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A short bibliography of fens and aspects of their conservation

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A short bibliography of fens and aspects of their conservation

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Introduction

This short bibliography consists of references about fens and their conservation considered to be useful to English Nature staff. A number of the papers and articles contain further useful references which can be pursued by those who are keen.

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The future

I will endeavour to update and expand the bibliography and this will provide the opportunity to incorporate comments **which I hope will be forthcoming**.

1. Catchments

There are few papers written specifically about the relationship between fens and their catchments. Dutch researchers have given this topic some consideration, but the main work on this subject in Britain is that of Wheeler and Shaw.

FOJT, W.J. 1991. *The conservation of fens and their catchments with particular reference to the north of Scotland.* Peterborough, Nature Conservancy Council (CSD Note No. 58).

FOJT, W.J. In press. Fen conservation and fen catchments. Paper given at conference of International Peat Society: *The Changing Face of the Fenlands and Implications for their Future Use.* Cambridge 1991.

KOERSELMAN, W., BAKKER, S.A., & BLOM, M. 1990. Nitrogen, phosphorus and potassium budgets for two small fens surrounded by heavily fertilized pastures. *Journal of Ecology, 78,* 428-442.

KOERSELMAN, W., BELTMAN, B., & VERHOEVEN, J.T.A. 1988. Nutrient budgets for small mesotrophic fens surrounded by heavily fertilised grasslands. *Ecological Bulletins, 39,* 151-153.

VERHOEVEN, J.T.A., VAN BEEK, S., DEKKER, M., & STORM, W. 1983. Nutrient dynamics in small mesotrophic fens surrounded by cultivated land. I. Productivity and nutrient uptake by the vegetation in relation to the flow of eutrophicated ground water. *Oecologia* (Berlin), *60,* 25-33.

WHEELER, B.D., & SHAW, S.C. 1992. Agricultural land use and rich-fen vegetation. *In:* Peatland ecosystems and man: an impact assessment, ed. by O.M. Bragg *et al.* (Joint symposium of the British Ecological Society and the International Peat Society, Dundee, 1989.)

See also 'general' section papers by Shaw and Wheeler (1990, 91) and Wheeler and Shaw (1987). Also refer to 'enrichment' section.

2. Classification of fen types

These references describe the hydromorphological classification of fens.

FOJT, W.J. 1989. *Quick reference to fen vegetation communities.* Peterborough, Nature Conservancy Council. (CSD Note No. 45.)

NATURE CONSERVANCY COUNCIL. 1989. Chapter 7 *In: Guidelines for selection of biological SSSIs.* Peterborough, Nature Conservancy Council.

WHEELER, B.D. 1984. British fens: a review. *In: European mires,* ed by P.D. Moore, 237-281. London, Academic Press.

3. Enrichment

Dutch researchers have been very active in this field and Wheeler and Shaw have also considered this aspect in their report listed in the general section.

EGGELSMAN, R. 1981. Hydrological aspects of peatland utilisation and conservation in northwestern Germany. *Proc. 6th Int. Peat Congress, Duluth USA, Aug 17-23 1980.*

KOERSELMAN, W., BELTMAN, B., & VERHOEVEN, J.T.A. 1988. Nutrient budgets for small mesotrophic fens surrounded by heavily fertilised grassland. *Ecological Bulletin, 39,* 151-153.

KOERSELMAN, W., BAKKER, S.A., & BLOM, M. 1990. Nitrogen, phosphorus and potassium budgets for two small fens surrounded by heavily fertilised pastures. *Journal of Ecology, 78,* 428-442.

SCHOT, P., BARENDREGT, A., & WASSEN, M.J. 1988. Hydrology of the wetland Naardermeer: Influence of the surrounding area and impact on vegetation. *Agricultural Water Management, 14,* 459-470.

VAN BAAREN, M., DURING, H., & LEITZ, G. 1988. Bryophyte communities in mesotrophic fens in the Netherlands. *Holarctic Ecology, 11,* 32-40.

VERHOEVEN, J.T.A. 1986. Nutrient dynamics in minerotrophic peat mires. *Aquatic Botany, 25,* 117-137.

VERHOEVEN, J.T.A., VAN BEEK, S., DEKKER, M., & STORM, W. 1983. Nutrient dynamics in small mesotrophic fens surrounded by cultivated land. I. Productivity and nutrient uptake by the vegetation in relation to the flow of eutrophicated ground water. *Oecologia (Berlin), 60,* 25-333.

WHEELER, B.D., & SHAW, S.C. 1990. Dereliction and eutrophication in calcareous seepage fens. In: Calcareous grasslands - ecology and management, ed by S.H. Hillier, D.W.H. Walton and D.A. Wells, 154-160. Huntingdon, Bluntisham.

See also 'General' section, papers by Shaw and Wheeler (1990, 91) and Wheeler and Shaw (1987).

4. Evaluation of fens for conservation

FOJT, W.J. 1990. The selection of British fens for Conservation. *In: Peat use and peatland conservation.* 44-55. Procurement of the International Peat Society, Keszthely, Hungary, 3-9 September 1990.

NATURE CONSERVANCY COUNCIL. 1989. Chapter 7, *In: Guidelines for the selection of biological SSSIs.* Peterborough, Nature Conservancy Council.

WHEELER, B.D. 1988. Species richness, species rarity and conservation evaluation of rich-fen vegetation in lowland England and Wales. *Journal of Applied Ecology, 25,* 331-353.

5. Hydrology

There has been very little research on fen hydrology in comparison to that undertaken on bogs. The earliest works are very site specific, eg Godwin (1932) at Wicken Fen and Kassas (1951) at Chippenham Fen. Even later investigations undertaken by the Institute of Hydrology (Gilman and Newson) at Cors Erdreinniog, Anglesey (1982), are site-specific. However, general principles are apparent from these studies. The work of Birmingham University (Gilvear 1992) partly summarised in the paper listed below, though concentrating upon East Anglia, provides useful new directions for investigation.

The Dutch have done a great deal of work specifically upon the hydrological and vegetation response of fens (rich-fens) to water loss. I have only listed one paper here, but section 9.1 provides further useful references.

GILMAN, K., & NEWSON, M.D. 1982. The Anglesey wetlands study. *Report No. 430 to Nature Conservancy Council.* (Contract Number HF3/03/158.)

GILVEAR, D.J. *et al.* 1992. Comparison of the hydrodynamics of three minerotrophic mires in East Anglia, England. In: Peatland ecosystems and man: an impact assessment, ed. by O.M. Bragg *et al.* Joint symposium of the British Ecological Society/International Peat Society, Dundee, 1989.

GODWIN, H., & BHARUCHA, F.R. 1931. Studies in the ecology of Wicken Fen. I. The groundwater level of the fen. *Journal of Ecology, 19,* 449-473.

GODWIN, H., & BHARUCHA, F.R. 1932. Studies in the ecology of Wicken Fen. II. The fen water table and its control of plant communities. *Journal of Ecology, 20,* 187-191.

GROOTJANS, A.P., & TEN KLOOSTER, P.H.W. 1980. Changes of groundwater regime in wet meadows. *Acta Botanical Netherlands, 29* (5/6), 541-554.

KASSAS, M. 1951. Studies in the ecology of Chippenham Fen. I. The fen water table level. *Journal of Ecology, 39,* 1-18.

6. Management

There is much scattered information on the management of fen vegetation, in particular mowing. There is relatively little work concerning the management of poor fens, though Shaw and Wheeler (1990) provides valuable information.

The following references include management techniques applied to reed-beds and more diverse fen vegetation.

GILLER, K.E. & WHEELER, B.D. 1986. Past peat cutting and present vegetation patterns in an undrained fen in the Norfolk Broadland. *Journal of Ecology, 74,* 219-247.

GRYSEELS, M. 1989a. Nature management experiments in a derelict reedmarsh. I: Effects of winter cutting. *Biological Conservation, 47,* 171-193.

GRYSEELS, M. 1989b. Nature management experiments in a derelict reedmarsh. II: Effects of summer mowing. *Biological Conservation, 48,* 85-99.

HASLAM, S.M. 1972. The reed, *Phragmites communis* Trin. *In:* The reed *('Norfolk Reed')*, 3-58. Norfolk Reedgrowers Association, Norwich.

MOOK, J.H., & VAN DER TOORN, J. 1982. The influence of environmental factors and management on stands of *Phragmites australis*. II. Effects on yield and its relationship with shoot density. *Journal of Applied Ecology, 19,* 501-517.

ROWELL, T.A., GUARINO, L., & HARVEY, H.J. 1985. The experimental management of vegetation at Wicken Fen, Cambridgeshire. *Journal of Applied Ecology, 22,* 217-227.

ROWELL, T.A. 1988. *The peatland management handbook.* Peterborough, Nature Conservancy Council.

VAN DER TOORN, J., & MOOK, J.H. 1982. The influence of environmental factors and management on stands of *Phragmites australis*. I. Effects of burning, frost and insect damage on shoot density and shoot size. *Journal of Applied Ecology, 70,* 179-200.

WHEELER, B.D. 1983. Vegetation, nutrients and agricultural land use in a north Buckinghamshire valley fen. *Journal of Ecology, 71,* 529-544.

WHEELER, B.D. 1983. *Turf ponds in Broadland.* Unpublished report to the Broads Authority.

WHEELER, B.D. 1985. *Management trials on fen vegetation in the Broadland fens, 1979-1983.* Unpublished report to the Nature Conservancy Council.

WHEELER, B.D., & GILLER, K.E. 1982. Species richness of herbaceous fen vegetation in Broadland, Norfolk, in relation to the quantity of above-ground plant material. *Journal of Ecology, 70,* 179-200.

WHEELER, B.D., & SHAW, S.C. 1991. Above-ground crop mass and species-richness of the principal types of herbaceous rich-fen vegetation of lowland England and Wales. *Journal of Ecology, 79,* 285-301.

See also 'general' section papers by Shaw and Wheeler (1990, 91) and Wheeler and Shaw (1987, 1990).

7. Classification of fen vegetation

The National Vegetation Classification mire, swamp and fen communities used data and information partly or largely taken from McVean and Ratcliffe (1962) (mainly *Sphagnum* dominated communities), Wheeler (1980) (swamp, tall herb fen and calcareous fen) and Spence (1964) (mixture).

MCVEAN, D.N., & RATCLIFFE, D.A. 1962. *Plant communities of the Scottish Highlands.* London, HMSO.

RODWELL, J. 1991. *British plant communities. Vol. 2. Mires and heaths.* Cambridge University Press.

RODWELL, J. In press. *British plant communities. Vol. 4. Aquatic communities, swamps and tall-herb fens.* Cambridge University Press.

SPENCE, D.H.N. 1964. The macrophytic vegetation of freshwater lochs, swamps and associated fens. In: The vegetation of Scotland, ed. J.H. Burnett, 306-425. Edinburgh, Oliver & Boyd.

WHEELER, B.D. 1980. Plant communities of rich-fen systems in England and Wales. I. Introduction. Tall sedge and reed communities. *Journal of Ecology, 68,* 365-395.

WHEELER, B.D. 1980. Plant communities of rich-fen systems in England and Wales. II. Communities of calcareous mires. *Journal of Ecology, 68,* 405-420.

WHEELER, B.D. 1980. Plant communities of rich-fen systems in England and Wales. III. Fen meadow, fen grassland and fen woodland communities and contact communities. *Journal of Ecology, 68,* 761-788.

8. Survey and monitoring

FOJT, W.J. 1991. Guidelines for fen survey. (Survey of fens at Phase II level.) Peterborough, Nature Conservancy Council. (CSD Note No. 59.)

FOJT, W.J. In prep. *Fen monitoring guidelines.* English Nature.

ROWELL, T.A. 1988. *The peatland management handbook.* Peterborough, Nature Conservancy Council.

WHEELER, B.D., & SHAW, S.C. 1991. *Vegetation changes at Chippenham Fen NNR. Monitoring procedures and base-line data for 1991.* Unpublished report to English Nature.

9. Special topics

9.1 Drainage

GROOTJANS, A.P., VAN DIGGELEN, R., WASSEN, M.J., & WIERSINGA, W.A. 1988. The effects of drainage on ground water quality and plant species distribution in stream valley meadows. *Vegetatio, 75,* 37-48.

GROOTJANS, A.P., SCHIPPER, P.C., & VAN DER WINDT, H.J. 1985. Influence of drainage on N-mineralisation and vegetation response in wet meadows. I. *Calthion palustris* stands. *Oecol. "Plant". Volume 6* (20), no. 4, 403-417.

9.2 Drought

SYKORA, K.V. 1979. The effects of the severe drought of 1976 on the vegetation of some moorland pools in the Netherlands. *Biological Conservation, 16,* 145-162.

9.3 Recreation

The following paper is concerned with the impact of trampling on a raised mire, but this is applicable to any wet *Sphagnum*-dominated surface.

SLATER, F.M., & AGNEW, A.D.O. 1977. Observations on a peat bog's ability to withstand increasing public pressure. *Biological Conservation, 11,* 21-27.

10. General publications

These references present information upon a variety of aspects of fen ecology and conservation.

FOJT, W.J. 1992. British fens and their conservation problems. *In: Peatland ecosystems and man: an impact assessment*, ed by O.M. Bragg *et al.* Joint Symposium of the British Ecological Society and International Peat Society, Dundee 1989.

SHAW, S.C., & WHEELER, B.D. 1990. Comparative survey of habitat conditions and management characteristics of poor-fen vegetation types. *Contract Surveys*, No. 129. Peterborough, Nature Conservancy Council.

SHAW, S.C., & WHEELER, B.D. 1991. *A review of the habitat conditions and management characteristics of herbaceous fen vegetation types in lowland Britain.* Unpublished report to English Nature.

WHEELER, B.D., & SHAW, S.C. 1987. *Comparative survey of habitat conditions and management characteristics of herbaceous rich-fen vegetation types. Contract Surveys* No. 6. Peterborough, Nature Conservancy Council.

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