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Alice McCosh Trust Report



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Background to the Project

The Norfolk Hawker (*Aeshna isosceles*) is such a rare dragonfly in the United Kingdom that it is protected by law. This species of dragonfly is only found in the Norfolk Broads and a small area of Suffolk. Much of the knowledge regarding the Norfolk Hawker (Plate 1) in the UK derives from the work of Leyshon and Moore (1993). However, there is still a great deal that is unknown about the habitat requirements of the dragonfly.



Plate 1: A specimen of a Norfolk Hawker larva

The survival of the Norfolk Hawker in the UK is faced with many pressures, such as loss of appropriate habitat and various types of agricultural and urban pollution. However, saltwater inundation and intrusion into the regions occupied by Norfolk Hawker, caused and intensified by sea-level rise, is currently the most significant threat to the survival of the dragonfly. As a result, the aim of the project is to further the knowledge on the habitat requirements of the Norfolk Hawker and investigate the potential effect of increases in salinity on the dragonfly's survival in the Norfolk Broads.

Programme of Investigation

As a preliminary investigation several historic datasets, which were kindly provided by the Environment Agency, Halcrow Ltd. and Natural England, were analysed in order to determine any conclusions that can be drawn about the dragonfly's habitat requirements from the data. Furthermore, the change in the distribution of the Norfolk Hawker in the UK over the last 30 years was also investigated. These investigations yielded several findings:

1. The Norfolk Hawker dragonfly had increased its distribution both south and west over the last 30 years by successfully colonising new sites.
2. Breeding populations of Norfolk Hawker were present where water salinity ranged from 0.66gL^{-1} to 1.94gL^{-1} during the 1984-2007 time period (seawater average salinity is 35gL^{-1}).
3. The dragonfly was strongly associated with habitats with specific plant communities (the A2, A3a and A3b endgroups of the Broadland dyke vegetation classification of Doarks and Leach, 1990).

In order to determine the extent of the accuracy of the conclusions from the historical data analyses and to examine the preferred habitat conditions of the Norfolk hawker dragonfly in greater detail, surveys were undertaken at a number of locations (Plate 2) in the Norfolk Broads in both spring and summer. The surveys comprised of collecting aquatic invertebrate community samples (Plate 3), physico-chemical and aquatic plant data (Plate 4). Without the Alice McCosh funding the spring survey would not have been undertaken due to the costs of equipment hire and accommodation during the fieldwork period.



Plate 2: The Ludham Marshes sampling location



Plate 3: The collection of aquatic invertebrate samples



Plate 4: The collection of physico-chemical data

The Findings of the Project

Analysis of the data gathered during the field surveys resulted in several interesting conclusions being drawn. The field data revealed that the Norfolk Hawker occurs in very diverse invertebrate communities and where the plant community is abundant and diverse, often alongside other rare animals (e.g. Plate 5) and plants. These findings indicate that the Norfolk Hawker occurs in climax communities rather than as a coloniser of newly formed habitats, implying that the successful breeding habitat of the dragonfly is an aged dyke unaffected by disturbances such as changes in water quality, over-management or fluctuations in climate.

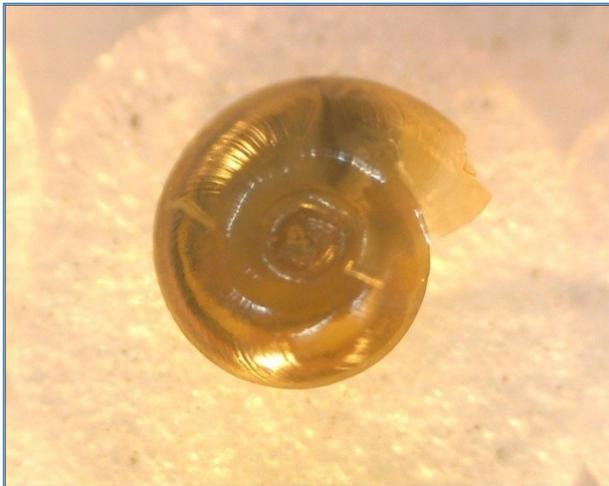


Plate 5: A specimen of the Shining Ramshorn Snail (*Segmentina nitida*), a very rare aquatic snail

Further analysis of the field data revealed that the key habitat requirements of the Norfolk Hawker dragonfly are low water salinity, abundant floating vegetation and deep water. Abundant submerged vegetation was a key habitat requirement in spring but not in summer.

The data collected at the surveyed sites which are known to be occupied by breeding populations of Norfolk Hawker were investigated, and it was found that these sites had an average water depth of 620mm and an average coverage of the water surface by floating vegetation of 42%. Furthermore, recorded water salinities at these sites were in the range 0.28gL^{-1} to 0.71gL^{-1} . The analysis of the field data also confirmed the findings of the historic data analysis; the Norfolk Hawker dragonfly has a preference for particular aquatic plant communities, rather than a single specific plant species as it was once believed (e.g. Shirt, 1987).

Overall, it was concluded that an increase in salinity to above approximately 1.4gL^{-1} will result in the exclusion of the Norfolk Hawker dragonfly from a location. As such, over-topping or intrusion events by brackish water may be tolerated by a population of the Norfolk Hawker if the event is of short duration, low intensity and the brackish water is quickly flushed from the populated habitat. Some populations of the dragonfly may therefore survive a rise in sea level due to the fact that the species has colonised the dykes well inland in the Broadlands. Populations vulnerable to such an event may survive where water quality and vegetation profiles in ponds and dykes isolated from the effects of sea level rise are appropriate.

It is hoped the knowledge developed during the course of this project will be used to inform on the effects of saline intrusion, as well as leading to improved wetland habitat management for the Norfolk Hawker dragonfly and other freshwater animals. All enquires about the project may be directed to Alex Pickwell (mrpickwell@gmail.com).

Acknowledgements

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Costs

Hire of water quality logger (1 week)	£480.00	}	Alice McCosh Trust
Accommodation during field work	£268.00		
Fuel	£100.00		
Sub-total	£848.00		
Costs incurred during summer season sampling	£700.00	}	Broads Authority
Laboratory based identification of samples	£1,300.00		
Desk study including results analysis and report preparation	£3,000.00		
Sub-total	£5000.00		
OVERALL TOTAL	£5848.00		

References

Doarks, C., and Leach, S.J., A classification of grazing marsh dyke vegetation in Broadland, Project No. 76, 1990, unpublished report for the England Field Unit, Nature Conservancy Council.

Leyshon, O.J., and Moore, N.W., A note on the British Dragonfly Society's survey of *Anaciaeschna isosceles* at Castle Marshes, Barnby, Suffolk, 1991-1992. *Journal of the British Dragonfly Society*, **9** (1993) 5-9.

Shirt, D.B., *British red data books: 2. Insects*, 1987, Nature Conservancy Council.