The Ecology of Poole Harbour
John Humphreys and Vincent May (editors)

12. Non-native Species in and around Poole Harbour

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Poole Harbour and its environs have become home to a range of alien aquatic and terrestrial flora and fauna. Some, like the hybrid Cord Grass and the Sika Deer have had a major impact on the habitats of the area, while others seem to have had little effect. This chapter describes the wide range of species, including those of the marine environment which have arrived or been introduced to the area in recent years.

Introduction

The issue of aliens and introductions is a vexed one. The introduction of non-native species either by accident or design is recognized as one of the major causes of the loss of biodiversity on our planet (IUCN, 2000). However, in Britain, no endemic plants are thought to have been made extinct, and there appear to be few rare plants threatened by introductions. If we include garden species, the British Isles hosts some 12,500 vascular plant species, of which only some 1400 are native, however, only 14 of this huge number of introduced species have become serious pests (Young, 2000).

In recent years, the rate at which introductions have arrived seems to have quickened. For example, one new aquatic vascular plant species entered the British flora in the 50 years up to 1850. In the following 50 years, the number was four, during the next 50 years, seven, and between 1950 and 2000, nine new species arrived. In 1928, Druce (1928) listed 293 vascular plant species as established aliens in Britain, an introduction rate of probably about one species a year over the previous 300 years. The latest lists, published in 1992 and 1994, list 889 established aliens, an average increase of about nine a year since Druce (Kent, 1992; Clement and Foster, 1994).

Introduced mammals are fewer in species, but can do a disproportionate amount of harm. Although, in Britain, the introduced North American Muskrat *Ondatra zibethicus* and the South American Coypu *Myocaster coypus* were successfully eliminated in 1937 and 1989, respectively, escaped Mink *Mustela vision*, and introduced Grey Squirrels *Sciurus carolinensis*, still pose a serious threat, the first to our native Water Vole *Arvicola terrestris*, and the other to the Red Squirrel *Sciurus vulgaris* populations, and both these introduced species seem unstoppable.

The Poole Harbour situation

The Poole Harbour basin has not been immune from these processes. The three mammals most likely to be seen are the Rabbit, introduced by the Normans in the twelfth century, the Grey Squirrel, first brought into Cheshire from North America in 1876, and then followed by another 30 introductions across England and Wales up to 1929, and the Sika Deer *Cervus nippon* introduced on to Brownsea Island from Japan in 1896.

Many of the drier woodland areas around the harbour contain Sycamore *Acer pseudoplatanus*, probably introduced into Britain in the fifteenth century and now found in 11 of the 19 woodland communities in Britain listed in the National Vegetation Classification (Rodwell, 1991). Areas of acid woodland and heath often contain *Rhododendron ponticum*, which has been here since at least 1763 and is one of the serious pests referred to earlier. On the Arne peninsula to the south of the harbour, the elimination of Rhododendron in the next 5 years is finally contemplated, a process which began in the mid-1960s.

In contrast, two species, *Cotoneaster simonsii*, found growing in woods and on heaths and roadsides around the harbour, and a more recent introduction, the Mexican Daisy *Eiogeron karvinskianus*, found on walls and in paved areas around Wareham, seem to offer little threat to native species. The former is one of 67 species of *Cotoneaster* growing in the wild in Britain, the commonest genera among vascular plant introductions (Clement and Foster, 1994).

It is often the freshwater aquatic habitats which seem to fare worst when alien plants and animals arrive. Twenty-three known non-native aquatics are known to be established in Britain, the commonest, Canadian Waterweed *Elodea canadensis* first recorded in 1842, and the most recent, Floating Pennywort *Hydrocotyle ranunculoides*, first seen in 1990 and now found in ten 10 km squares (Farrell, 2001). In the ditches around Poole Harbour, Least Duckweed *Lemna minuta* and Water Fern *Azolla filiculoides* from the Americas, and Pygmyweed *Crassula helmsii* from New Zealand, have all been introduced.

As a result of the accidental introduction of the American Cord Grass *Spartina alterniflora* and hybridization with our native Cord Grass *Spartina maritima*, followed by the production of a fertile hybrid a few years later, large areas of Poole Harbour are covered by saltmarsh dominated by the fertile hybrid *Spartina anglica*, although this species has waned in the harbour over recent decades (Gray and Benham, 1990). This species is now seen as having some conservation benefit, as it provides some protection for saltmarshes against erosion, and to roosting waterbirds. *Spartina* is present, often as the only species, in over 50% of the high tide roosts used by wintering and passage waders in Poole Harbour (Morrison, 2004).

A marine non-native species directory published by the Joint Nature Conservation Committee (Eno *et al*., 1997) listed some 20 algal and 30 invertebrate species known to

have become naturalized in British coastal waters, estuaries and lagoons. Difficulties associated with recording and monitoring species within the marine environment ensure that this is likely to be a considerable underestimation of the true number of marine non-natives that have become naturalized after introduction. Species are commonly introduced as ship fouling organisms, ballast water inhabitants, or associates of intentionally introduced shellfish.

Surveys undertaken in Poole Harbour over recent decades have revealed a substantial presence of marine seaweed and invertebrate invaders on shores and in low water channels (Dyrynda, 1987, 2003). Scattered shells of the North American Slipper Limpet *Crepidula fornicata* stranded on sandy shores around the harbour mouth originate from dense accumulations of limpet clusters that carpet low water channels in many parts of the harbour. This species is a serious pest of both natural and farmed oyster beds in Poole Harbour (Dyrynda, 1987) and many other locations in north-west Europe (Eno *et al*., 1997**)**. Copses of the Japanese Seaweed *Sargassum muticum* have been a feature of channel margins in the outer harbour during summer months since this species arrived in Poole *c*. 1977. The Korean Sea Squirt *Styela clava*, first recorded near Plymouth in 1953, now extensively colonizes mollusc shells and other substrates in Poole Harbour channels, whereas the introduced bivalve mollusc *Petricola pholadiformis* burrows in sub-tidal hard clay. The Australasian Barnacle *Elminius modestus* (introduced to the UK by Second World War shipping) is abundant on docks and piers across the harbour.

Marine invasions continue to the present day. In 1997, Poole Harbour provided the second Atlantic record for a Pacific bryozoan *Tricellaria inopinata* (Dyrynda *et al*., 2000), and recent surveys (spring and summer 2003) have revealed two more significant records for Poole, pioneer colonies of Wakame *Undaria pinnatifida*, a large edible brown seaweed from South East Asia, and the extensive presence of the red seaweed *Agardhiella subulata* (Dyrynda, this volume, chapter 8). In most cases, these introductions have involved accidental transfers, usually via other British coastal locations. One exception, however, has involved hatchery-reared stock of the Manila Clam *Tapes phillipinarum*, farmed west of Brownsea Island since the late 1980s. Naturalization and colonization of sedimentary shores and shoals across the harbour followed during the 1990s, enabling the birth of a now well-established new commercial fishery.

Conclusion

The introduction of alien species is a complex issue. Effects on native habitats and species are often difficult to disentangle and many introductions appear to be neutral or benign. The problem in most cases is that we cannot predict when making a new introduction of an alien species, either deliberately or accidentally, whether it will be harmful to our native fauna and flora or not. When introduced species do prove to be harmful, eradication is, in most cases, not a realistic option, leaving acceptance, or resource-intensive, long-term control measures, as the only options.

Evidence from terrestrial studies shows that aliens are often a threat to native species, resulting in population declines, limiting distributions, and in extreme cases, causing extinctions (e.g. Clout and Veitch, 2002). It is less clear how introduced species impact on marine ecosystems and species. One estimate suggested that the main causes of extinction in marine organisms have been human exploitation and habitat destruction and that only a handful of species have been lost as a result of introductions (Dulvy *et al.*, 2003). However, marine extinctions and their causes are difficult to detect and could be underestimated. Experience suggests that in any consideration of introductions, the precautionary principle should always prevail.

References

Clement, E. J. and Foster, M. C. (1994) *Alien Plants of the British Isles*. London: Botanical Society of the British Isles.

Clout, M. N. and Veitch, C. R. (2002) Turning the tide of biological invasion: the potential for eradicating invasive species. pp: 1–3. In: *Turning the Tide: Eradication of Invasive Species. Proceedings of an International Conference on Eradication of Island Invasives*. Veitch, C. R. and Clout. M. N. (eds). Cambridge: World Conservation Union (IUCN).

Druce, G. C. (1928) *British Plant List*. Arbroath: Buncle.

Dulvy, N. K., Sadovy, Y. and Reynolds, J. D. (2003) Extinction vulnerability in marine populations. *Fish and Fisheries*, **4**: 25–64.

Dyrynda, P. E. J. (1987) *Poole Harbour Subtidal Survey. Baseline Assessment*. Report to the Nature Conservancy Council.

Dyrynda, P. E. J., Fairall, V. R., Occhipinti Ambrogi, A. and d'Hondt, J-L. (2000) The distribution, origins and taxonomy of *Tricellaria inopinata* d'Hondt & Occhipinti Ambrogi, 1985, an invasive bryozoan new to the Atlantic. *Journal of Natural History*, **34**: 1993–2006.

Dyrynda, P. E. J. (2003) *Marine Ecology of Poole Harbour*. http://www.swan.ac.uk/biodiv/poole

Eno, N. C., Clark, R. A. and Anderson, W. G. (1997) *Non-native Marine Species in British Waters: A Review and Directory.* Peterborough: Joint Nature Conservation Committee.

Farrell, L. (2001) Alien aquatic plants in Britain. In: *Alien Species – Friends or Foes? Journal of the Glasgow Natural History Society*, Suppl., **23**: 44–47.

Gray, A. J. and Benham, P. E. M. (1990.) *Spartina anglica – A Research Review*. London: HMSO and Institute of Terrestrial Ecology.

IUCN (2000) *Guidelines for the Prevention of Biodiversity Loss Due to Biological Invasion*. Gland: World Conservation Union.

Kent, D. H. (1992) *List of Vascular Plants of the British Isles*. London: Botanical Society of the British Isles.

Morrison, S. J. (2004) *Wader and Waterfowl Roost Survey in Poole Harbour 2002/03*. Wareham: Poole Harbour Study Group.

Rodwell, J. S. (ed.) (1991) *British Plant Communities.* Volume 1. *Woodlands and Scrub*. Cambridge: Cambridge University Press.

Young, B. (2000) Invasive species and other priorities for English Nature. In: *Exotic and Invasive Species*. Bradley, P. (ed.). *Proceedings of the Eleventh Conference of the IEEM, Winchester.*