

Creation of dykes on grazing marshes and effects on the Norfolk hawker *Aeshna isosceles* dragonfly at Ludham and Potter Heigham Marshes NNR, Norfolk, England

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SUMMARY

At a National Nature Reserve in the Norfolk Broads (eastern England), between 1986 and 1998, 1,600 m of new dykes were excavated in the winter months. Seven of these 12 dykes were subsequently colonised by Norfolk hawker *Aeshna isosceles* dragonflies (a UK species of conservation concern).

BACKGROUND

The Norfolk hawker *Aeshna isosceles* is widely distributed in lowland areas of southern and central Europe, south to North Africa, but in Britain it has always been scarce and local. *A. isosceles* is listed under Category 1 (endangered) in the British Red Data Books on Insects (Shirt 1987) and, due to its rarity, is a UK Biodiversity Action Plan Species.

At the turn of the century the Norfolk Broads in eastern England, supported thriving populations but in the late 1970s and early 1980s surveys indicated that it had greatly declined and was absent from many former haunts. This decline is primarily attributed to habitat loss and water pollution. The Norfolk hawker, in Britain, is now confined to the grazing marshes in the Norfolk and Suffolk Broads. However, since the 1980s it has steadily spread, re-colonising former sites. This has coincided with habitat restoration, improvements in water quality and several warm summers. One such habitat restoration programme is described here.

ACTION

Excavation of new dykes: In the Norfolk and Suffolk Broads, the Norfolk hawker is

characteristically a species of unpolluted fen and grazing marsh ditch and dyke systems. Inhabited water bodies in The Broads usually contain a rich flora with water soldier *Stratiotes aloides* almost always present. Other floating/semi-submerged plants often include frogbit *Hydrocharis morsus-ranae*, pondweed *Potamogeton* spp. and greater bladderwort *Utricularia major*.

Both the Norfolk hawker and water soldier appear to prefer dykes with a reduced flow rate, such as those found in dykes that branch off the main system or those that have a dead end. With these habitat requirements in mind, at Ludham and Potter Heigham Marshes National Nature Reserve (Norfolk Broads) between 1986 and 1998, 1,600 m of new dykes were excavated in the winter months (560 m in 1986, 550 m in 1996 and 560 m in 1998) and linked to dykes already used by Norfolk hawkers.

CONSEQUENCES

Colonisation of new dykes by water soldier and Norfolk hawker dragonflies: Within two years of the first 560 m of dykes being dug, 360 m were naturally colonised by water soldier and subsequently used by Norfolk hawkers. The next two dyke creation events

were also followed by colonisation of water soldier along 200 m (out of 550 m) in 1997 and 330 m (out of 560 m) in 1999. These dyke lengths were also subsequently colonised by Norfolk hawkers. Altogether, seven out of the 12 dykes created over the period 1986-1998 subsequently showed the presence of Norfolk hawkers when surveyed.

Conclusions: It has been difficult to assess how beneficial this scheme has been as the increase in dragonfly numbers has been difficult to quantify. However, since 1986, 890 m of the newly excavated dykes have been colonised by water soldier and these lengths have all been used by Norfolk hawkers where ovipositing females have regularly been observed. These new stretches have increased the suitable aquatic breeding habitat by approximately 30% and consequently a significant increase in dragonfly numbers has been assumed.

These dykes have only been surveyed completely for the presence of adults (as opposed to their aquatic larvae) and surveys to obtain proof of breeding for individual dykes has not been sought. However, Norfolk hawkers breed extensively at the site in general and the additional lengths of dyke have created new areas of unpolluted habitat which has undoubtedly also benefited many other invertebrates and aquatic plants, some of these also local and uncommon species.

REFERENCES

Shirt D.B. (1987) *British Red Data Book: 2 Insects*. Nature Conservancy Council, Peterborough, UK.