ruddy ducks *Oxyura jamaicensis*, now well-established in Britain, including parts of Scotland (Figure 3). Some of the British population winter alongside Spanish populations of their close relative, the white-headed duck *Oxyura leucocephala*. The latter is now threatened with global extinction, partly through hybridisation with its North American congener.

Figure 1 Trends in the geographic ranges of introduced plant species, between the 1950s and 1987-88. a) Changes in range size. b) Impacts predicted for species showing a significant increase in range size.

a.



b.



a) Changes in range size		b) Impacts predicted for species showing a significant increase in range size	
Type of change	No. of species	Type of impact	No. of species
Minor change	705	Adverse, High impact	3
Small increase	45	Adverse, Medium impact	28
Small decrease	8	Adverse, Low impact	10
Significant increase	58	Benign, Medium impact	8
Significant decrease	5	Benign, low impact	9
Total species	824	Total species	58

Figure 2 Regional variation in the number and percentage of introduced vascular plant species showing an increase in range between the 1950s and 1987-88.

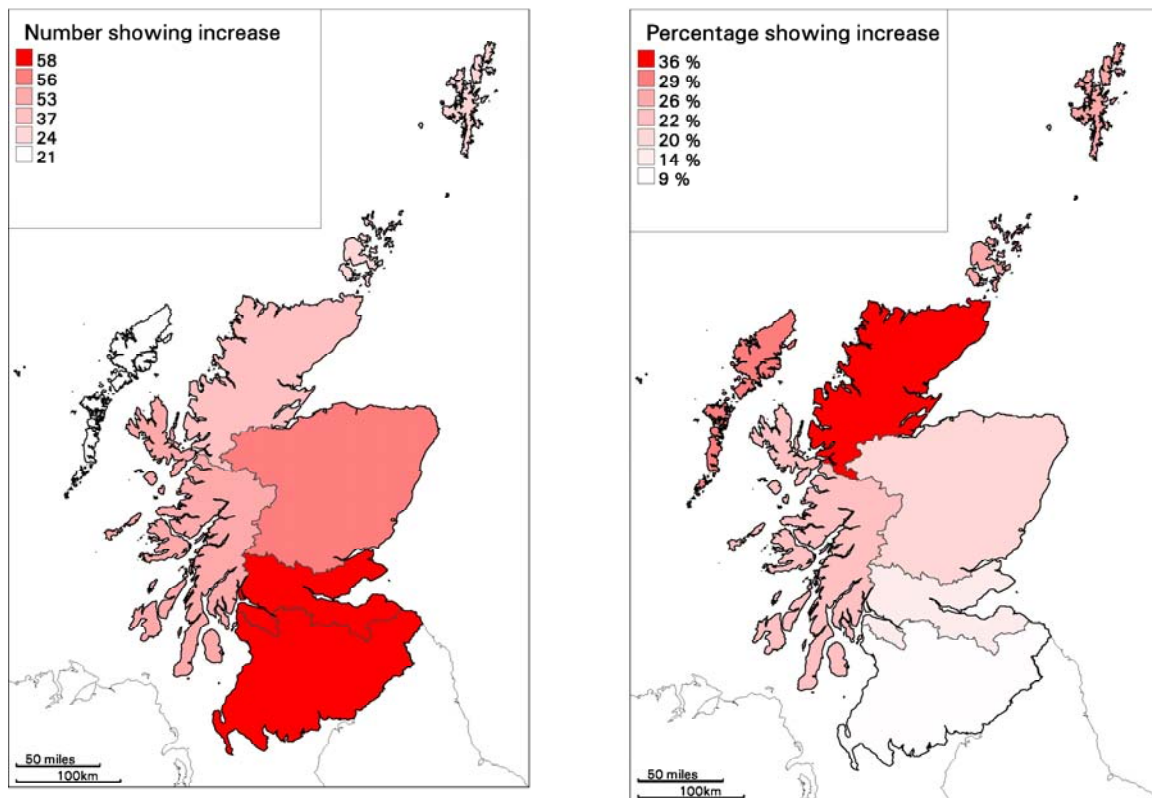
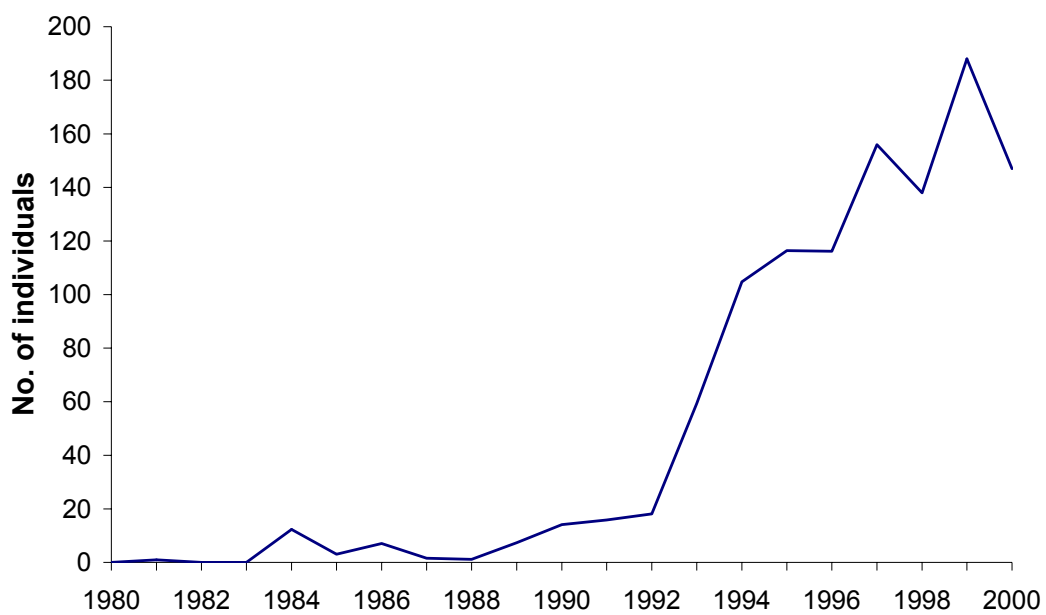


Figure 3 Peak counts of ruddy duck in Scotland since 1980.



Source

This profile has been developed from data extracted from Welch *et al.* (2001). Ruddy duck trend data were provided by the Wildfowl and Wetlands Trust. Additional sources were: UK Steering Group (1995), Hill *et al.* (1999), Strachan *et al.* (2000), Usher (2000).

Authorship

P. Shaw & C. Burns
Scottish Natural Heritage

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This note forms part of the Natural Heritage Trends series, documenting the best information available on rates and directions of change (temporal and spatial) in terrestrial, fresh water and marine environments.

Contact: FREEPOST natural heritage trends
e-mail: trends@snh.gov.uk

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