

Restoration of the littoral margin by removing trees around Hoveton Great Broad, Norfolk, England

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SUMMARY

Removal of alder *Alnus glutinosa* and grey sallow *Salix cinerea* carr from the edge of Hoveton Great Broad led to restoration of vegetation around the littoral margin; after removal of trees from some of the wetland edge emergent littoral plants showed vigorous growth.

BACKGROUND

The Broadlands of Norfolk and Suffolk, eastern England, are Britain's largest protected wetland area. They consist of 63 man-made interlinked shallow freshwater lakes formed 600 years ago when medieval peat diggings flooded as water levels rose. There are over 200 km of navigable waterways, with many more small waterways, such as streams and dykes. These link a variety of habitats which support a rich diversity of wildlife, including some of the rarest flora and fauna in Britain.

In the Broads, the presence of a well developed littoral margin around a lake and a high proportion of reed *Phragmites australis* swamp edge to open water, is thought to play a key role in determining the predator/prey interactions in the fish community and provides sheltered areas for aquatic macrophytes. Reed swamp is also a valuable transition habitat for plant communities and it supports several nationally scarce invertebrates and birds. Hence, preventing succession to carr woodland is considered important for the maintenance and restoration of some Broadland plant and animal communities.

This case describes the effect of removing alder *Alnus glutinosa* and grey sallow *Salix cinerea* carr from the edge of Hoveton Great Broad to restore the littoral margin.

ACTION

Study site: Hoveton Great Broad is part of the

Bure Marshes National Nature Reserve and lies within the Broads National Park in Norfolk, eastern England. It is connected to the River Bure and is surrounded by alder and willow carr woodland and fen. There is little human disturbance as there is no boat access, but there is an English Nature public boardwalk.

Removal of trees from lake edge: In autumn and winter in 1999 and 2000, overhanging alders and sallows were removed from a 10 m wide strip around approximately 4,200 m (85%) of the perimeter of Hoveton Great Broad. Areas to be felled were selected by visual inspection and use of aerial photos. Old woodland trees were checked for bat roosts prior to cutting (all bat species are legally protected in the UK). An English Nature contractor felled the trees using a chainsaw. The stumps were then levelled and those not near the water's edge were treated with glyphosate (Roundup®) herbicide according to manufacturers instructions. The felled material was windrowed (stacked) within the remaining tree line, leaving gaps every 25 m.

Depending on the situation, regrowth was either treated with foliar spray (glyphosate), or cut back again if near the waters edge. However, due to very little regrowth, this was required over only 19 days in June/July 2002, and one day in July 2003.

Monitoring: Every summer since 2000, the site has been monitored by visual inspection by boat and from the walkway. At this time it is determined if regrowth needs to be treated. Diversity and abundance of plant species are estimated.

CONSEQUENCES

Removal of trees from lake edge: As soon as the trees were removed in 2000, and thus light levels subsequently increased, riparian plants began to recover. Initial growth occurred from the pre-existing wet woodland understorey vegetation that was present. This was dominated by lesser pond-sedge *Carex acutiformis* and greater pond-sedge *Carex riparia*, neither of which colonise open water.

By spring 2000, there was vigorous growth of emergent plants, which contributed to an improved littoral zone. This typically contained approximately 75% of open fen species (e.g. yellow flag *Iris pseudacorus*, hairy willow-herb *Epilobium hirsutum*, hemp agrimony *Eupatorium cannabinum*, yellow loosestrife *Lysimachia vulgaris* and marsh fern *Thelypteris palustris*). The notable exceptions were lesser reedmace *Typha angustifolia* and

reed *Phragmites australis*, which although present, were in small numbers, presumably due to their susceptibility to being shaded out. Since 2001 however, reed cover has been steadily increasing.

By summer 2005, these open water colonisers had established in 10 patches (approximately 20 m strips) around the lake.

Conclusions: The removal of trees from the lake edge was a simple and effective method for improving the vegetation in the littoral zone around Hoveton Great Broad. It has been important to monitor the site in order to control any woody regrowth. In addition, areas of littoral trees have been maintained (15%) as these are thought important as bat roosts (especially for Daubenton's bat *Myotis daubentonii*), and also provide wet woodland habitat for many other species.