

# Documentation of the Training Course **WETLANDS FOR LIFE**

A Training Course in Wetland Management and Restoration



## Norwich, Great Britain

30 September - 5 October 2002



With the contribution of the LIFE financial  
instrument of the European Community

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Radolfzell, October 30<sup>th</sup>, 2002  
 Edited by Udo Gattenlöhner

## 1 Introduction

The Broads Authority hosted the second training course scheduled under the EU Life Project on Sustainable Management of Wetlands and Shallow Lakes from 1 to 4 October 2002. The 4-day course was held in Norwich and attended by 26 participants, 10 from Living Lakes partners in Germany, Greece and Spain and 12 from a range of conservation and other organisations in England (Department of Environment Farming and Rural Affairs, English Nature, Internal Drainage Boards, National Trust, Royal Society for the Protection of Birds, Universities and Wildlife Trusts).

The course was designed for wetland managers and focused on four key themes: hydrology, water quality, fens and drained marshes, and working with local communities and visitors. Each day was split into presentations during the morning and field visits in the afternoon. In the evenings, each participant was invited to feed back what had been of key significance. This was followed by a lecture from an invited guest.

This document comprises a full record of the training materials used on the course. The course proved to be very successful judging from the positive feedback and evaluation forms completed by participants. The feedback is provided in Section 9.

There will be a further training course organised by the Broads Authority in 2003 as part of this same project. Full details of the project can be found on its website at: [www.livingwetlands.org](http://www.livingwetlands.org).

## 2 Presentations

### 2.1 Welcome and Introduction to the Trainings course: A National Park - Dr John Packman, Broads Authority

#### **Innovation and Change in the Broads**

- Halvergate Grazing Marshes Scheme
- Forerunner of ESA
- Restoration of Barton Broad
- Harvesting the Fens

#### **Long Term Issues for The Broads**

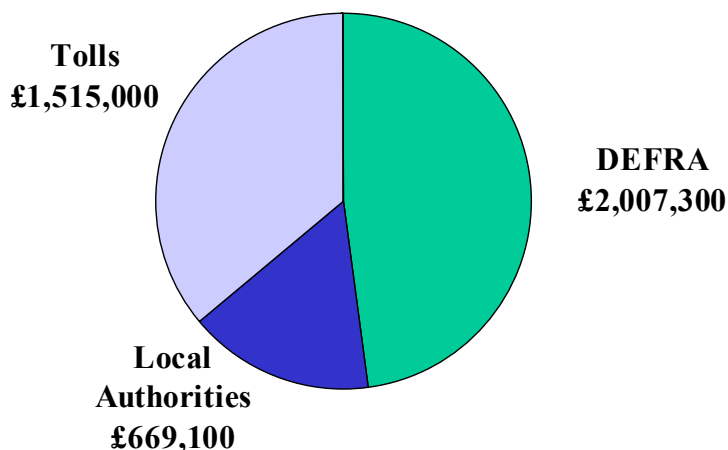
- Climate Change - high water levels & flooding
- Water quality management
- CAP reform
- Maintenance of the navigation
- Rivers and broads restoration & management
- Quality of the built environment
- Management of the fen areas
- Future of tourism
- Sustainable Tourism

### Responsibilities of the Broads Authority

- To conserve and enhance the natural beauty of the Broads
- To promote the enjoyment of the Broads by the public
- To protect the interests of navigation

### Finances

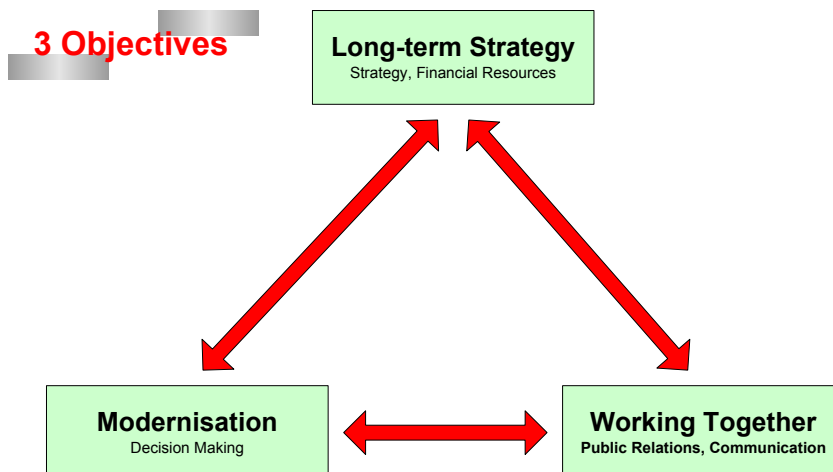
Income 2002/03:



### Vision

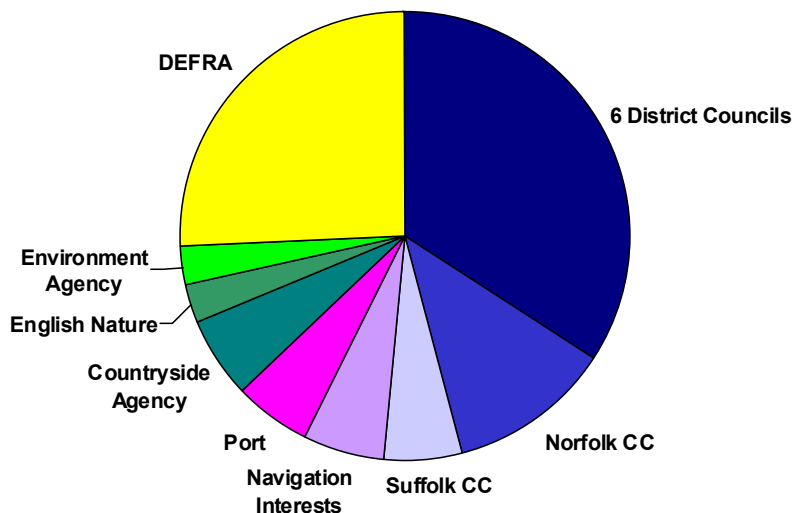
1. Be well known and in-touch with local people and interested parties.
2. Be respected for its innovative research and projects.
3. Have a close working relationship between a team of informed members and a dedicated staff with clear goals who enjoy working for the Authority.
4. Have an efficient and effective operation which makes good use of public money.
5. Have sufficient resources to have the big impact on the Broads that is required.
6. Demonstrate sustainable practices.

### Objectives



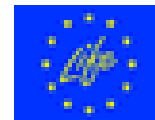
### Members of Broads Authority

35 Members + 5 Navigation Committee



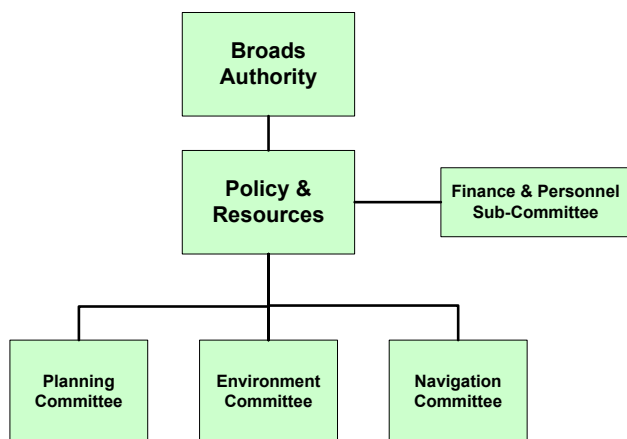
### Size compared with other National Parks

Population	Area (ha)	Staff	Budget	Members
42,239 (Lake Dist)	229,198 (Lake Dist)	221 (Peak)	9,194 (Peak)	38 (Peak)
38,100 (Peak)	214,159 (Snowdon)	120 (Lake Dist)	6,696 (Lake Dist)	<b>35 (Broads)</b>
32,000 (Brecon)	176,869 (York Dales)	120 (Snowdonia)	5,005 (York Dales)	26 (Dartmoor)
29,100 (Dartmoor)	143,833 (Peak)	113.7 (York Dales)	4,861 (NYM)	26 (Exmoor)
26,251 (Snowdon)	143,603 (NYM)	110.12 (Pembroke)	4,832 (Snowdonia)	26 (Lake Dist)
25,500 (NYM)	135,144 (Brecon)	98 (Brecon)	4,010 (Pembrokeshire)	26 (NYM)
22,842 (Pembroke)	104,947 (Northumb)	<b>95 (Broads)</b>	3,812 (Dartmoor)	24 (Brecon)
17,980 (York Dales)	95,570 (Dartmoor)	93 (NYM)	<b>3,729 (Broads)</b>	24 (York Dales)
10,645 (Exmoor)	69,280 (Exmoor)	82 (Dartmoor)	3,453 (Exmoor)	22 (Northumb)
<b>5,500 Broads</b>	62,000 (Pembroke)	69.5 (Exmoor)	3,211 (Northumb)	18 (Snowdonia)
2,200 (Northumb)	<b>30,292 (Broads)</b>	42 (Northumb)	3,078 (Brecon)	15 (Pembroke)

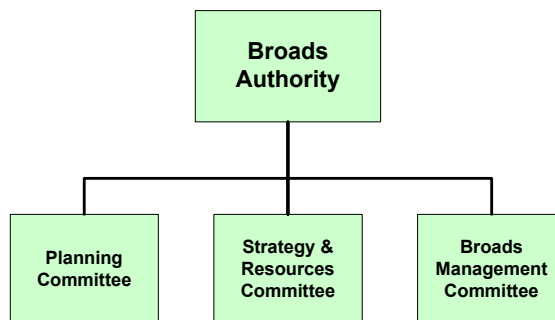


Structure:

**Previous Committee Structure**



**Current Committee Structure**



Key Changes

Change	When
- Develop a new Broads Plan	Started
- Implement new officer structure	1 <sup>st</sup> November
- Set up new committee structure	March
- Establish a new Broads Forum	May
- Change the name of Authority	Into ASAP
- Reduce Authority's membership	

## 2.2 Introduction to the Broads - Andrea Kelly, Broads Authority

### Introduction to the Rivers and the Broads

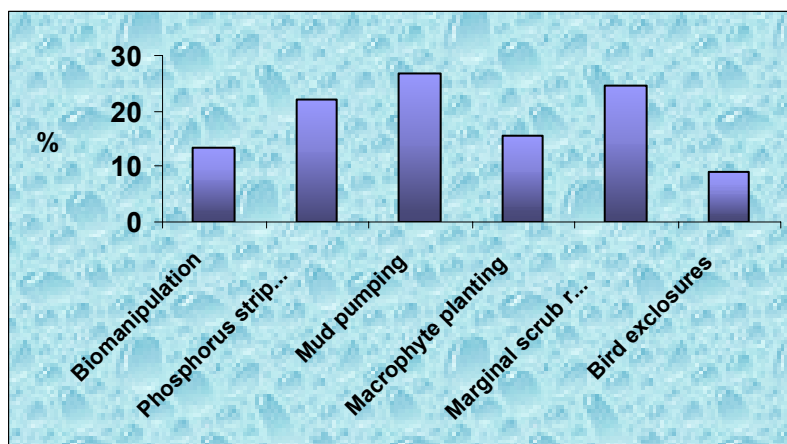
- Executive Area 303 sq km
- 200 km of navigable water
- 45 Broads
- 7,552 ha of sites of national and international importance for nature conservation
- 13 Scheduled Ancient Monuments
- 18 Conservation Areas
- 250 Listed Buildings



### Problems that the Broads face

- Eutrophication  
Siltation  
Toxic substances
- Loss of submerged macrophytes
- Loss of littoral margin area
- Loss of biodiversity
- Low river flows
- Climate change – saline incursion
- Invasive species

### Percentage of the 45 Broads where restoration works have been undertaken



## Rivers and Broad Research

### *EU LIFE project:*

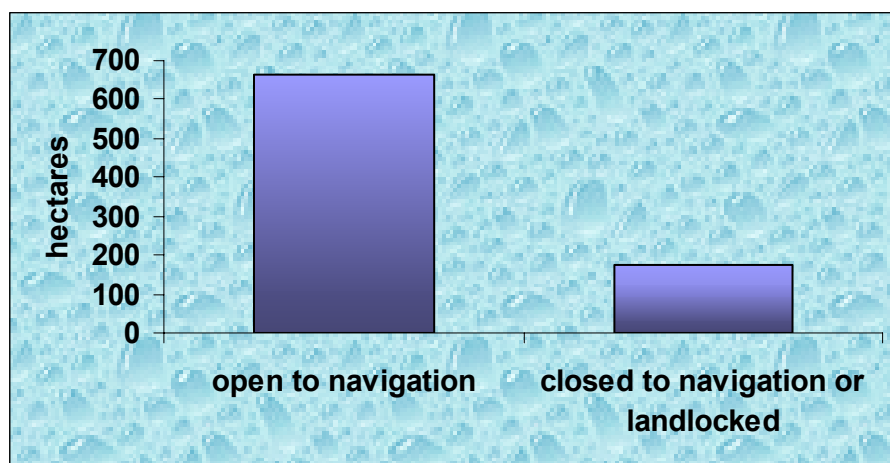
- output: Moss et al (1996) A guide to the restoration of nutrient-enriched shallow lakes

### *PhD and post doc projects*

- Stoneworts and macrophyte recovery
- Phosphorus transport modelling
- Paleoecology
- Toxicity of boat antifouling paints
- Upper Thurne hydrology and ecology

### *Ongoing research and management at various sites*

## Area of broads open or closed to navigation

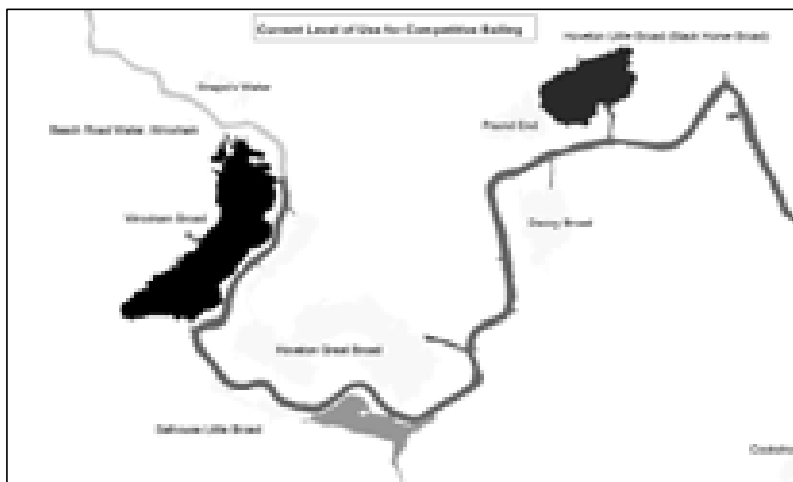


## The need for a Rivers and Broad Strategy

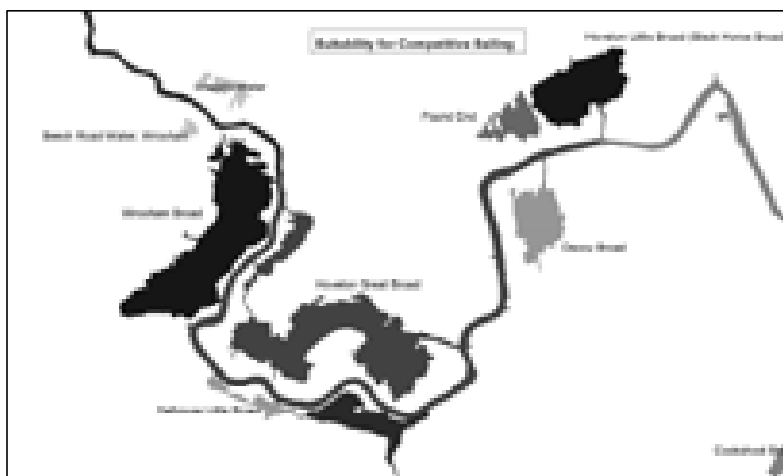
- to collate rivers and broads information in a GIS based database
- containing information about the current status and future potential for each of the following activities:
- Conservation
- Water based recreation (eg Sailing and canoeing)
- Land based recreation
- Angling



### Current level of use for competitive sailing



### Suitability for competitive sailing



### Uses of the Rivers and Broad Strategy

- the data base will form the tool for strategic management of the rivers and broads
- it provides opportunity to consult with relevant stake holders
- Quality, up-to-date data is required 'the output is only as good as the input'

## 2.3 Understanding the hydrology of wetlands - Dr Kevin Hiscock, University of East Anglia

### ***Introduction***

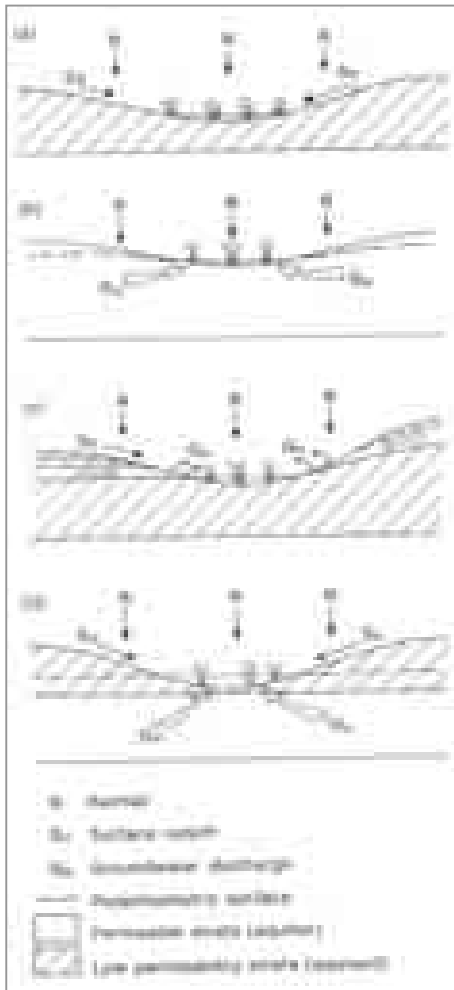
The global extent of wetlands is estimated to be from 7 – 8 x 10<sup>6</sup> km<sup>2</sup> and, compared to other ecosystems, are an extremely productive part of the landscape with an estimated average annual production of 1.125 kg C m<sup>-2</sup> a<sup>-1</sup> (Mitsch et al. 1994). The relatively high productivity and biological diversity of wetlands support an important landscape role in nutrient recycling, species conservation and plant and animal harvest. Although very much smaller in extent compared to marine habitats, inland water habitats exhibit greater variety in their physical and chemical characteristics. Wetlands, with their often abundant and highly conspicuous bird species are protected by national and international agreements and legislation. Notable wetland protected areas include the Moremi Game Reserve in the Okavango Delta, Botswana, the Camargue National Reserve in France, the Keoladeo (Bharatpur) National Park in India, Doñana National Park in Spain and the Everglades National Park in the United States (Groombridge & Jenkins 2000). Inland water ecosystems are unusual in that an international convention, the 1975 Convention of Wetlands of International Importance especially as Waterfowl Habitat (the Ramsar Convention; Navid 1989) is dedicated specifically to them.

### ***Definition of wetlands***

Inland water habitats can be divided into running or lotic systems (rivers) and standing or lentic systems (lakes and ponds). Wetlands are typically heterogeneous habitats of permanent or seasonal shallow water dominated by large aquatic plants and broken into diverse microhabitats occupying transitional areas between terrestrial and aquatic habitats (Groombridge & Jenkins 2000). The four major wetland habitat types are bogs, fens, marshes and swamps. Bogs are peat producing wetlands in moist climates where organic matter has accumulated over long periods. Water and nutrient input is entirely through precipitation. Bogs are typically acid and deficient in nutrients and are often dominated by Sphagnum moss. Fens are peat producing wetlands that are influenced by soil nutrients flowing through the system and are typically supplied by mineral-rich groundwater. Grasses and sedges, with mosses, are the dominant vegetation. Marshes are inundated areas with emergent herbaceous vegetation, commonly dominated by grasses, sedges and reeds, that are either permanent or seasonal and are fed by groundwater or river water, or both. Swamps are forested freshwater wetlands on waterlogged or inundated soils where little or no peat accumulation occurs. Like marshes, swamps may be either permanent or seasonal.

### ***Hydrological classification of wetlands***

Various attempts have been made to classify wetlands and a variety of subdivisions have been recognised based on broad features such as substratum type, base status, nutrient status and water source, water level and successional stage. The development of the main wetland habitat categories and terms, in relation to the main ecological gradients, has been reviewed by Wheeler & Proctor (2000). Other approaches include a hydrogeological classification based on the main external sources of water and flowpaths (Lloyd et al. 1993) and a hydromorphological (or hydrotopographical) classification based on the shape of the wetland and its situation with respect to apparent sources of water (Goode 1977). A simplification of the hydrogeological classification is shown in Fig. 1 to illustrate the influence of topography, geology and water source in maintaining wetlands.



*Fig. 1 Simple hydrogeological classification of wetland types. In (a) surface runoff is fed by rainfall and collects in a topographic hollow (for example, valley bottom, pingo or kettle hole) underlain by a low permeability layer. In (b) rainfall recharge to an unconfined aquifer supports a wetland in a region of low topography and groundwater discharge. In (c) superficial deposits, both unconfined and semi-confined, and underlain by a low permeability layer, contribute groundwater seepage in addition to surface water runoff. In (d) surface water runoff is in addition to artesian groundwater discharge from a semi-confined aquifer.*

A change in the factors controlling the source of water to a wetland can have potentially devastating consequences for the fen community, particularly a change in groundwater flow direction. A case study of the impact of groundwater abstraction on the freshwater habitat of a valley fen and the measures taken to restore the fen is given in below.

**Case Study:**

Impact of groundwater abstraction on Redgrave and Lopham Fen, East Anglia, England

Redgrave and Lopham Fen is an internationally important British calcareous valley fen situated on the Norfolk and Suffolk border in the peat-filled headwaters of the River Waveney (Fig. 2). The fen, covering 123 ha, is the largest fen of its type in lowland Britain and

was declared a Ramsar site in 1991. The largest part of the fen is covered by shallow peat supporting a complex mosaic of reed and sedge beds, mixed species fen and spring flushes. The fen is noted for its rare and precarious community of fen raft spiders, the largest spider native to the British Isles. For nearly 40 years, the fen experienced substantial ecological change, principally due to a change in the groundwater flow regime relating to an adjacent water company borehole.

The general geology of the fen consists of Cretaceous Chalk covered by glacial till, sands and gravels. The Chalk surface is incised by a deep buried channel which is thought to be about 1 km wide in the vicinity of the fen. With reference to Fig. 1, the fen is a combination of wetland types (c) and (d). Before the late 1950s, calcareous and nutrient-poor water rose under artesian pressure from the semi-confined Chalk aquifer and seeped into the fen both around the fen margins and within the peats. The extreme heterogeneity of the superficial Quaternary deposits resulted in great spatial variation in the quantity of rising Chalk water. The interaction of base-poor water from marginal sands with the calcareous and acid peats produced local variation in soil chemistry that supported a diverse mosaic of fen plant communities of high botanical interest.

In 1957, two Chalk abstraction boreholes were installed adjacent to the fen (Fig. 2) for public water supplies and licensed to abstract 3600 m<sup>3</sup> day<sup>-1</sup> in 1965. Warby's Drain and the River Waveney were deep-dredged at this time, substantially increasing channel capacity, with a sluice at the downstream end of Redgrave Fen installed to control outputs. As shown schematically in Fig. 3, the operation of the water company source led to the elimination of vertical groundwater seepage and the frequent drying out of Warby's Drain. The normal condition of perennial, high water levels with Chalk groundwater discharging through the fen (Fig. 3a), thus maintaining a soligenous hydrology (where wetness of the site is maintained

by water flow from soil) was replaced by a seasonal downward movement of surface water (Fig. 3b). The hydrology of the fen had now become controlled by rainfall patterns and river levels thus producing a topogenous hydrology (where wetness is maintained by the valley topography). During the summer, the fen dried out more frequently with groundwater heads reduced to a metre below the fen surface. Test pumping and radial flow modelling suggested that about a quarter of the pumped groundwater was at the expense of spring flow into the fen (Burgess 2002).

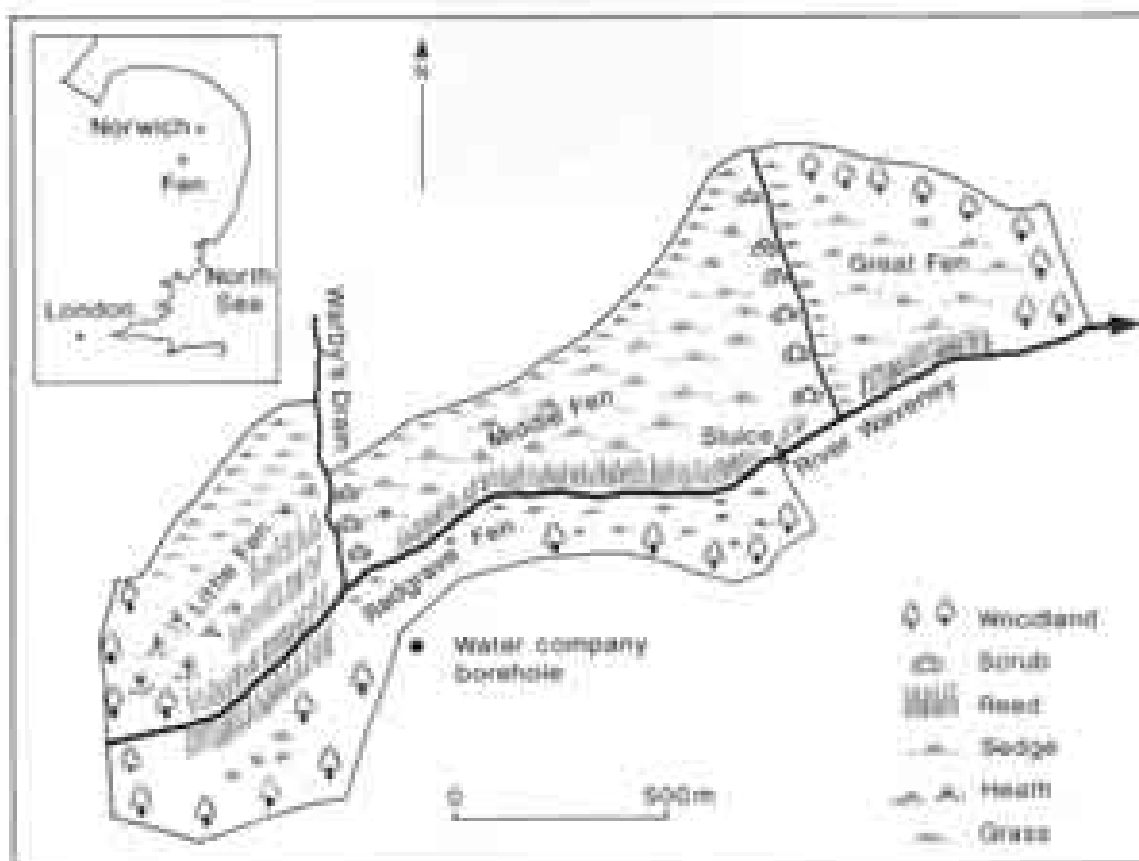


Fig. 2 Location and site map of Redgrave and Lopham fen showing the position of the former operating water company borehole.

These hydrogeological changes caused by groundwater abstraction were matched to a deterioration of the flora and fauna at the site (Harding 1993). From a comparative study of botanical records, Harding (1993) showed that great changes had occurred to the ecological character of the fen as a result of the drying out, namely the invasion of scrub. The reduction in the water table altered the balance of competition towards dry fen species and the expansion of *Phragmites* and *Molinia*, that are tolerant of low water levels, while previously dominant species such as *Cladium* and *Schoenus* contracted. The loss of calcareous and base-poor seepage water and the increased fertility from the sudden release of large amounts of stored nitrates through peat wastage under a lower water level also benefited *Phragmites*.

To reverse the environmental damage, the groundwater pumping was relocated to a borehole 3.5 km east and downstream of the fen and became operational in 1999. The total cost of the replacment supply was of the order of £3.3 million (US\$4.8 million), which included the cost of the investigation, source works, pipeline and restoration work on the fen.

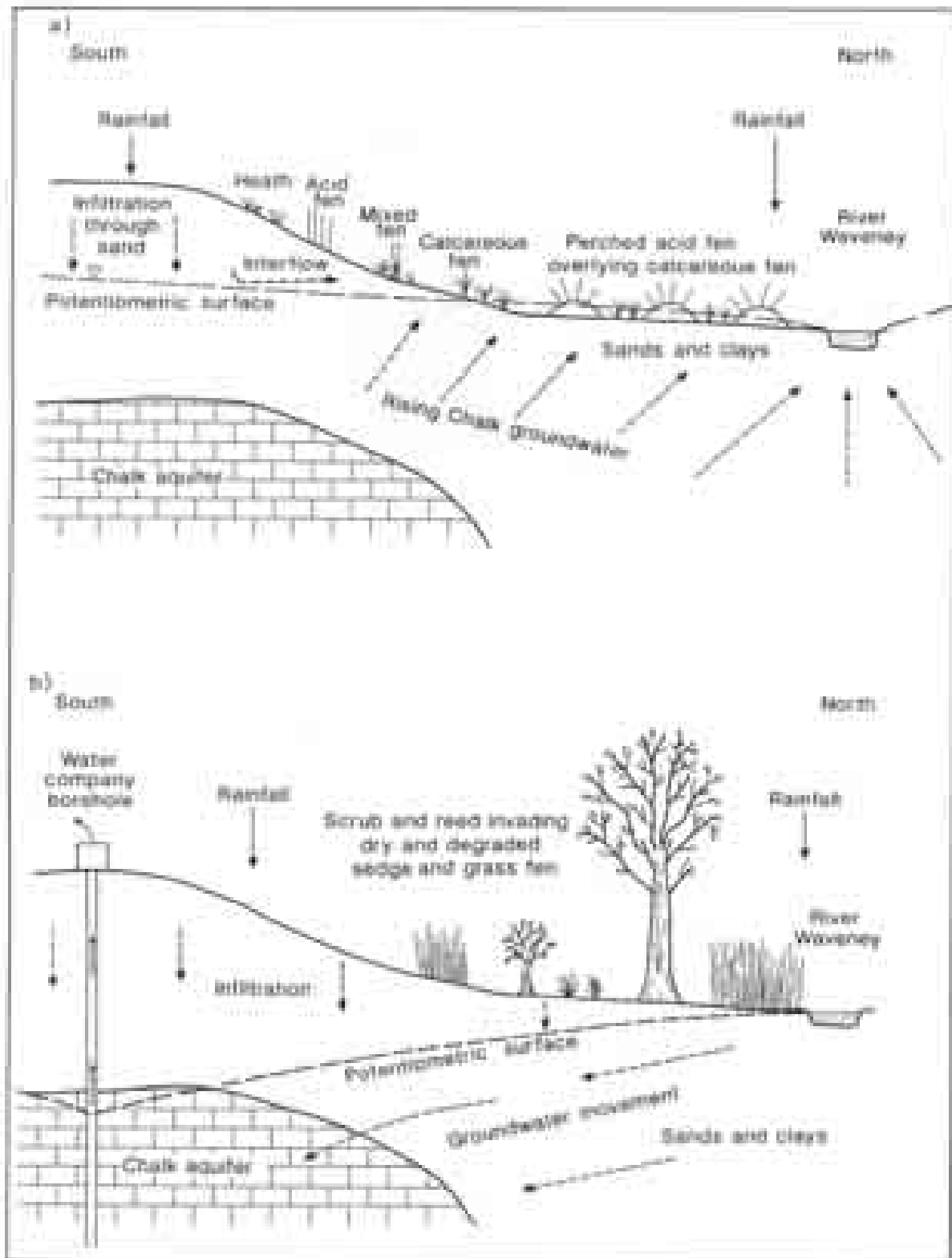


Fig. 3 Schematic cross-section through Redgrave and Lopham Fen illustrating groundwater and ecological conditions (a) before groundwater pumping and (b) after several years of groundwater pumping from the water company borehole (see Fig. 1 for location). After Burgess (2002).

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## 2.4 Water quality and its restoration

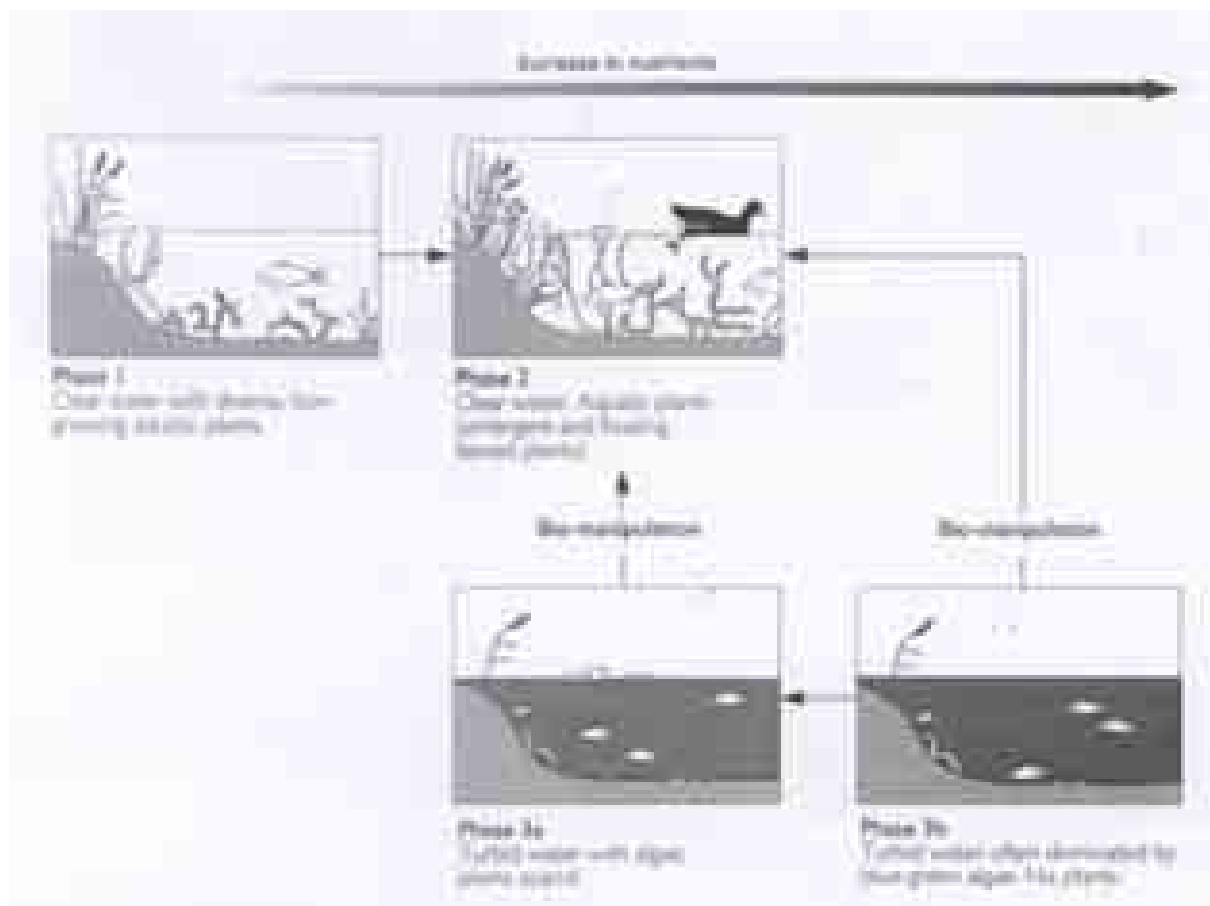
### 2.4.1 Cleaning up after nutrient enrichment - Rory Sanderson, Environment Agency

#### *The degradation of open waters in Broadland*

The Norfolk Broads are a series of small shallow lakes formed from flooded medieval peat workings along the three main river valleys of the Bure, Ant and Thurne. Many historic records are available from amateur naturalists that indicate the high conservation value of these 'gin clear' waters.

The picture is somewhat different today. Many of the Broads are in a poor state, and have lost much of their biodiversity as a result. The waters are generally much more cloudy as a result of algal growth, and many of the aquatic plants have been lost because sufficient light cannot penetrate to the shallow bottom to support their growth.

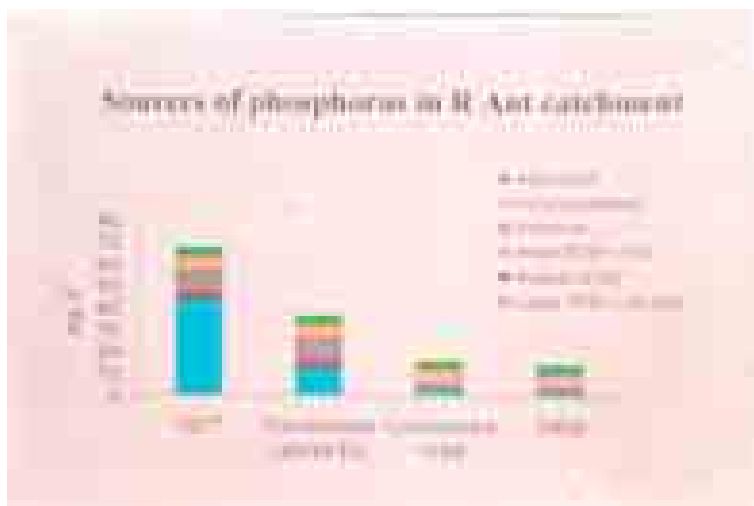
The phases of decline are now understood. The pristine state (phase 1) that was present at the turn of last century is characterised by clear water and by a diverse assemblage of low growing, submerged plants. The next phase of decline (phase 2) occurred during the mid 20th century and was characterised by clear water, but with luxuriant growth of taller 'rank' plant species at the expense of the submerged forms. The third and final phase (phase 3) is the degraded state that occurs in many Broads today. This is characterised by turbid, algae rich waters, with few macrophytes. Blue-green algae may become a nuisance in such Broads.



*What cause the decline? - Nutrient enrichment*

The change over the last 100 years has resulted from higher concentrations of plant nutrients, namely phosphorus and nitrogen, entering the system. The general decline in water quality and biodiversity associated with such enrichment is widely known as 'cultural eutrophication'. Harper (1982) defines eutrophication as 'the term used to describe the biological effects of an increase in the concentration of plant nutrients, usually nitrogen and phosphorus'. A phosphorus concentration of between 25-85 mg/l can cause eutrophic conditions to persist in still waters.

Plants and algae require nutrients to grow and reproduce. Two important nutrients in particular limit this growth in aquatic systems. Phosphorus is generally considered to be the limiting nutrient for plant growth in freshwaters although nitrogen may limit growth when phosphorus levels are high. Nitrogen is more likely to be limiting in estuarine and marine waters. Identification of the major sources in a particular catchment gives a good indication of where to direct efforts to restore degraded systems. The calculation of phosphorus loading from point



sources in Broadland has been influential in directing efforts to reduce the discharge of this nutrient from most large sewage treatment works.

### *What happened in Broadland? – The effects of enrichment*

The productivity of a lake, and ultimately its conservation status, is largely determined by its nutrient supply. A close relationship between algal density (measured as summer mean chlorophyll a concentration) and total phosphorus is evident in the Broads. This indicates that the Broads are indeed phosphorus limited to a degree and that this nutrient may therefore be a good target in any restoration strategy.

Nutrient enrichment had a number of effects on the ecology of the Broads. Direct effects of increased fertility included the excessive growth of rank plant species associated with phase 2, and increased algal productivity associated with phase 3. These changes promoted a number of indirect effects including the loss of submerged plant species as a result of increased competition and shading. With the loss of plants, the visual refuge needed grazing for zooplankton was lost, and this in turn allowed algae to flourish in a relatively 'un-grazed' environment. All these factors helped to change the Broads from the pristine state to phase 2 and 3. It is estimated that only 4 of a total of 41 Broads remain in phase 1, 10 are considered to be in phase 2, and the rest are in phase 3.

Increased nutrients were not solely responsible for the decline. In fact, clear water conditions may prevail over a wide range of nutrient concentrations as long as macrophytes can out compete algae. To complete the degradation to stage 3 requires further factors to remove macrophytes. These have been termed 'forward switches' and include the direct removal of plants by mechanical damage (boats and harvesting), grazing and herbicides. They also include indirect effects which aid algal dominance by reducing the amount and size of zooplankton grazers. Such factors include increased salinity, pesticide pollution and a change in the fish community structure to one dominated by plankivores such as roach and bream.

### *How can we improve things?*

The restoration of eutrophic shallow lakes requires a strategic approach, in which all of the following are addressed:

- Establish the target – this is very important as different user groups may require a different outcome
- Identify and remove any forward switches
- Identify important nutrient sources and reduce loadings
- Biomanipulate
- Re-establish plants to help to stabilise required community changes
- Re-establish an appropriate fish community to aid zooplankton grazer recovery
- Monitor the results and learn from mistakes

Target establishment is crucial. The aims should not only be achievable, but various user groups should be involved, in deciding the desired outcome of a restoration project. This will help ensure the success of future projects. The targets should also be realistic in terms of the nutrient concentration that may be achieved through nutrient reduction programmes. Certain standards are available, such as those published in the Environment Agency's management strategy for 'Eutrophication in England & Wales' that will aid this decision.

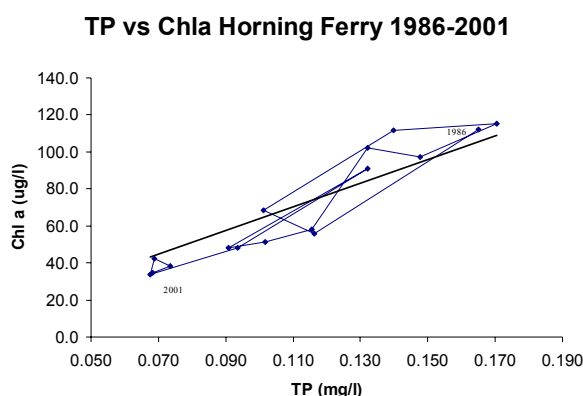
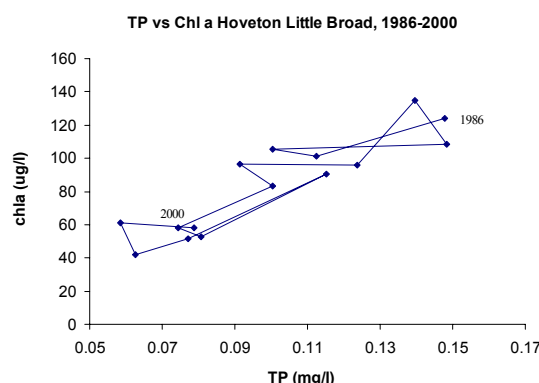


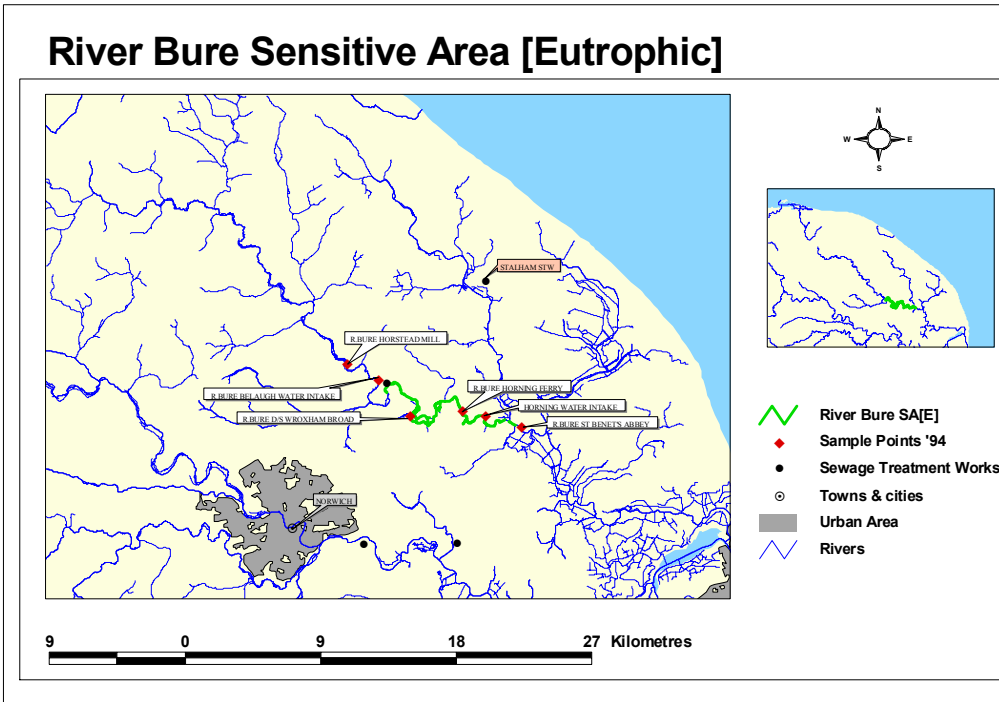
*Nutrient reduction in Broadland – a first step towards recovery*

Nutrient control was first introduced in Broadland over 20 years ago. Phosphorus sources from sewage treatment works (STWs) were targeted because nutrient loading work had shown this to be a significant source of the limiting nutrient to Broads rivers. In the early 1980's chemical removal was introduced by the Water Authority at all STWs in the River Ant catchment serving over 100 persons. This was extended to the Bure catchment in 1986. The amount of phosphorus discharged is now set by discharge consents, issued and monitored by the Environment Agency. The initiative has proved successful, with each works now discharging less than 10% of the phosphorus load emitted prior to 1986.

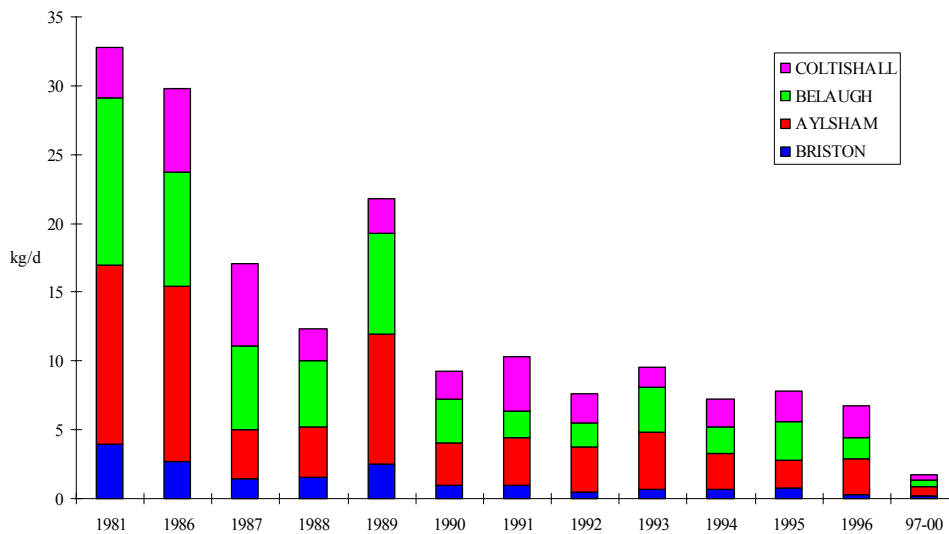
The reduction in loading from STW's is mirrored in the measured phosphorus concentrations in the River Bure. Chlorophyll a (a surrogate measure of algal density) has also declined, indicating a general improvement in water quality as a result of reduced phosphorus. The same pattern is seen within the Broads connected to the Bure, such as Hoveton Little Broad, although there has been little sign of reversion to a macrophyte dominated system. This indicates that simple nutrient reduction is not sufficient to restore these Broads as there are still some forward switches that may be in operation.

One Broad where there has been an indication of reversion to clear water status (phase 2) is Cockshoot Broad. This was one of the first to receive restoration measures, when in 1982 it was isolated from the River Bure and had a large proportion of its sediment removed. The initial results were striking, with dense beds of macrophytes appearing within the first year, and large grazing zooplankton returning to the Broad. Algal abundance has remained lower than the river, indicating that isolation from a nutrient rich source has worked, but the early signs of recovery were short lived. Unfortunately there were still some forward switches in operation such as saline incursions which removed the larger grazing zooplankton (*Daphnia* sp) and a poor fish community structure. These need to be addressed to promote a self-sustaining restored broad.





Total Phosphorus load to River Bure from nutrient stripped STWs



*How can legislation help the restoration process?*

There are a number of legislative tools which may benefit the restoration works of Broadland.

- Discharge consents, issued under the Water Resources Act, 1991, can be used to set limits on the contents of effluents from consented works. Discharge limits are generally set to provide adequate protection to the receiving water on site specific basis, although they may define specific quality standards as set by European Directives.
- Urban Wastewater Treatment Directive. STWs discharging to areas that are susceptible to eutrophication have a prescribed phosphorus limit imposed. STWs

involved are only those that serve over 10000 people. The Rivers Bure and Ant are both designated as Sensitive Areas (eutrophic).

- Nitrate Directive. Aims to protect against excessive pollution from agricultural sources. Nitrate Vulnerable Zones (NVZs) are identified within which an Action Plan is established to limit diffuse pollution. The action plan limits fertiliser application and imposes duties on farmers to keep records and store slurry accordingly. The Environment Agency regulates implementation.
- Habitats Directive. This legislation aims to maintain or restore certain habitats to favourable status. Sites are designated according to species or habitats and have conservation objectives associated which could take the form of a target nutrient concentration for example. Environmental quality standards are being developed for phosphorus in waters affecting such designated sites.

## 2.4.2 Biomanipulation and the way forward - Andrea Kelly, Broads Authority

### Biomanipulation in the Broads

'restructuring of the biological community to achieve a desirable response'

- What is the role of biomanipulation in the restoration process
- How can biomanipulation help achieve a a stable healthy ecosystem
- Case study from Broadland

### Phased approach to restoration

1. Reduce catchment derived nutrient sources
2. Reduce internal (sediment) sources of nutrients
3. Remove fish (biomanipulate) to get clear water
4. Achieve diverse and stable aquatic community

### Clear water feedback mechanisms

Plants can

- Absorb wave energy
- Lock up nutrient
- Provide structure and refuge

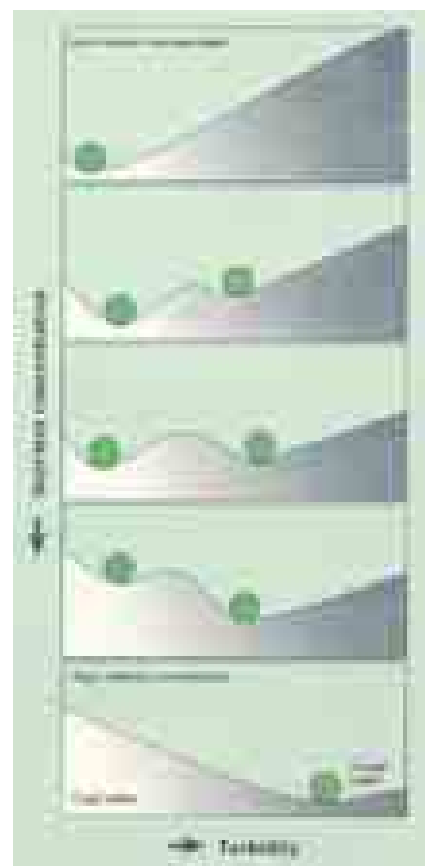
### Turbid water feedback mechanisms

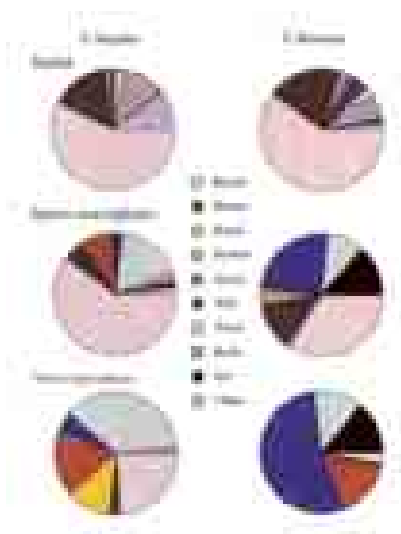
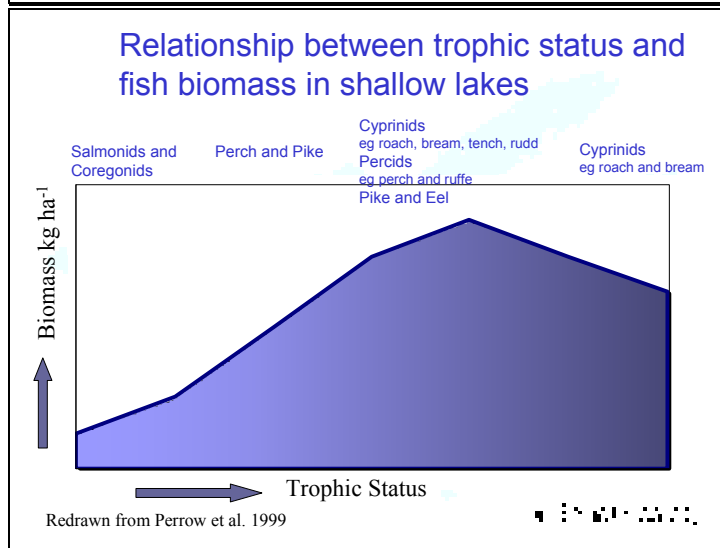
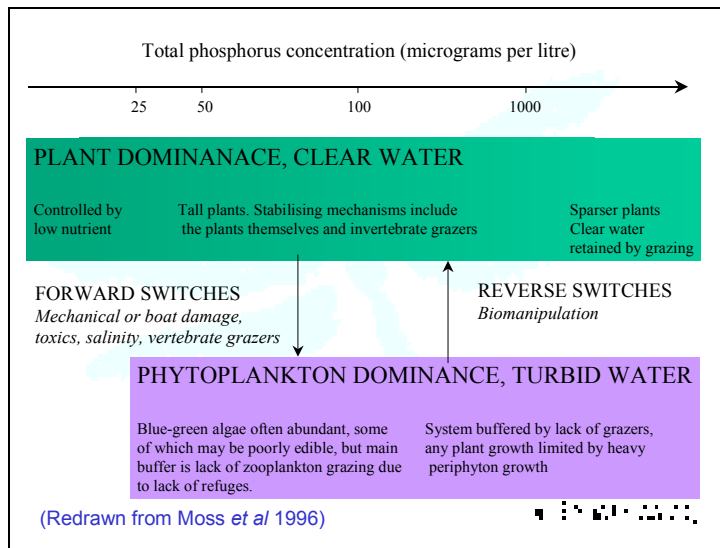
- Algae blocks out light
- Sediments prone to resuspension
- Fine particles clog up zooplankton feeding apparatus

### Stable states "marble-in-a-cup" diagram

Representation of stability at five different levels of nutrient Concentration and turbidity.

(Redrawn from Scheffer 1990)





Mean relative composition of fish species in the broads

Changes in the fish composition in the Norfolk Broads with eutrophication

- Smaller fish and young age class structure
- Roach domination (<10cm) and some larger bream (up to 50cm).
- Pike may be present, however cannibalism risk is high due to lack of plants
- High density, low biomass

Have occurred as a result from:

- loss of macrophytes (plants)
- fewer plant associated macroinvertebrates

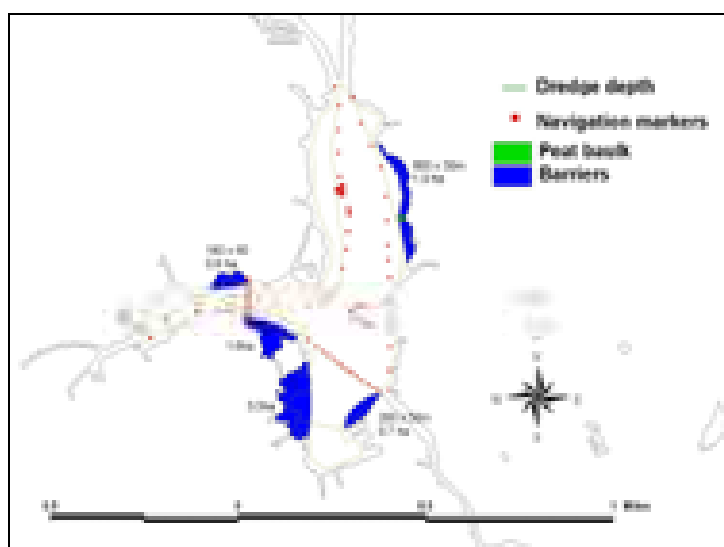
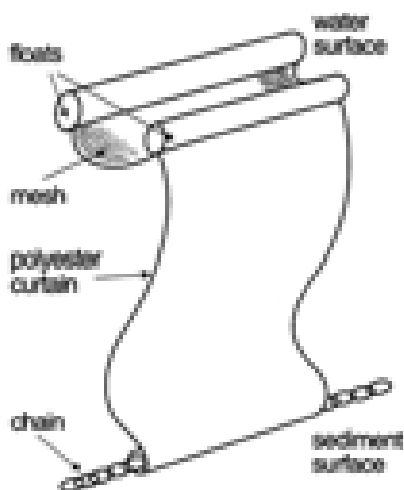
Approaches to biomanipulation

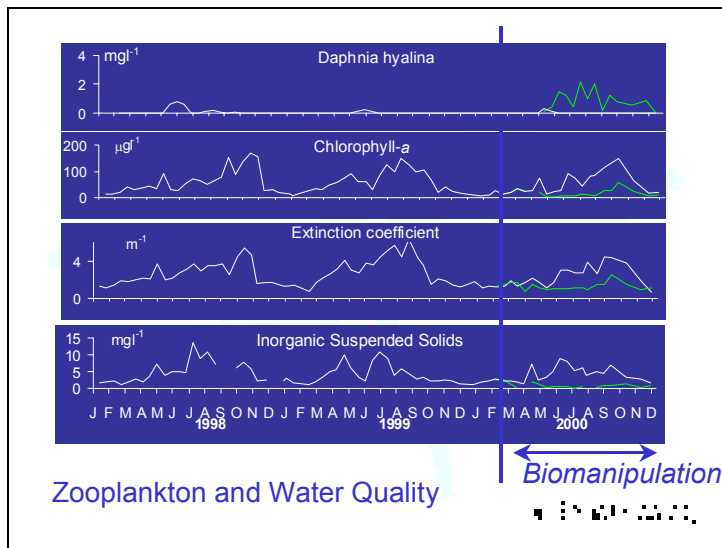
- Removing zooplanktivorous fish
- Enhancing stocks of piscivorous fish

Barton Broad – biomanipulating parts of a lake

- Many shallow lakes in Broadland are hydrologically connected the wetland
- To isolate them is either technically or politically impossible
- Fish proof barriers have been developed that allow biomanipulation of parts of a lake

Diagram of the flexible barrier





### Summing up

- a common misconception about biomanipulation is that '*fish are the enemy*'!
- consultation enables lake users to understand why biomanipulation is required
- consultation is recommended at every stage of the project
- Clear water, macrophyte dominated lakes have different fish populations to algae dominated lakes
- Initial lower fish populations should - in the long term - result in ecological diversity and productivity.
- Biomanipulation is part of the restoration package
- Biomanipulation is more likely to achieve success if it follows a nutrient reduction programme

## 2.5 Fen and drained marshes: their management and restoration

### 2.5.1 History of fens and their management - Rob Andrews, Broads Authority

#### Abstract

The Broadland fens are of national and international importance for nature conservation. This area has been exploited for its natural resources for centuries, but it has been neglected over the last 50 years, leading to a dramatic change in landscape and in the available habitat for characteristic species. The establishment of a National Park has enabled a coordinated approach to their restoration and management. This work includes the continuation of some traditional and commercial practices such as reed harvesting as well as the development of innovative ways of enhancing the nature conservation potential, such as the excavation of turf ponds. The work has been guided by experience of fen workers and the results of detailed surveys, research and monitoring.

There are many modern day threats to the fens in Broadland, including some which are outside the control of the Broads Authority. However, the drawing together of a Fen Conservation and Management Strategy will help to direct resources to achieve the best possible future for this area.

#### Introduction

The Broads or "Broadland", is a complex of shallow lakes, undrained fen and large expanses of drained marshland in the valleys of three main rivers and their tributaries in coastal East Anglia, in England (see Figure 1). The whole area of approximately 30,000 hectares, was

given national protection in 1989, equivalent to National Park status, alongside the creation of the Broads Authority, who coordinate its management (see Broads Authority, 1993).

This paper describes the management of the undrained fen of Broadland. In Britain, reedbeds and other fen habitats are highly valued for nature conservation (Ward, 1992). Virtually, the whole of the Broadland fen area currently has statutory protection, by virtue of national conservation designations and it is proposed to be included in future European designations for Special Protection Areas and Special Areas for Conservation.

## History of the fen area

In Roman Britain, a large part of Broadland was an estuary and saltmarsh vegetation and brackish reedbeds were widespread. Fen vegetation was then limited to the margins of the upper valleys. A change to more freshwater conditions occurred as tidal penetration up the valleys progressively decreased from 1610 BP to 1000 BP. At this time, the estuary reduced in size and deep layers of peat were formed in the waterlogged conditions along the length of the valleys. However, the fen communities of the lower valleys wasted away following the embankment of the rivers and the drainage of the adjoining marshland. Only narrow strips of undrained peatland vegetation remain now, between the river and the river embankment, known as “ronds”.

From the medieval period, the peat in the middle and upper sections of the valleys was exploited as a source of fuel, creating large, shallow lakes now known as broads. Peat extraction also took place on the surrounding fens until about 1920 AD. The more recent workings in the fens were very shallow and most have now been colonised by fen vegetation and are hard to locate. The complex network of ditches in the fen areas were dug out to assist removal of the peat and other fen products. For a fuller account of the fen management history, see George (1992).

## Types of fen

Most of the undrained peatland in the Broads are “flood plain mires”, since they are primarily influenced by the slow-moving rivers. In addition, there are several “valley mires” along the slopes and floors of smaller valleys, which receive most of their water supply from springs and seepage lines. Most of the fen area receives base-rich water from the catchment, with smaller areas influenced by water passing through calcium-deficient sands and gravels. Research has shown that the distribution of the principal fen communities in the Broads is related primarily to the stratigraphy of the valley deposits (Lambert and Jennings, 1960).

Other important factors include the degree of nutrient enrichment from the river and the history of past management.

The Broadland fens are ecologically diverse and are exceptional in the British context. Wheeler (1980) recognised 21 different fen communities in Broadland out of the 30 which occur in England and Wales. Fen that has developed into woodland is known as carr, and is usually dominated by Alder (*Alnus glutinosa*), with a rich understorey of shrubs and herbaceous vegetation in glades. Fen carr (developed over solid peat) can be distinguished from swamp carr, which has formed more recently over lake sediments and is a relatively unstable formation, usually with an abundance of Tussock sedge (*Carex paniculata*). The wooded area now extends to some 3000 ha. Open, herbaceous fen vegetation (about 2500 hectares), occurs in relatively small parcels amongst the scrub, woodland and alder carr, except in the Thurne valley, where the reinvasion of wooded vegetation has been limited by brackish conditions.

The open fen area is usually dominated by reed (*Phragmites australis*), Saw sedge (*Cladium mariscus*), Fen rush (*Juncus subnodulosus*) or the true sedges (*Carex* species). Pure stands

of reed and Saw sedge are still harvested commercially in a few areas but other areas are floristically rich. The *Peucedano-Phragmitetum Caricetosum* community, which is found over some former peat diggings, can support over 50 different species in a ten metre square. The rarest flowering plant within this community is the Fen orchid, (*Liparis loeselii*), which is afforded special protection under national law. The other Red Data Book plant species is Crested Buckler fern (*Dyopteris cristata*), which tends to be associated with more acid communities supporting Downy birch (*Betula pubescens*) and bog moss (*Sphagnum* species).

### Fen invertebrates

The invertebrate fauna of Broadland is just as rich and diverse as its flora, although it is less well recorded. Most of the rarities are associated with the open, herbaceous fen communities. The British rate of the Swallowtail (*Papilio machaon*) is now restricted to the herbaceous fen of the Broads. Three moth species are also Broadland specialities - the Small Dotted Footman (*Pelosia obtusa*), Reed Leopard (*Phragmataecia castaneae*) and Fenn's Wainscot (*Photedes brevilinea*). A rich beetle fauna is associated in particular with reed and saw-sedge beds and with moss carpets, small ponds and ditches. Twenty species of Odonata still occur in Broadland, but some, such as the Scarce Chaser (*Libellula fulva*), are less widely distributed than they were in the past, when there was vast stretches of herbaceous fen, intersected by ditches and turf ponds (George, 1992).

### Fen birds

The open reed-dominated fens are the preferred summer habitat for a group of small birds, commonly including the Reed warbler (*Acrocephalus scirpaceus*), Sedge warbler (*Acrocephalus schoenomaenus*), and Grasshopper warbler (*Locustella naevia*), with less commonly Savi's warbler (*L. locustella lusciniodes*). Three well-loved and nationally rare breeding birds also depend on regularly managed reedbeds for breeding - the Bittern (*Botaurus stellaris*), Bearded tit (*Panurus biarmicus*) and Marsh harrier (*Circus aeruginosus*). The latter two bird species are now relatively frequent in the fen areas, the bittern has all but disappeared, probably due to nutrient enrichment of the rivers and deterioration of the open fen habitat, due to neglect (Tyler, in prep.). The alder carr is frequented by more typical woodland birds that occur throughout Britain, such as the Great and Lesser Spotted woodpeckers (*Dendrocopos major* and *D. minor*), the sparrowhawk (*Accipiter nisus*) and a good variety of songbirds.

### Fen mammals

Otters (*Lutra lutra*) were common in the Broads up to the 1950's, but now the only animals surviving are ones that have been recently re-introduced. Their loss is probably attributable to bioaccumulating chemicals such as organochlorines (George, 1992). The fens and carr are still rich in small mammals such as voles and shrews. In particular, these fens are thought to be especially important for the Harvest mouse (*Micromys minutus*) and the Water shrew (*Neomys fodiens*) in Britain, due in part to the loss of other habitats (Jowitt and Perrow, 1993). Two notable introductions to the Broads have been the South American Coypu, which became abundant in the Broads from the 1940's and was exterminated by the mid 1980's and the Chinese Water Deer (*Hydropotes inermis*), which has been present since the 1950's and is unlikely to have any significant effect on the ecology of Broadland.



## Threats to the Broadland fens

### a) Neglect

The Broadland fens have been harvested for centuries for a variety of useful materials. This management has been instrumental in shaping the animal and plant communities that are our heritage in the Broads. The principal crops were reed, sedge and mixed fen litter for roofing material, marsh hay as bedding or food for livestock; bulrushes (*Schoenoplectus* spp.) as a material for weaving mats; various roots such as those of *Typha* spp. for use as animal food; Alder and other tree species for firewood and construction.

During the course of this century, there has been a decline in the market for marsh hay and litter, together with a drastic reduction in the number of marsh workers. Together with changes in farming practice this has led to the gradual decrease of all except the most lucrative of the commercial harvesting, so that now only reed and sedge cutting remains a regular activity. Natural succession has therefore transformed most of the open fen landscapes into scrub and carr woodland over the last few decades. In the absence of harvesting, the fen surface has risen due to the accumulation of dead plant material and some have been invaded by plant species characteristic of drier habitats.

Today, there is an active programme of fen management to restore the recently lost open, herbaceous fen and to maximise its value for nature conservation. However, financial resources and the labour supply are limited and such management can only be carried out where individual landowners are in agreement. Such agreement is easiest to achieve where there is the potential for a commercial return from reed or sedge. Many areas remain unmanaged or management is sub-optimal due to these constraints.

### b) Water Resources

The Broadland fens overly chalk aquifers, which can supply water that is valuable for public consumption and agriculture. Although the regulatory authorities (National Rivers Authority) are now taking steps to restrict abstraction that is likely to cause any significant loss of water to these fens, there are many existing licences which are causing a gradual dehydration of some fen areas, through the decrease of spring flow. In addition, summer river flows have diminished significantly in the Rivers Bure and Ant in the Broads, which may also contribute to changes in fen communities, by allowing the fen surface to dry out more frequently. A related problem is the more frequent inundation by saltwater, caused by extreme high tides during surge conditions in the North Sea.

### c) Water Quality

All of the Broadland rivers have suffered from severe nutrient enrichment over the last 50 years. The enrichment has been caused in part by the settlement of people in the valleys, resulting in phosphorus-rich sewage discharges to the river. The intensive cultivation of majority of the catchment of the Broads to produce arable crops, has also resulted in increased nitrogen inputs, which reaches the fen as run-off from higher land and from the river. Together, these nutrients have caused severe eutrophication of the rivers and in turn, this may be changing the nature of the fens.

## Conservation Management of the Fens

Commercial management is carried out by a number of self-employed marsh workers, together with landowners. The conservation management of the fens of Broadland is one of the principal tasks of the Broads Authority, who also liaise closely with private cutters. The programme of conservation work is carried out in partnership with English Nature, the national agency for nature conservation, local landowners and voluntary bodies. A range of techniques are currently practised. Most derive from traditional management methods but

others have been developed for nature conservation purposes. The main techniques are described briefly below.

## Commercial Management

### a) Reed Cutting

Reed (*Phragmites australis*) is killed by regular cutting in the summer, so the reed harvest is always carried out in winter when the reed stems are dead, leafless and fully dried out. In this condition, the stems are in a suitable state to go onto the roof. For thatching purposes, reed may be cut every year or every two years. Reed can rarely be used from a reedbed that is more than three years old because the stems become worn and brittle. In general, reedbeds cut every two years (apart from being better for most birds) produce a better growth of reed in their second year. Field observations suggest that the dead stems of standing reed create a cold frame effect for the young shoots of the following spring, so producing taller, thicker, stronger stems.

If reedbeds are left unmanaged, some of the thick spreading species such as Pond Sedge (*Carex riparia*) or Reed Sweet Grass (*Glyceria maxima*) will shade out young reed shoots and the area will become less attractive for harvest and for its characteristic wildlife. It is also important that cutting machinery cuts low to the ground to remove all of the litter and prevent a build up of dead vegetation, which will dry the fen. Reed that is cut low to the ground tends to last longer on the root since the exposed stems are thicker and tougher.

### b) Sedge Cutting

Saw sedge (*Cladium mariscus*) is only used for thatching the ridge of the roof. Although *Cladium* is widespread throughout Europe, East Anglia is the only area where it is commercially harvested. The crop can be cut once every three or four years in fens where it is the dominant plant. Sedge cutting is confined to the growing season so that cut stems may heal and produce new shoots before the winter. *Cladium* can be killed by prolonged flooding of cut stems during the winter months. Freshly cut bunches of sedge are left to dry for several days before being tied and sold for thatching. By the time this sedge is used on a roof, most of the other plants in the bunch should have dried and shrunk to negligible proportions.

## Non-commercial Management

### c) Marsh Hay Cutting

Rotational cutting and clearing of these mixed fen habitats is now carried out using teams of paid staff and volunteers purely for nature conservation reasons. Various makes and models of reciprocating blade cutters are used according to individual needs and budget. The vegetation is cut in the summer months after most of the flowers have set seed. It is then left to dry for several days before raking into habitat piles or into bonfires constructed in areas of lower botanical interest.

Most of this work is done by hand as the fens are too fragile to support heavy machinery for baling and transporting cut material. This makes the techniques very time consuming and labour intensive, so it is restricted to these areas which have the greatest botanical interest.

### d) Ditch and Ride Management

Fen ditches are normally between three and five metres wide. They are important for boating access and as a supply route for water both onto and off the fen, as well as providing a valuable habitat. Ditch edges need to be cut on a regular basis, however, to prevent the overgrowth of scrub and tall vegetation which would eventually shade out aquatic life. Many of Broadland's ditch edges are cut back to a width of two or three metres which has the dual

effect of management for nature conservation and the creation of a path or “ride“ valuable for access, fen plants and insects. Most of the ditch and ride management is now on land owned by conservation bodies.

#### e) Burning

Areas of fen are sometimes burnt as a standing crop in winter either to restore them for reed and sedge harvest or as a management technique to maintain open fen conditions. Burning is usually carried out in March after cutting necessary fire breaks and it is only carried out on relatively calm days which allows a greater degree of control of the fire.

Burning is a quick and easy technique that allows many hectares to be managed with the minimum of labour supply. Broadland fens are always very wet at the surface, so much of the dead litter is left unburnt. This will eventually lead to a drying out of the fen unless unburnt material is raked off and burnt periodically. Conversely, all types of scrub up to about 4 metres tall is killed by burning and will only re-grow from ground level, so burning is very effective as a scrub control technique.

#### f) Scrub Clearance

Freshwater fens will automatically be invaded by Young Alder, Birch or Sallow (*Salix caprea*), if left unmanaged for more than a few years. Clearance of blocks of scrub is usually done with teams of conservation workers, contractors or volunteers. The majority of the wood is burnt on bonfires although some is left to provide a habitat for insects, fungi and birds. Stumps are cut as low as possible to the ground and treated with a weedkiller such as ammonium sulphamate, to prevent re-growth of the tree. This is vital, since there are insufficient resources to repeatedly cut these areas.

Periodic scrub removal on a long rotation (5-10 years) will maintain open fen but will not produce as diverse a habitat as shorter rotation management. Sites that have been cleared of more established scrub are also very difficult to cut in the future with machinery, due to the large stumps.

#### g) Water Control

A substantial part of the flood plain rivers of Broadland must be flooded for many weeks each year in order to support the range of unusual plants and animals characteristic of the area. Every fen has a network of ditches and smaller “foot drains” (c. 1 metre wide) which move water both on and off the marsh. These channels must be maintained on a regular basis to give efficient water distribution throughout the fen. This system may be improved by building dams or sluices to prevent areas drying out. Some fens even have an active pumping system that allows water to be maintained at optimum levels throughout the year. The wetter fens are usually the most important both ecologically and from a commercial point of view.

#### h) Turf Pond Excavation (see Figure 2)

Some of the most valuable areas in the Broadland fens are these that were once cut for peat. Very few of these shallow turf ponds have been dug this century, so most are in the latter, drier stages of their succession. In order to re-create the wetter, more diverse types of fen the Broads Authority and English Nature have recently begun a programme of large scale turf pond excavation using a 20 ton specialist excavator.

Densely wooded areas are chosen for this type of management, where the wetland plant interest has largely been lost, after years of neglect. The machine is able to up-root scrub and move it away from the fen where it can be used to make raised banks. The surrounding peat is then excavated to varying depths between 0.5 metres and 1.0 metres and this material is used to smooth off the piles of scrub, to facilitate future management of the bank.

Initial work on an experimental scale has shown that these shallow ponds quickly colonise with aquatic plants followed rapidly by a “wetter type“ of fen community. Large scale ponds of this type are planned to give a variety of successional stages from open water to fen. This

represents a very important management technique for the conservation of some of the more threatened Broadland species such as the Bittern, Water Rail *Rallus aquaticus*, and Fen Orchid.

### **Research, survey and monitoring**

The fens have attracted less scientific interest than other habitats in the region but this has begun to change since the Broads was given national park status. Early work (1979-1989) concentrated on understanding some of the factors and processes affecting vegetation and its general response to a limited range of management operations (see Broads Authority 1984 and 1988 for summaries). The impact of management work in the Broads has been assessed by aerial photographs (Countryside Commission, 1991) and by monitoring permanent plots situated amongst a range of vegetation types (see Kennison, 1991). This monitoring data has been important in guiding the timing and nature of management practice. This monitoring work has also been important in detecting change caused by water abstraction, although detailed hydrological research is necessary to understand the factors affecting the water balance of any particular fen (Gilvear et al 1989). Bird and invertebrate surveys have shown how the vegetation structure, e.g. presence of small ponds, sedge tussocks and isolated bushes, can determine what species will occur.

Work by Wheeler (1983) encouraged the Broads Authority to dig some very small experimental turf ponds. The monitoring of succession in these over 10 years (Kennison, 1992), led to the investment in a large scale programme of works and sufficient experience has been acquired to draw up specific guidelines for turf pond creation. Monitoring data is placed on a computer database so that it can be accessed easily and fed back into the next review of the guidelines.

Only recently we have compiled a map of the Broadland fens showing the distribution, extent and condition of the plant communities present (Parmenter, in prep.). A new classification system (linked to the national one) has had to be constructed to describe Broadland's fen vegetation properly. This work will assist in the drawing up of a Fen Conservation and Management Strategy, prioritising works to achieve the best overall conservation benefit for the Broadland fens. Some hard choices will have to be made because resources are always going to be limited. It is intended that we will use a Geographical Information System (GIS) to map fen information and management.

### **Conclusion**

The Broadland fens are of outstanding importance in Britain for nature conservation and they support habitats and species of European significance. Much of the favoured habitat has been lost in recent years to neglect and changes in the catchment threaten the long term security of conservation efforts in these fens. A major programme of fen restoration has been initiated, based on survey and research information and traditional management practice.

The conservation work is coordinated by a partnership of statutory and voluntary agencies and with the cooperation of landowners. Management for commercial gain from fen products is carried out alongside management for nature conservation. To make up for the loss of agricultural labour in the fen areas, conservation staff and volunteers have been employed, together with the use of modern equipment to increase the efficiency of restoration operations.

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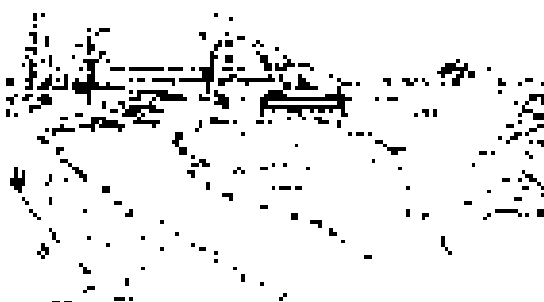
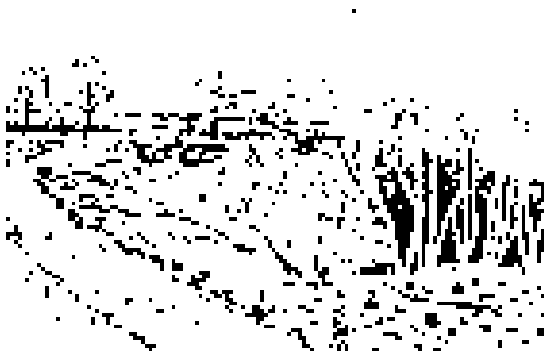
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**Table 1 Research, survey and monitoring carried out on the Broadland fens between 1979 and 1994.**

Reedbed bird survey of England, Wales and Scotland.	Broads Authority (1984)
Factors, processes and management experiments on Broadland fen vegetation.	Broads Authority (1984)
Turf ponds in Broadland.	Wheeler (1983)
Population flux of <i>Liparis loeselii</i>	Broads Authority (1984)
Historical ecology of the Broadland fens.	Broads Authority (1988)
Changes in the quality of thatching reed	Boar, Leeming & Moss (1991)
Rollsby Broad Transect Study of fen vegetation.	Kennison (1991a)
Vegetation monitoring of Broads Authority managed fens.	Kennison (1991b)

Habitat conditions of fen vegetation types.	Broads Authority (1988)
Invertebrate survey of East Anglian fens.	Broads Authority (1988)
The effects of reedbed management on fauna and flora.	Broads Authority (1988)
Turf ponds monitoring.	Kennison (1992)
Land use change in National Parks.	Countryside Commission (1991)
Hydro-dynamics of East Anglian fen systems.	Gilvear et al (1989)
Effects of burning in Broadland fens	Sutherland
Small mammals in Broadland fens	Perrow (1993)
Bittern research.	Tyler (in prep)
Fen resource survey of the Broadland fens	Parmenter (in prep)

**Figure 18: Stages of turf pond excavation (drawing by Matthew Dane, reproduced with permission of Broads Authority).**



The location within the reedbed is also important. To avoid damaging the existing invertebrate interest, it is advisable to create a pond for example, adjacent to or at the edge of the wetland (Kirby 1992), although even here important communities of plants may be present and should be avoided. On large reedbed sites, the addition of open water at the expense of pure reed, which generally has less wildlife diversity than more mixed areas of plants, will add to the wildlife value without damaging the other reedbed habitats present.

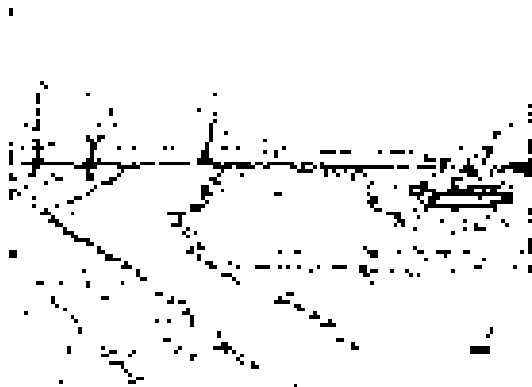
For pools, ponds, meres, scrapes and lakes the basic principles are the same. Soil is excavated from reedbed using a mechanical digger to produce a hole, which fills with water. Spreading the spoil on existing reed areas or other valuable habitat should be avoided and it may be pushed into the centre and used to construct islands for example, or as at Far Ings on Humberside, dropped into the edge of deeper water to make it shallower (Case Study 3). At Strumpshaw Fen in Norfolk, the mud pumped to re-open the Old Broad was deposited on a designated, banded area of low-value scrub. The construction of bunds may be combined with open water creation as was the case at Walberswick in Suffolk where material was scraped from the reedbed to create a sea wall leaving shallow open water areas on either side (Case Study 11).

Similarly, in the Broadland fens, "turf" ponds are dug as part of fen restoration work where the peat spoil is used to consolidate existing bunds or to construct new ones to prevent

excessive flooding by the tidally influenced river system. The ponds are profiled, allowing reed and a variety of other plants gradually to recolonise the shallow margins (Figure 18). A similar system but on a smaller scale has been used at Redgrave and Lopham Fen on the Norfolk and Suffolk borders where small pools were dug to mimic traditional peat diggings for the benefit of the endangered great raft spider.

At Blacktoft Sands on Humberside, some 20 ha of shallow, coastal lagoons were created by excavating the tidal reedbed, using the spoil to construct islands and a boundary bund, which holds back water after topping up on a high tide. One lagoon of about 8 ha of wet reedbed and 4 ha open water, is kept as wet as possible by retaining high water levels throughout the year but frequently dries out in hot summers. There is a further 88 ha of tidal reedbed.

Similarly, at Minsmere in Suffolk 20 ha of wader breeding srape was excavated leaving some 145 ha of reedbed intact. Apart from the aquatic habitat this provided, about 2,5 km of reed edge was added.



At Titchwell in Norfolk, a novel method of creating open water has been developed whereby scraped “topsoil” (mainly plant debris) was excavated to one side and the subsoil also dug out. The topsoil was replaced in the hole and the subsoil placed on top of it. The weight of this compressed the softer topsoil below, creating a shallow pool. The reed rhizomes in the original topsoil were buried too deep to grow so that reed could recolonise only from the margins. Experimental plots of 10 x 10 m had achieved nearly complete reed cover again within five years of excavation (Sills pers comm). Similar, but larger “upside-down” or “inverted substrate” pools have been created in 1991 and 1993 (see Figure 1 in Case Study 7).



At Far Ings in Humberside, a series of small pools were excavated to produce an encroaching reed margin for the benefit of feeding bitterns and other wildlife (Case Study 3).



## 2.5.2 Bring on the animals - Sue McQueen, Broads Authority

### Conservation Grazing

- Use of livestock to manage semi-natural habitats
- Projects in place across UK on range of habitats, e.g. heath, moor, woodland
- Extensive grazing, i.e. large areas & low numbers
- Another potential large-scale fen management technique
- Wetland grazing experience in UK & Europe
- New 'experimental' approach in Broads
- Aim to maintain open fen conditions & promote habitat diversity
- Extensive natural systems with minimal interference

### Why Graze?

- Range of fen management techniques with range of results
- Notable advantages of extensive fen grazing:
  - o Promotion of habitat & structural diversity
  - o Creation of ecotones
  - o Sensitive technique
  - o No product to remove from the fen
  - o Large-scale & long term



### Stock Selection

- Type - cattle, sheep, ponies
- Breed - traditional .vs. improved
- Animal background
- Own stock or grazier?

### Konik Polski

- Conservation grazing background in Holland
- Extremely hardy
- Suitable grazing and browsing ability
- Compensation of growth
- Intelligent and adaptable
- Good health and healing ability
- Strong, slow growing hooves

### Welsh Mountain

- Conservation grazing background in Wales
- Small and lightweight
- Thrifty and hardy
- Tolerant of biting insects
- Adventurous, sure footed and adaptable
- Relatively easy to handle

### Sutton Fen Grazing Project

- Large fen area of 120ha
- Open fen with scrub, woodland, solid & hover substrate, dry banks within site
- 16ha dry adjacent grassland
- Nine Koniks imported from Holland May '00
- Twelve Highland heifers & bull introduced 2001



### Sutton Fen Evaluation

#### Issues:

- Failure of animals to explore the fen
- Over-use of internal banks in autumn/winter
- Over-use of adjacent dry land in summer

#### Explanation:

- Position of dry adjacent land relative to fen
- Animal background
- Supplementary feeding of cattle

### Broad Fen Grazing Project

- Relatively small site of c.20ha
- Open fen with scrub, woodland, solid substrate & hover fen over peat diggings
- Dry vegetated bank network within the site & limited adjacent dry land
- Seven Welsh Mountain ponies introduced from Anglesey in Nov '97

### Broad Fen Evaluation

#### Issues

- Browsing of scrub limited
- Summer grazed only owing to flooding in winter & limited adjacent dry ground

#### But..... success!

- ponies explored & utilised whole site
- grazing created good structural diversity

### Learning From Experience

- Two very different sites:
  - o size of site & infrastructure
  - o animal management
- Some conclusions:
  - o Animal background is key
  - o Some breed differences, e.g. browsing
  - o Social groups, i.e. sex and age structure
- Importance of monitoring for site and livestock



### Conclusions

- Extensive fen grazing can produce favourable results
- Experimental nature in Broads means a certain amount of trial and error
- Importance of monitoring & learning from experience
- A mixture of livestock types may be best for the site, but can cause husbandry issues
- Important to maintain high welfare standards

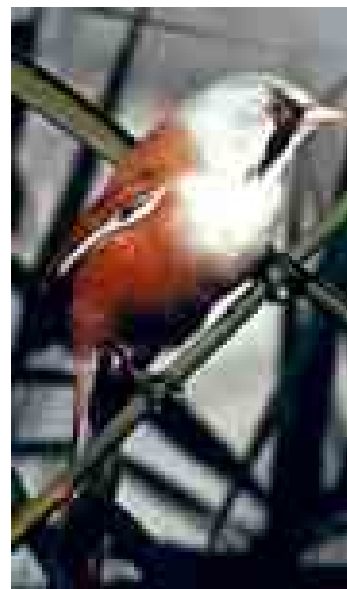
## 2.6 Guest Lecture – Wicken Fen: A 100-year Vision - Adrian Colston, National Trust

### Wicken Fen National Nature Reserve

- 99.9% of wild fens have been drained and lost since 1600.
- Today only Wicken Fen, Woodwalton Fen and Chippenham Fen survive.

**A quick tour of the Fen** The windpump on the Sedge Fen. This was originally located on Adventurers' Fen and was used to drain the peat digging trenches. It was restored in the 1950s and is the last working windpump in the Fens.

- Extensive areas of fen meadows dominated by colourful wildflowers. Wicken Lode - the chalk river that runs through the middle of the reserve.
- The Lode is the cleanest river in Cambridgeshire and is the 'life blood' of the Fen
- Saw sedge - the crop that has been harvested at Wicken Fen since 1414.
- Up to 50 families used to work on the Fen harvesting sedge for roofing and animal bedding, digging peat and catching wildfowl. There are 18 miles of walks on the Fen
- The reeds beds were created in the 1950s following a time when the land grew crops for the war effort.
- The wet grasslands on Priory Farm were created during the 1990s from sugar beet fields. The reed fringed ditches are home to many species of birds such as the reed warblers as well as rare snails and beetles
- On the Fen edge the peat gives way to clay with meadows dominated by ox-eye daisy
- Otters returned to Wicken Fen in 1999 after an absence of over 60 years
- Some of Wicken Fen's special birds
  - o The marsh harrier
  - o The bearded tit
  - o The bittern
- In addition to mammals and birds Wicken Fen has a huge diversity of insects. For example, 20 of the 21 species of dragonfly in Cambridgeshire occur on the Fen



**Over 1000 species of beetle have been recorded on the Fen**

- Some are large and spectacular like this 3" musk longhorn beetle
- Others such as the twin spot longhorn beetle are very rare - this species has only been recorded in the parish of Wicken in the whole of the UK

**Unbelievably over 2200 species of fly have been recorded on the Fen - making it the best site for this group in the country!**

- Some mimic wasps, others resemble bumblebees
- A few are large and bite

**Over 1000 species of moth have been recorded on the Fen**

- Some species are very rare such as the silver barred which only occurs at 5 sites in the UK
- And not all moths are dull and brown - the brightly coloured tiger moth has red underwings to scare away predators
- Other moths fly during the day such as the spectacular Emperor moth

**Butterflies have not fared well at Wicken over the last 100 years**

- The swallowtail is extinct even after two re-introduction programmes
- The marsh fritillary was lost during the early part of the 20th century. Only the brimstone has flourished - it does not depend on high summer water levels like the other two species do

**The Fen is drying out**

The caterpillar of the swallowtail depends on milk parsley which needs to grow with its roots in water during the summer. Drainage of the fens has lowered the water table and as a result there is not enough for the caterpillar to eat.

**Two new species of bush cricket arrived at Wicken Fen a couple of years ago as a result of climate change**

- Roesel's bush-cricket
- Long-winged cone-head

### **A huge variety of fen plants flourish on the Fen**

- Marsh pea and yellow loosestrife are common in some of the fen meadows
- Early marsh orchids line the ditches
- Meadowsweet is abundant everywhere
- Common bladderwort - a carnivorous plant found in some of the ditches and ponds.
- Its roots do not burrow into the soil - instead little bladders trap unwary water fleas and then consume them for their nutrients - one plant can catch 100,000 fleas a year!

### **Some national rarities**

- Fen violet is only known from two other sites in the UK. It was re-discovered on the Fen in the 1980s
- Fen ragwort - only survives in the Fens
- Wicken Fen is an internationally important wetland with over 7000 species of wildlife
- It is Britain's equivalent of a Tropical Rain Forest

### **Managing the Fen for wildlife**

- The sedge harvest has been carried out continuously at Wicken since the 1400
- Sedge cutting in Wicken Fen: early morning. Robert Walker MacBeth 1880s

### **Managing the reed beds**

- Around 20% of the reed beds are cut for thatching reed - the remainder is burnt on a 4 year rotation to encourage various insects

### **Managing water levels**

- The Fen suffers from summer water shortages.
- A 2km membrane has been installed to keep the water in.
- Water levels are monitored on a monthly basis.

### **Bitterns, LIFE and reed beds**

- Thanks to funding from the EU LIFE fund the reed beds have been restored - particularly for bitterns
- Many of the reed beds at Wicken were in a derelict state - too dry and poor for wildlife

### **Over taken by scrub**

- Sedge and meadow are the habitats for which Wicken is famous
- During the 1890s the sedge and peat industry collapsed and management all but stopped and gradually scrub overtook the Fen
- Fortunately Victorian entomologists who loved the Fen acquired sections of the Fen for the fledgling National Trust in 1899 - saving it from drainage
- Now thanks to funding from the Heritage Lottery Fund we have been able to employ 3 new wardens and buy a mechanical excavator which substantially speeds up the clearance
- Scrub was historically cleared by hand - a very time consuming process

### **Grazing with wild horses**

- These animals will stop the scrub from re-encroaching and produce a variety of new and attractive wildlife habitats
- Once the scrub has been cleared the west end of the Fen will be grazed by wild horses called tarpan or konigs.

### **The Heritage Lottery Fund have also given us grant aid to:**

- create a new 50 acre reedbed on some arable fields
- conserve the Wicken Fen archive
- computerise all the biological records
- build a new tower hide which overlooks the area where the wild horse live

**Wicken Fen is very much for people as well as wildlife**

- The Centre contains a lot of interpretation detailing the wildlife, history, current projects and future plans occurring on the Fen
- Wicken Fen attracts over 35,000 people a year to the William Thorpe Visitor Centre
- There is a shop selling a range of wildlife related goods and a café in the visitor centre
- We organise over 100 events a year including boats trips, craft exhibitions and guided walks There are currently three nature trails including a 1 km long raised boardwalk which gives access for push chairs and wheel chairs.

**Wicken is an important place for children**

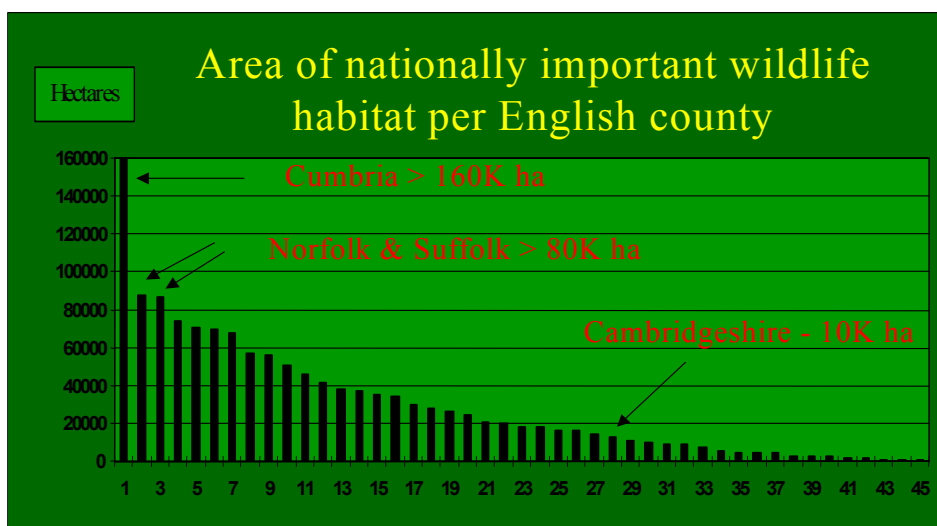
- 7000 school children visit the Fen annually for informal and formal education
- We also run a monthly Watch Group - an environmental club for local children
- The National Trust believes in life long learning. As a result we run lots of courses on wildlife, history and crafts for adults too.



**Fen Cottage**

- As well as the wildlife habitats there is also a small Fen Cottage - restored to show how it looked in the early 1900s - making the connection between people and place
- The Ganges Hut was built in the 1960s by the navy to accommodate cadets who worked on the Fen clearing scrub.
- More recently it has been used as the base camp for the National Trust's Working holiday groups.
- Now thanks to a landfill tax grant from Wren it will be re-furbished as our new Education Centre in October 2001. The presentation so far has reviewed the past 100 years and has set out the projects for the next five.
- An internationally important wetland rich in wildlife for people but still under threat The question remains - is Wicken Fen sustainable for the next 100 years as an island of wild Fen in a sea of intensive agriculture? Wicken Fen is very beautiful but it is too small.
- As a result the National Trust has developed a 100 year Vision for the property to address that issue and many others wider ones which affect Cambridgeshire.

**Putting Cambridgeshire in a national wildlife context**

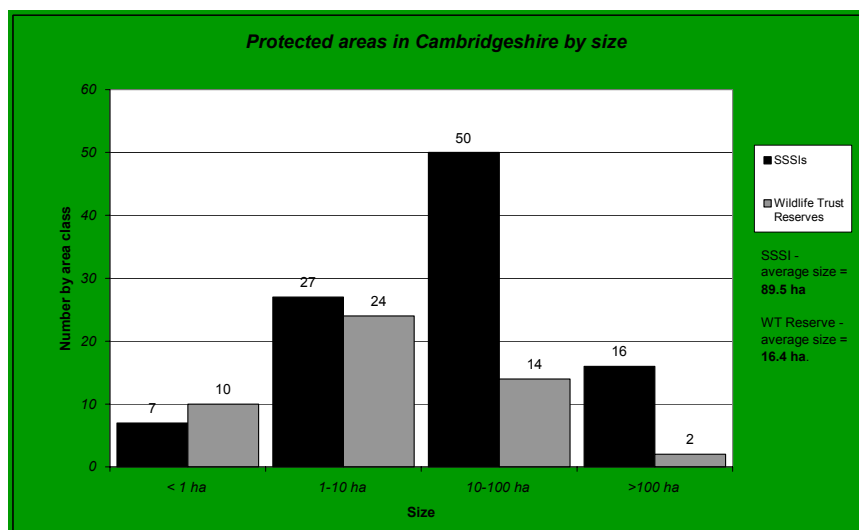


Cambridgeshire ranks very poorly with respect to other counties in England

### The Black Hole

- Counties with less than 1/2 the average of nationally important wildlife habitat
- National conservation policies and funding have largely ignored the Black Hole
- No National Parks, Environmentally Sensitive Areas, Areas of Outstanding Natural Beauty, Heritage Coasts etc.
- BUT lots of people live in the Black Hole and deserve access to a countryside rich in wildlife
- Modern agriculture has transformed the landscape making it less attractive for people and wildlife
- Sea level rise on the East Coast is leading to 'managed retreat' and the loss of important wildlife habitats
- Many coastal wetlands are threatened by salt water intrusion and many will be lost over the coming years.
- We need to make up for these losses now. Bulldozers working at Cley to protect the shingle bank
- Erosion of the shingle banks at Salhouse

### Protected areas in Cambridgeshire are very small



SSSI - average size = 89.5 ha. WT Reserve - average size = 16.4 ha.

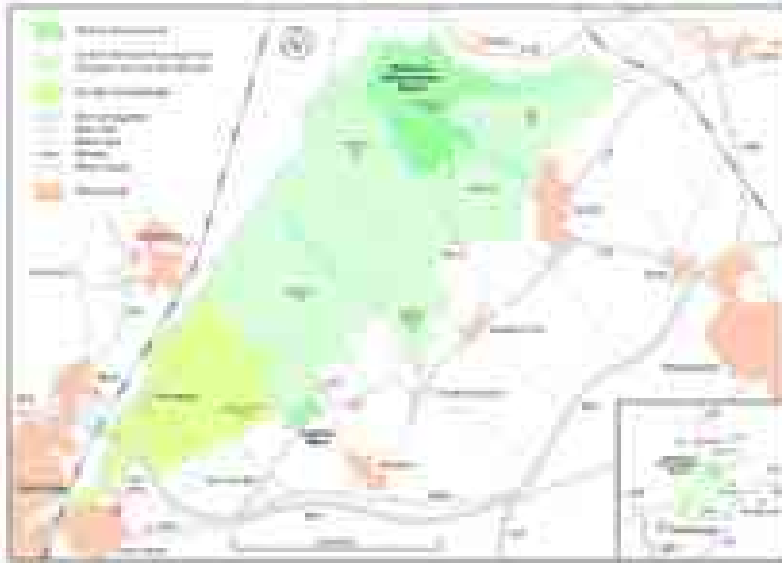
- Nature conservation has been forced into tiny sites and many species only survive as a result of intensive and expensive management regimes.
- This is unsustainable.

### Cambridge - becoming the high tech capital of Europe

- Inward investment is high but a new green lung is also needed
- The pressures of development resulting from a vibrant economy mean that up to 105,000 new houses will be required over the next 25 years

### We need a new approach

- We need to think BIG
- We need to think long term
- We need to be holistic



### The Wicken Fen Vision

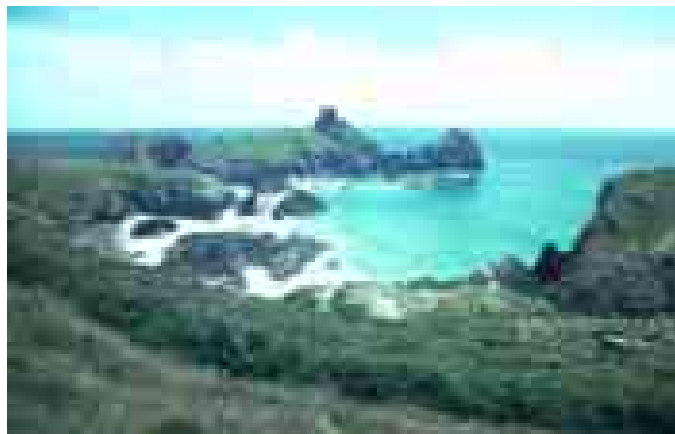
- The land today
- The multiple water and land levels
- A GIS simulation created by Cambridge University showing possible habitat types
- Progress to date!
- Adventurers' Fen was created in the 1950s from wheat fields
- Priory Farm - was created in 1993 from sugar beet fields
- Guinea Hall Farm was bought in 2000

and work is underway today to restore it to wet grasslands

- 415 acres at Burwell Fen Farm - a £1.7M acquisition £933,500 from the Heritage Lottery Fund
- £50,000 from Wren
- £500,000 raised from the public for future restoration and management
- Burwell Fen Farm was a huge complex of reedbeds in the 1930s. Eric Ennion's drawing details this before it was drained during the last war. An Appeal to Trust supporters and local businesses has been launched
- Everyone can help - even the Property Manager who raised £1000 at the London Marathon!
- The jigsaw puzzle is beginning to fit together. Where will the next piece fit in?
- Burwell Fen Farm is immediately adjacent to our existing landholding

### Future land management

- Many of the ideas are based on the Dutch wetland at Oostvaardersplassen - created 30 years ago.
- We aim to use extensive grazing regimes
- The National Trust has a great track record in extensive land acquisition for public benefit
- We aim at Wicken to do in the lowlands what we have already achieved on the coast and in the uplands



### The Wicken Fen Vision is a project which will

- Create a Green Lung for Cambridgeshire
- Create new habitats for wildlife
- Help the economic growth of the area
- Provide new recreational assets
- Make a real difference to the countryside and people's lives

## 2.7 Working with local communities and visitors

### 2.7.1 Our next Broads Plan: an integrated and participatory approach to managing the Broads - Dr Michael J B Green, Broads Authority

#### 1. *Introduction*

- 1.1 The Broads Authority is bound by statute to review its **Broads Plan** every five years and vary it if appropriate. The current Broads Plan 1997 is due for review and this has been identified and agreed as a priority within the Authority's Development Programme, with a completion date scheduled for the end of 2003. It has also been agreed that Broads Plan 2003 should be accompanied by a **five-year Action Plan** that will provide the basis of an **annual Business Plan**.
- 1.2 It is envisaged that Broads Plan 2003 should be a **long-term strategy**, based on a **20-year vision**. This is consistent with the duration of the Broadland Flood Alleviation Project, which commenced in 2002, and provides a sufficiently long-term framework within which to consider major issues such as climate change. Within this timescale, the Authority would need to review the Plan at least every five years and vary it as appropriate.
- 1.3 The next Broads Plan 2003 should be based on measurable and achievable objectives, with defined targets, that build on the earlier policies of Broads Plan 1997. Existing policies within the latter will be reviewed early on in the process.
- 1.4 The next **Broads Local Plan** (likely to be called a Local Development Framework) will follow in the wake of Broads Plan 2003. It is intended that the same consultation process will be used to identify key issues for informing the development of both the Broads Plan and the Local Development Framework.
- 1.5 Future **Best Value Performance Plans** (post 2003) will need to be fully integrated with the Broads Plan, demonstrating clearly how and to what extent Broads Plan objectives are being met. As emphasised in the 2002 Best Value Inspectors' Report, the Authority needs to become much more **customer (i.e. public) and outcome focused**. The next Broads Plan and accompanying process provides a major opportunity for establishing mechanisms and structures to address these shortcomings for both now and the future.
- 1.6 The recent Green Paper on Planning reinforces the role of **community strategies**, which are developed at district level. In the case of national parks, their management plan needs to be incorporated within the relevant communities strategies (six in the case of the Broads).

#### 2. *Key Elements of the Process*

##### **Participatory process**

- 2.1 Crucial to securing wide support for preparing and, importantly, implementing the next Broads Plan is to ensure that the process is **transparent, participatory and inclusive** from the outset. Thus, the process should be aimed at:
  - bringing together a wide range of organisations and individuals to create a common purpose and collective responsibility for the future of the Broads;
  - generating consensus around a set of objectives, based on a shared vision for the future of the Broads; and
  - engendering a strong sense of ownership amongst organisations and individuals in the objectives of the Plan.

- 2.2 The three **main groups of stakeholders** to be closely involved in the process are:
- people with information or skills relevant to the Plan and its preparation;
  - people affected by what happens as a consequence of the Plan; and
  - people with authority or resources to help implement the Plan.

Thus, **stakeholders** comprise the following:

- those who live or work in the Broads Executive Area;
- visitors to the Broads;
- partner organisations (governmental, non-governmental and corporate);
- local authorities and parish councils; and
- the wider public.

### Forums

- 2.3 **Community forums** will be established in the second half of 2002 and aimed at:
- being inclusive (i.e. open to anyone), but with the full range of interest groups (including parish councils) targeted to ensure participation by a representative; and
  - providing a framework for local issues to be identified and potential objectives and actions formulated through workshops.

Community forums will be established on a geographic and community sub-catchment area basis as follows:

Middle Bure and Ant

Lower Bure, Thurne and Trinities

Middle Yare (east to Reedham) and Norwich

Lower Yare (Halvergate/Haddiscoe) and  
Yarmouth

Waveney and Lowestoft

It is also planned that **members of the Authority** will participate in each forum.

- 2.4 The **Broads Forum**, newly established under the Authority's Development Programme, is representative of a wide range of organisations with an interest in the Broads, other than those already represented on the Broads Authority. It is well placed to contribute to and monitor the development of Broads Plan.

### Statutory stakeholders

- 2.5 Statutory stakeholders, including local authorities, will be able to participate in the development of the Broads Plan via their representative members of the Authority, as well as via other mechanisms involving members and officers. It may also be appropriate for their more local representatives to participate via the community forums.

### Steering Group

- 2.6 Its purpose is to manage and pilot the planning process, but NOT to dictate policy. Membership comprises members of the Strategy and Resources Committee (13),



officers of the Management Team (5) and the Chairman of the Broads Forum. (4 meetings/year)

### **Expert Advisory Group**

- 2.7 Its role is to provide external advice on the process, strategies and potential resources for addressing key issues. Members are key national experts and decision-makers (maximum of 6) within sectors relevant to BA's interests, the Chairman and Vice Chairman of the Authority, and officers of the Management Team. (2 meetings/year)

### **Facilitation**

- 2.8 Members agreed to engage consultants to help design and facilitate the consultation process. A well-designed and successfully implemented consultation process is crucial to the development and implementation of the Broads Plan. Experience from other local authorities with their local plans suggests that the consultation process is best carried out by independent consultants in terms of raising the credibility of the exercise and benefiting from expertise in facilitation. While this has traditionally not been the practice of national parks, a number of them recognise the advantages of such an approach in terms of coherence, independence, effectiveness and quickness.

## **3. Progress Design**

- 3.1 The process for the next Broads Plan was designed at a facilitated workshop in July 2003, involving a selection of members of the Broads Plan Steering Group and officers from the Senior Management Group.
- 3.2 The process is summarised in **Appendix 1**. By way of explanation, imagine a matrix, with stakeholders as columns along one axis (x) and time as rows along the other (y). The actual cells of the matrix represent the various products (eg process plan, workshops, deposit plan etc) and show when stakeholders are able to engage with them. There is also an additional column (No. 2) that tracks the main actions over time. The matrix also tracks Committee cycles for approvals/guidance at the various stages.
- 3.3 The process involves the following key steps and elements:
- Process plan provided to key stakeholders to information and feedback. Also included is an invitation to a workshop early in November.
  - Issues brochure prepared and sent to key stakeholders to prepare them for the workshop.
  - Similarly, issues brochure will be made available to members of local communities and parish councils, with an invitation to a workshop in their area.
  - Meanwhile, a team of Broads Authority officers is trained in September, ready to help with facilitating workshops in November and December.
  - Wider public sampled and also provided with access to issues brochure to which they are invited to respond in writing.
  - Outputs from workshops and public responses inform drafting of Broads Plan which is deposited by early May for consultation.
  - 3-month consultation of deposited Plan during which a second round of key stakeholder and community workshops is held to consider controversial issues and specific actions for incorporating in the Plan.
  - Consultation ends in July 2003, final preparations, and adoption of plan by members in Sept-November, with launch in January 2004.

4. *Structure of the next Broads Plan*

- 4.1 It is proposed that Broads Plan 2003 should be a concise, strategic and SMART (Specific, Measurable, Achievable, Realistic and Timely) document of about 25 pages, in which issues, objectives and targets are clearly identified in a coherent manner. One model generated by staff that merits further consideration is based on the following: **Vision** for the Broads, **Mission** for the Broads Authority, **Strategic objectives**, and an **Action Plan**.
- 4.2 In line with the Authority's more integrated approach to its committee and organisational structures, it is proposed that the first part of the Plan should focus on key themes, rather than statutory functions, and the second part on the community forums areas. Common issues such as sustainable development and social inclusion will need to be mainstreamed across the entire Plan. A possible draft contents list is outlined below.

*Broads Plan - A Possible Structure*

1. Executive Summary (2pp)
  - Vision for Broads
  - Signatures of partners
  - Acknowledgements
2. Introduction (2pp)
  - About the Broads national park
  - About the Broads Authority
  - About the Broads Plan process
  - About the wider context (e.g. Best Value, Community Plans)
3. Key Themes x 4-6 (12 pp)
  - Background (key features, scale)
  - Key issues, threats and opportunities
  - Overall aims and policies
  - Key objectives, with actions, lead partners, targets and measurable outcomes
  - Resources
4. Community Areas x 5 (2 pp each)
  - Map of area
  - Key issues and possible scenarios over next 20 years, threats and opportunities
  - Possible scenarios and desirable outcomes over next 20 years
  - Key objectives, with actions, lead partners, targets and measurable outcomes
  - Resources
5. Evaluation (1 p) (27 pp in total)

## Summary and schedule of the Broads Plan process (2002-2004)

Committee meetings are in italics.

Target date	Action	Broads Authority Committees			Key stakeholders <sup>1</sup>	Local communities	Public
		Broads Authority	Strategy & Resources <sup>2</sup>	Broads Forum			
16 Aug.	PLAN PROCESSES		Review draft process plan and key issues <sup>3</sup>				
30 Aug.					Inform and consult on process plan. Invite to workshop.		
12 Sept.	SCOPE KEY ISSUES			<i>Inform about process plan and scoping paper on key issues</i>			
23 Sept.			<i>Scoping paper on key issues</i>				
Early Oct.					Provide scoping paper on key issues and questionnaire on special qualities.	Provide <sup>4</sup> and make available <sup>5</sup> scoping paper on key issues and questionnaire on special qualities. Invite to workshops.	Provide <sup>6</sup> and make available <sup>7</sup> scoping paper on key issues and questionnaire on special qualities.
26-27 Sept.	TRAIN	15 staff trained in facilitation					
21 Oct.			<i>Update</i>				
8 Nov.		<i>Report on process plan and scoping paper on key issues</i>					

<sup>1</sup> Key stakeholders include statutory bodies represented on the Authority, non-statutory bodies on the Broads Forum and other organisations with whom the Authority works in partnership.

<sup>2</sup> Note that members of this committee, Management Team and the Chairman of the Broads Forum comprise the Steering Group for the Broads Plan.

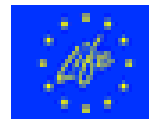
<sup>3</sup> Key issues to be arranged under the following 7 themes: Water quality and quantity, Recreation and tourism, The waterways, Landscape, Habitats and wildlife, Built and local heritage, Promoting understanding.

<sup>4</sup> To members of existing BA liaison groups, participants of BA's Annual Public Meeting, parish councils

<sup>5</sup> Via BA website, press releases, local libraries, parish council/community notice boards

<sup>6</sup> To stratified random sample of visitors to Broads and other users (eg tolls payers)

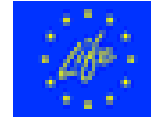
<sup>7</sup> Via websites (eg BA, NATA, EETB)



Target date	Action	Broads Authority Committees			Key stakeholders <sup>1</sup>	Local communities	Public
		Broads Authority	Strategy & Resources <sup>2</sup>	Broads Forum			
6 Nov.	ENGAGE WITH STAKEHOLDERS				STAKEHOLDER WORKSHOP <sup>3</sup> based on 7 themes		
12 Dec.				<i>Report on stakeholder workshop outputs</i>			
by 13 Dec.						5 COMMUNITY WORKSHOPS <sup>9</sup>	
20 Jan.	DRAFT DEPOSIT BROADS PLAN		<i>Report on stakeholder and community workshop outputs</i>				
7 Feb.		<i>Report on stakeholder and community workshop outputs</i>					
6 Mar.				<i>Early draft of Deposit Plan for Consultation</i>			
7 Apr.			<i>Deposit Plan for Consultation</i>				
25 Apr.		<i>Deposit Plan for Consultation</i>					
<b>Early May</b>		<b>Deposit Broads Plan for consultation</b>					
May-Jun.	CONSULT ON DEPOSIT PLAN				STAKEHOLDER WORKSHOP	5 COMMUNITY WORKSHOPS	
29 May				<i>Deposit Plan for Consultation</i>			

<sup>8</sup> Key stakeholders will be provided with opportunity of follow-up meetings with BA officers as required.

<sup>9</sup> Community workshops based around the following 5 areas: Middle Bure and Ant; Lower Bure, Thurne and Trinities; Middle Yare (east to Reedham) and Norwich; Lower Yare (Halvergate/Haddiscoe) and Yarmouth; Waveney and Lowestoft.



Target date	Action	Broads Authority Committees			Key stakeholders <sup>1</sup>	Local communities	Public
		Broads Authority	Strategy & Resources <sup>2</sup>	Broads Forum			
30 Jun.	<b>FINISH PLAN</b>		<i>Review responses to Deposit Plan</i>				
18 July		<i>Review responses to Deposit Plan</i>					
<b>25 July</b>		<b>End of consultation period for deposit Broads Plan</b>					
Early Sept.				<i>Broads Plan</i>			
Late Sept.			<i>Adopt Broads Plan</i>				
Early Nov.		<i>Adopt Broads Plan</i>					
End Nov.		Broads Plan to printers					
Jan.		<b>Launch Broads Plan</b>					

## 2.7.2 Involving communities in the environment - Kate MacKenzie, British Trust for Conservation Volunteers

### *Introduction*

### *Background to BTCV and its work with Communities*

#### *What is meant by Community*

- Geographical
- Community of interest
- Community of need

#### *Why should we involve the community*

- Consultation
- Planning and development of projects and programmes
- To get their support
- Education and awareness raising
- To involve them in lobbying, practical action or other activities
- Active citizenship – developing a sense of ownership and involvement

#### *Understanding your community*

- Age, cultural and ethnic make up
- Interests and concerns
- NGO's and Statutory organisations operating in the area
- Expectations

#### *Defining what you want*

- Set your objectives
- How are you going to contact the community
- How will you manage the process
- What are the limitations and boundaries

#### *Limitations and Boundaries*

- Time and financial
- Your own or the organisations knowledge, skills and resources
- Legal or statutory restrictions
- What is realistic and achievable

#### *What does the community need and want*

- Knowledge
- Training and skills
- Support
- Feedback and be able to feedback
- Ongoing development
- Empowerment

#### *Tools and Techniques*

- Focus groups
- Planning for Real and other visioning exercises
- Video diaries

- Oral and visual history groups
- Community Forums
- Consensus building
- Local management and warden groups
- Events, walks and talks

### *Celebration, Reward and Feedback*

### *Sources of help and advice*

## 2.7.3 Sustainable Tourism and visitor management - Bruce Hanson, Broads Authority

### *Introduction*

For the greater part of the twentieth century the traditional image of tourism in the Broads has been the boating (or perhaps 'floating') holiday. For the great majority of people this has meant a week, or possibly two weeks, aboard a motor cruiser hired from one of the many boatyards around the river system. Sailing has always been popular, along with other quiet activities such as bird-watching and fishing, but the hire-cruisers for long have been dominant in the Broads.

During the last quarter of the century this pattern began to change, and a steady decline set in. The hire fleet shrank from a high point of approximately 2500 boats to less than 1200 today, bringing serious repercussions for the local economy. The reasons for this are complicated, but they are clearly linked to the relentless growth of the overseas package holiday, which has changed the face of the entire domestic UK holiday industry.

### *The Role of the Broads Authority*

There is an in-built tension in the Broads Authority's role, as with all other UK National Parks, in that the demands of wildlife and nature conservation must be balanced with consideration for the social and economic needs of the local inhabitants. To address this the Authority developed an approach that is today called sustainable tourism – before the term was ever invented. In practice this has meant an almost minimalist technique – providing information and education in a quiet, low-key way so that people hardly realise that they are being educated. The Authority's expertise has been widely acclaimed and it played a pioneering role in the early stages of the development of the European Charter for Sustainable Tourism in Protected Areas, and it was closely involved in the landmark publication 'Loving Them To Death'.

### *Information and Fun*

The Broads Authority operates a network of small-scale information centres at strategic locations around the Broads. These are valuable to land and water-based tourists alike. Waiting for people to come through your doors is not enough, however, and the Authority has always sought to go out and actively engage people wherever possible.

Education is a serious business, but there is no reason on Earth why learning should not be fun. The Fun in the Broads programme consists of a series of events held throughout the National Park, which enable the Authority to promote its message directly to the public. An example of this is a puppet show, specially commissioned every year on an environmental theme. Another

example is the annual Wherry Tour, where traditional Norfolk sailing vessels, crewed by Authority staff, take the public on a series of short sailings around the river system. This provides exceptional opportunities to promote our work almost on a one-to-one basis, as well as a wonderful experience for our visitors.

The Authority operates four electrically powered boats, which again give people the opportunity to experience the natural world in a very intimate and special way. One of these craft, the Ra, is the first solar-powered passenger vessel to sail in Britain.

A network of bike and canoe hire centres has been set up to provide further opportunities for people to get out of their cars and into the loveliest and least accessible places. These are to be developed further to provide 'package' holidays in themselves.

### *A Future of Quality*

There are many excellent places to eat, drink and sleep in the Broads, but sadly there are some establishments that do not meet the standards that most of us expect to day. To address this problem the Broads Authority has launched a quality assurance scheme, known as the Broads Quality Charter. It was launched in the southern area with a publication known as the Secrets of the Southern Broads, and work is now in progress to extend it to cover the whole of the National Park. The aim is to gently nudge standards upwards where they are lacking, and to provide training and marketing assistance. An environmental standard has not yet been applied to this, but a package is being developed with this in mind.

The Broads Authority will shortly be submitting an application to Europarc to become the first UK National Park to be accredited with the European Charter for Sustainable Tourism in Protected Areas. This will provide a valuable framework to develop new and existing initiatives, and it will at the same time provide a focus to help to drive them forward.

## 2.7.4 Towards a Sustainable Hire Boat Industry - Louise Reynolds, Broads Authority

### *Introduction*

The Broads are a popular boating holiday destination, attracting around 120,000 people per year who come predominantly for the area's peace, tranquillity, big open skies and sense of freedom. Within Europe, the Broads offer a rare boating opportunity in that within a couple of hours totally inexperienced pilots can be left completely in charge of motor-cruisers worth up to £130,000.

### *Historical background*

Seen by many as the birthplace of the self-drive boating holiday, the first records of hire boat activity here date back to the end of the Victorian days when wherries and yachts were offered for hire, each with their own skipper and steward. The operator of these first excursions was a man called John Loynes who moved his hire boat activity from Norwich to Wroxham Bridge in 1878. His memory lives on in the modern firm of Faircraft-Loynes which trades from the same location today. By 1887 there were 39 boatyards offering boats for hire.



A gentleman called Harry Blake began acting as a London agent (Blakes Norfolk Broads Holidays Ltd) for 13 yards in 1908, advertising 120 boats with accommodation for 600 people; this caused boating holiday activity to increase in the early part of the 20th century. By 1939 the hire fleet had increased to 277 yachts and 310 cruisers but holiday activity on the Broads stopped completely during the war.

After the war, the Blakes agency (which was operated as a co-operative) was joined by another agency, Hoseasons, and during the 1960s and

1970s Broads hire boats were in such demand that people would queue outside the London offices as soon as the new season's brochures were printed in order to secure their favourite boat for their chosen week. Agency staff apparently regularly received gifts - theatre tickets – as customers attempted to guarantee their place on a Broads hire cruiser.

It was apparently also during this time that boating on the Broads became a 'working class' holiday as the purchasing power of miners from the northern areas of England increased.

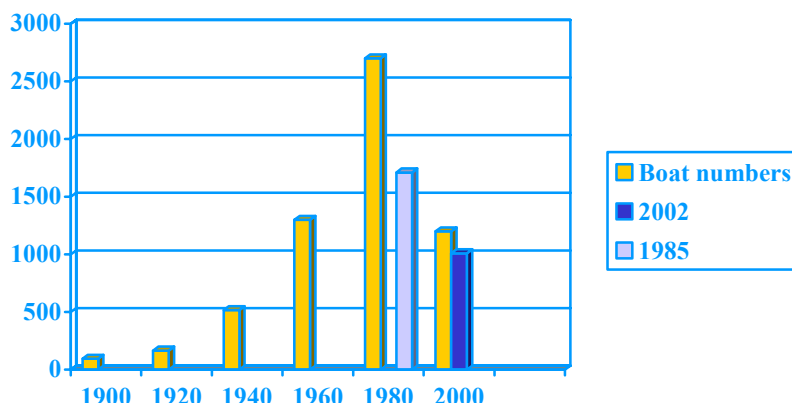
And so the 'peak' year for hire boat operation on the Broads was 1981 when 2,709 hire craft were available (109 yachts, 2,150 cabin cruisers and 450 motorized day boats). But then recession hit hard and between 1981 and 1985 1,000 boats were lost from the hire fleet (to 1,710 in 1985). Boat numbers appear to have remained fairly constant between 1989 and 1998 which seems to mark the beginning of another period of accelerating decline and current numbers are about 1,100 craft. Even at the current low levels, given the 125 miles of navigable waters this is an average concentration of 10 boats per navigable mile. The last two years have been very good for the industry and opinions vary as to whether this is a 'blip' (caused by anomalies such as foot and mouth and September 11 last year) or whether it will continue.

Despite this apparently significant decline since the 1980s, the Broads still hosts 48% of Britain's total boating holiday activity (38% of the share is on British Waterways waters and 8% is on the Thames). It is estimated that boating holidays in the Broads generate around £60 million per annum<sup>10</sup> for the local economy which in turn is calculated to support around 2,300 jobs.

#### *Call for help*

In 1999, concerned over the continued decline, the Broads Hire Boat Federation (BHBF) published a document entitled "Norfolk Broads Boating Holidays: the facts and the future" which had a clear purpose of attempting to "arrest further decline".

This stimulated the action of the Broads Authority and other regional organisations to find a way of analysing the best way forwards. These organisations comprised: Boat hire operators; Blakes Holiday Boating; British Marine Federation; Broads Authority; Broads Hire Boat Federation; East of England Development Agency; East of England Tourist Board; Hoseasons



*Trends in Boat Numbers*

<sup>10</sup> Derived from figures provided by the East of England Tourist Board utilising the 'Cambridge Economic Impact Model'

Holidays; Norfolk County Council. They collectively commissioned a study by a leisure consultancy firm (Strategic Leisure) who reviewed the entire Broads hire boat holiday, including services on shore. The resulting Broads Hire Boat Study identified a number of problems affecting the overall holiday experience throughout the Broads National Park:

- Standards of customer care
- Quality of infrastructure, moorings, etc.
- Quality of on-shore services / catering
- Condition of some holiday boats
- Lack of 'team spirit' and commitment to the Broads among service providers
- Sufficiency and quality of information and guidance
- Availability of and access to 'off boat' entertainment and attractions

These and other shortcomings together contribute to a poor overall holiday experience for some visitors. In a world where every holiday customer has a vast range of potential destinations and holiday offers it was identified that there needs to be improvements if the Broads is to survive and prosper as an important boating holiday destination.

Continuing their work with market analysis and focus group discussions to see how the holiday experience could be improved, Strategic Leisure drew together their findings into the Broads Hire Boat Strategy and Action Plan. This was endorsed last year by the member organisations and received encouraging support from a range of additional organisations (such as the Royal Society for the Protection of Birds) who it is hoped will be working in partnership during the next stages of implementation.

One of the first steps necessary to progress the Plan was to appoint a Project Officer whose job it would be to help steer the Plan's implementation and I took up that post three months ago.

### *The Plan*

The overarching vision of the Plan is rather grandly set out as being:

to achieve a thriving boat hire industry by providing "a quality experience which is customer focused and competitive in the market place and which is both economically and environmentally sustainable in the future".

The Plan highlighted the following guiding principles for adoption by all tourism businesses around the Broads:

- Aim for a high quality visitor experience regularly exceeding expectations
- Make the most of the distinctiveness of the area
- Contribute to the environmental sustainability of the Broads
- Significantly improve the quality of on-shore facilities and tourism infrastructure
- Become competitive and dynamic offering value for money and taking advantage of new opportunities
- Be market-led and customer focused

A leaflet is being printed to communicate these points to the service sector businesses around the Broads as a starting point to improving the overall holiday product.

The Plan itself has 8 interlinking components: structure, product development, training, marketing, pricing, planning, environment, and research and monitoring. In practice these overlap and in some cases strongly influence each other.

Within these overall components the Plan lists a total 51 core areas for action (for example "Rationalise hire fleet numbers", "Develop and strengthen links between waterways and countryside recreation activities", "Establish a unified identity with a credible and constant image to underpin Broads brand to be used across the tourism sector taking into account local logos and marketing campaigns", "Prepare marketing plan for each key market sector", "Create a

better understanding between ecological and industry interests...”), and these are in some cases broken down into say 10 sub-categories which sketch-out the beginnings of how each could be achieved. Alongside each core area of action there is a list of ‘potential partners’ and each core area has been given a ‘short-’, ‘medium-’ or ‘long-term’ label. The actions can be broadly summarised into those appearing in Box 1.

## **Box 1: Identified actions**

### *Structure*

- Identify project champion
- Review representation of steering group, re-establish
- Strengthen role of partners (formation of trade federation for service providers)
- Promote BHBF and chairman

### *Product*

- Boat audit (identify capital costs of upgrade. Longer term: alternative boating)
- Investigate financial incentives for upgrades (longer term: develop loan fund)
- Quality grading scheme (grant to get it moving)
- Audit of facilities (showers, toilets, moorings, sports & leisure, esp. GY/Nch yacht stations) leading to Improvement Programme
- Improve on-shore facilities (workshops, quality charter, network of providers)
- Information (“welcome to The Broads” guide onboard, new interpretation, improve availability)
- Activities and packages (guided activities, expand canoe/cycle hire, added value packages, childrens needs, etc., specialist packages, all-in-one priced deals inc. air/rail travel)
- Destination Signposting (audit brown signs, new logo, plan, implement)

### *Training*

- Audit of skills (questionnaire of boatyards)
- Audit training needs
- Awareness raising at yards (environmental/tourism issues)
- Organise industry seminars/training events

### *Marketing/Promotion*

- Prepare unified identity and approach (“The Broads”)
- Awareness raising, promotion, working with partners, co-ordinate with national initiatives
- Produce ‘who does what’ guide (of marketing orgs)
- “Broads Gateway” website
- On-line events guide (audit what’s available first?)
- Prepare marketing plans for short break couples, families, specialist, disabled, overseas...

### *Planning*

- Workshops to bridge planning/commerce
- Prepare area specific development briefs
- Maximise benefits from Flood Alleviation Strategy
- Enhance ecological and cultural heritage
- Consider private sector impact

### *Environment*

- Develop Broads Green Boating Audit toolkit (already exists so promote, develop awards)
- Conservation holidays (already covered – specialist markets)
- Examine best practice in Holland and elsewhere (ensure within Broads Plan review)
- Map cruising patterns and consider zoning (Rivers and Broads Strategy)
- Co-ordinate mooring facilities with zoning (10-yr strategy)
- Eco-friendly boating (control quality of water discharge, exhaust systems, sound proofing, pool knowledge, commission new designs, explore funding)
- Promote/seek funds for extension of electric charging

### *Research and Monitoring*

- Prioritise and work-up actions with timescales
- Desk and new research

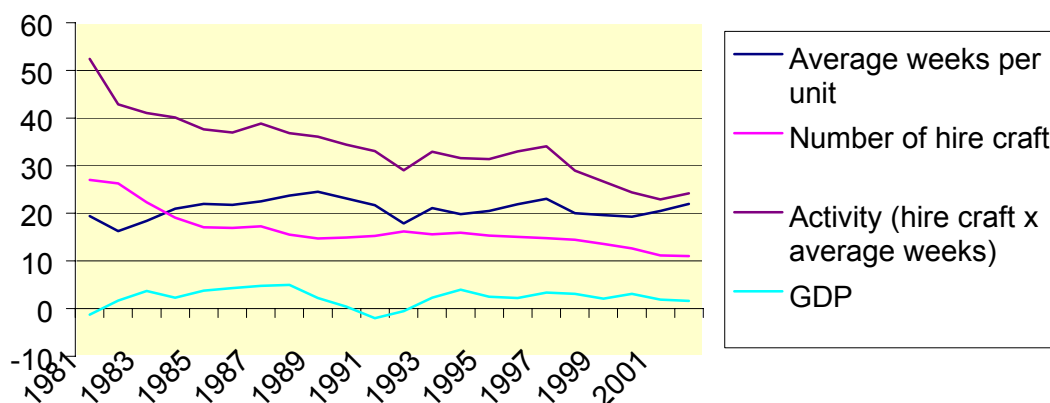
*Sustainability*

The ideal of sustainability is that we provide for our grandchildren healthy economic, social and environmental conditions. Boating holidays on the Broads cut across all of these and given that the Sandford Principle of conservation coming first does not apply in the Broads, careful consideration needs to be given to the interplay of boating activities. Each of the economic, social and conservation elements of sustainability is complex in itself even before beginning to cross-compare for common-ground. To give a brief overview of the economic element:

*Economic sustainability*

In terms of 'economics', boating holidays need to be profitable. Boating activity on the Broads has been in decline at a rate of 3-4% per annum, influenced by national and international trends and primarily affecting the boatyards. This is the thrust of the 'call for help'.

The most important figure for measuring the economic activity of the hire boat sector is to look at the average number of weeks each boat (unit) is hired out over the year.



As the graph shows, this average number of weeks per unit sold strongly follows GDP, buffeted around by other anomalies. We can also overlay the number of hire boats operating each year (in hundreds) and by multiplying the number of hire craft by the average number of weeks a hire craft is active, we can establish an indicative measure of weeks of hire boat activity for each year. It is this activity that has been in decline at around 3-4% per annum (54% total decline since 1981) over the last 20 years.

National economic productivity will affect domestic purchasing power. The downward trend in activity despite annual growth in GDP per capita means that boating on the Broads is becoming less of a priority as incomes rise. Such sectors, where growth does not keep up with income, or even falls as incomes grow, are described by economists as having low or even negative income elasticity.

Factors influencing GDP are outside the control of boatyards or even regional authorities. There are also declining real costs of going abroad on holiday with international trends in cheap flights to guaranteed sunshine. There are also changing holiday patterns within the UK working population (more short breaks being taken throughout the year instead of one main summer vacation) as well as lifestyle choices which are all affecting the uptake of Broads boating holidays.

*To consider the boatyard perspective*

It is impossible to describe an 'average' boatyard; they (68 of them in all) range from a one-man-band with a fleet of 7 hire boats undertaking no other activities on site, to yards employing some full time, some part time and some casual staff and undertaking a whole range of activities (camping, floating accommodation, private moorings, slipway and repairs, fixed accommodation, additional services such as shops) to yards with mostly other activities but one hire boat and then there is the yard with 450 hire boats.

Just under half of the yards audited to date rely solely on the hiring of boats. The rest have diversified into one or a whole range of supporting operations and, in business terms, these seem to be the most successful yards (although again it is misleading to generalise). In seeking alternative uses for their land to help improve earnings, current planning regulations stipulate they must maintain some boatyard activity on their site. Permission for residential property is not given although many now have holiday accommodation on site and there seems to be an increasing move towards fixed holiday accommodation with add-ons of day boats, dinghies, etc. Another approach to diversification has been to remain solely with hire craft but to corner a particular sector of the market, for example luxury four-poster beds, Jacuzzis, etc.

Statistics so far show that one quarter of yards hiring cruisers also build boats (and I have been quite amazed to walk into a relatively small wooden-framed, tin-roofed shed to find a couple of men building state-of-the-art boats for retail at over £100,000), and these tend to be exported to Europe. Some yards have smaller build activity, building their own boats not for forward sale. In some cases the hire activity underpins boat building, and so hire boat holidays are enabling these significant local skills to continue, while in other yards boat building underpins the hire boat activity.

Lack of profit has resulted in a general lack of re-investment either in hire boats or on-shore services. A new boat can cost between £40,000 and £130,000 and loans are typically offered on a 7 year payback period, which means that it is 7 years before a new boat begins to earn. Unlike most businesses investing these sorts of capital amounts, a hire boat tends only to be utilised for 6-8 months in the year. The average age of hire boats on the Broads is 16 years old, but many are 30 years old or more, the oldest boats being concentrated in one yard which adopts a quantity, mass market approach to its holiday product.

A considerable proportion of support services for floating holiday makers around the Broads are provided by boatyards (water, fuel, free moorings, showers, toilet pump-outs, etc.) and a lack of re-investment has implications for the provision of these services. In addition, there is a policy of free moorings for hire craft on Broads Hire Boat Federation yards, where the number of spaces provided equals the number of hire boats operated from that yard. If boatyards continue to reduce their hire fleets and turn moorings over to popular and lucrative private mooring space (where as one operator said to me "the only work is writing the invoice") the extent of free holiday moorings and support services could become unsustainable and/or uncoordinated.

Nationally, hire boat companies are facing difficult pricing decisions (can the current quality of infrastructure support price increases which would make the industry profitable but would appeal only to the quality, top-end of the market?) and jointly wonder at how the Dutch, French and Irish holiday boating infrastructures are so well provided. Licences which are paid by the hire boat sector across the UK (called 'tolls' in the Broads which are like a road tax for boats) influence this debate considerably; with higher tolls/licences, better quality infrastructure could be provided. Hire boats currently pay three times the amount paid by private craft. It would be interesting to look at how the Broads and the UK structure of licensing and toll-payments differ from those existing within European neighbours.

In addition to these issues relating to the economic sustainability of the boatyard arm of hire boat industry in the Broads, there are economic issues relating to on-shore service providers and the interaction between shore- and water-based service providers (pubs, restaurants, etc.). There are also social and environmental issues to consider which cannot be gone into depth

here. The social strand includes access for all and ‘save the boating history of the Broads’ while the environmental strand could be put simply as ‘get the noisy, polluting, inappropriate boats out of Britain’s unique natural wetland’. The complexity of each ‘sustainability’ strand has hopefully been demonstrated.

### *Making Decisions*

Decision making requires a measure of pragmatism and in order to arrive at an Action Plan, Strategic Leisure developed and implemented a ‘sustainability matrix’ which set different ‘strategic options’ against ‘key areas of impact’.

Strategic Option	Key area of impact		

The key areas of impact were defined as:

- Profitability
- Investment potential
- Employment
- Environmental sensitivity
- Partnership support
- Overall sustainability

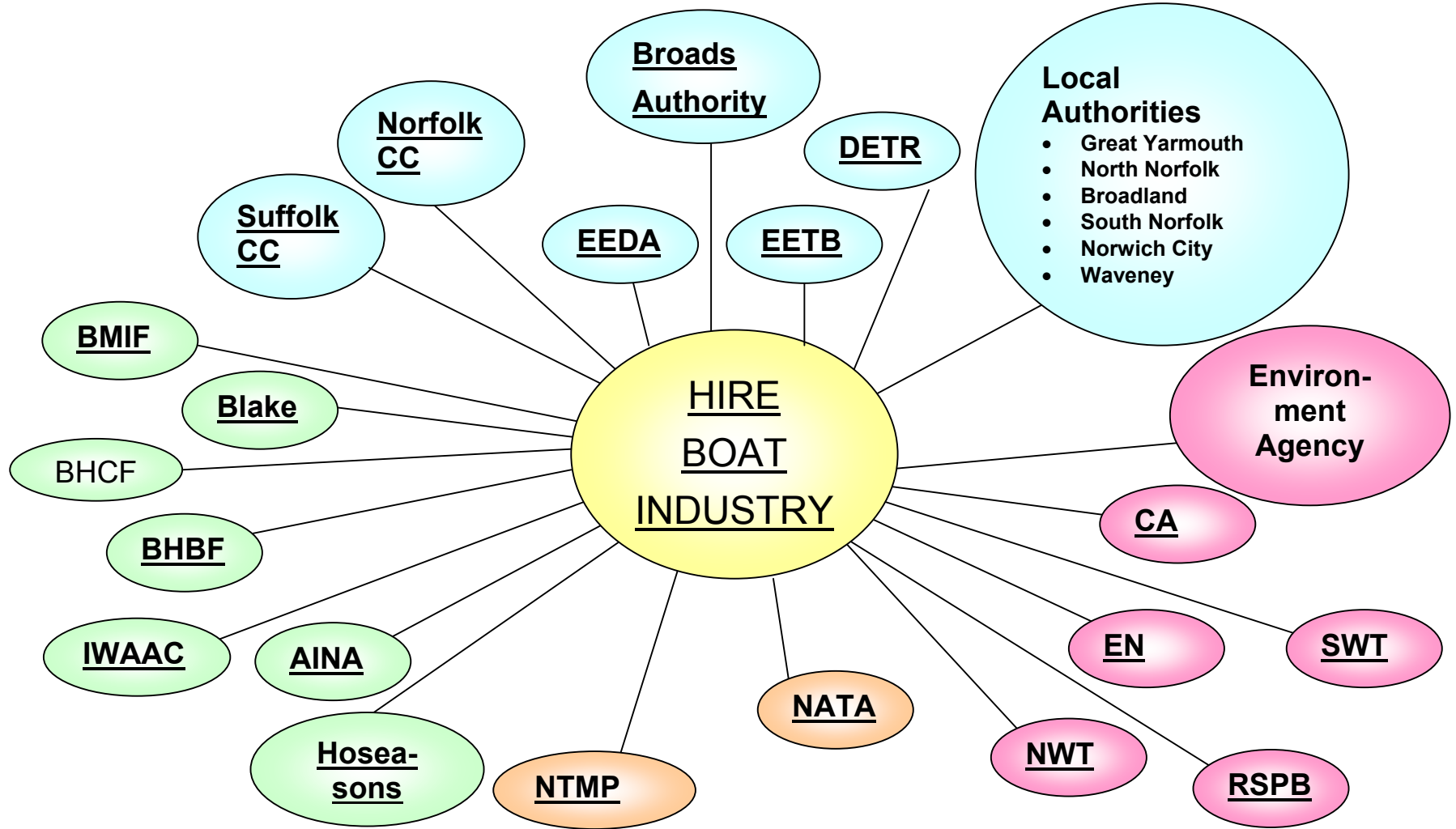
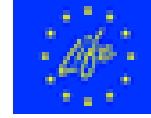
The ‘strategic options’ analysed were: cost focus; differentiation; consumer focus; structural development; product development; and diversification. For differentiation, as an example, the options were: (a) reduce cost (cheap and cheerful); (b) increase cost (exclusivity); and (c) variable costs (quality/location linked/per person pricing).

Against each ‘option’ and under each area of impact a simple score of between 1 and 5 was allocated, with 1 indicating a strongly positive impact, 5 strongly negative.

In basic terms the general way forward was identified as being a boating holiday with a variable cost focus, tailored towards niche markets (such as those related to activities, green/eco, birdwatching, etc.), with a consumer focus of ‘social greys’ and specialist groups. Marketing was identified as needing to be led with dedicated resources by the Norfolk Tourism Management Partnership. The holiday product should become electrically powered with a focus on ‘floating pontoons’ and extension of current moorings. The hire boat fleet needs to reduce, the mix of fleet should be changed and boatyards should redevelop out of boating.

### *Partners*

It is important to draw attention to the partnership nature of the Boating Holidays Project. Not all of the problems identified in the Study can be addressed by the boat hire operators alone, or indeed by one Project Officer. The Broads Authority, with National Park status, is responsible for management and maintenance of the waterways and many moorings. It also has responsibilities for promoting and managing on-shore tourism, for providing information and interpretation as well as for protecting the ecology and habitats which form the natural assets of the boating holidays trade. The District and County Councils also have an important role in providing many services which are essential to the enjoyment of a Broads boating holiday.



As well as these authorities, key to the provision of quality holidays are the proprietors of small businesses around the Broads (pubs, restaurants, shops, post offices, attractions) who derive or who could derive trade from boaters. The Broads holiday experience is perpetually recreating itself out of the ecology, people, history, memory, landscape and activities available. It is a mosaic of many different factors and each person dealing with visitors has an acute impact on their holiday experience, on their impression of the area, the people who live and work here, how life is lived here.

Mechanisms are being developed to engage with these service providers to help carry out the aims of the Project. Over the next few months, potential partnership organisations will be approached or revisited to see how they can contribute to the thrust of effort aimed at revitalising the Broads as a quality destination. This will include conservation organisations who have already pledged their support in helping to encourage holidays to become more in tune with the local environment.

### *Priorities*

Clearly there is a huge amount to be achieved. The first Steering Group meeting highlighted the priorities (not ranked in order) as:

- on-shore facilities at Great Yarmouth and Norwich Yacht Stations
- quality grading scheme
- seek ways and means of obtaining funding for specific projects
- increase and improve quality of on-shore facilities
- undertake a survey of boatyards and facilities
- quality charter
- training workshops

As work in relation to the quality charter, the grading scheme, and the Yacht Stations is progressing, the main thrust of work over the last few weeks has been auditing boatyards, primarily to: ascertain services provided at yards; identify potential additional mooring space (to extend the 24hr free moorings), space for camp ground and/or children's play space; find buildings ripe for regeneration (eligible for East of England Development Agency – EEDA - grant); audit holiday information provided on boats and at yards; undertake training audit; and to meet the operators.

About 50 boatyards have been audited and mostly for the first ten minutes or so (sometimes for two hours) they have been keen to pass on their experiences and their views of what should have been done better over the last few decades, their family's links to the land, hearing about quirky customers they've known for 30 or more years who have become real friends and always booked the same boat, and so on and so forth. This has been absolutely fascinating and at times deeply moving, particularly when last week I met with a couple who had been running a hire boat yard for 50 years, it had been operating as a boatyard for 100 years, and they were clearing it out because they had ceased operating. He quietly wiped away tears as I asked where they were passing their customers on to. She showed me two large old framed black and white photos, one of the 15 or so staff about 30 years ago on the yard ("that's me look" she said, and there was a bright faced young women in her twenties) and the other of about 20 old wooden Broads cruisers all shiny and smart, lined up waiting for holidaymakers ("those are my boats, weren't they boo'iful"), the empty buildings abandoned but with fresh signs of toil, work, busy-ness, memories.

It is hard to ignore the feeling that an important era is coming to an end.



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*What's Next?*

The next phase of work will involve:

- Organising the project launch, which is to include presentations to boatyard operators, including case studies provided by pubs to open dialogue between waterborne and on-shore service providers.
- Recontacting potential partners with a view to their increased and focused involvement in the aims of the Project.
- Broads Tourism Association: the idea with this is to link together those providing for tourists around the Broads. Starting with the pubs most affected by boating holidays, they will be invited to help form an association.
- Website design to ensure the area, and boating holidays within it, is being promoted appropriately.
- Involvement in the Broads Plan Review to help knit the area as a waterborne holiday destination into the overall future vision of the Broads.

### 3 Feedback

#### 3.1 Feedback from participants at the end of each day's training

Note: Each participant was invited, in turn, to highlight one or two aspects of the day that had been of particular interest and/or relevance. These points were recorded on a flipchart and are detailed below.

##### **Tuesday 1<sup>st</sup> October 2002**

##### **“Understanding the Hydrology of Wetlands”**

- Saline intrusion and relative drainage levels.
- LEAP – Local Environmental Action Plans.
- Groundwater controls important.
- Redgrave and Lopham Fen – well-funded restoration plan! Resources!
- Groundwater:     greater awareness  
                          management of water levels
- Water management for wetlands?
- Flow regime  
  Quantity vs. quality
- Eco-hydrology: connections
- Data availability outside of ‘ivory tower’
- Climate change and saline intrusion  
  - what are we trying to protect?
- Think big! Think collaboratively!
- Importance of educational programmes – income and education.
- Water-level management plans and saline intrusion. Are we getting it right?
- Expense of supplying groundwater.
- Efficacy of trading licences?
- E.I.A. and computing modelling to aid water resources management.
- Value of traditional farming schemes.
- Increasing sophistication – CAMS.

##### **Wednesday 2<sup>nd</sup> October 2002**

##### **“Rivers and Broads: The Research, Management and Restoration”**

- “Biomanipulation,” too technical:
  - irritated, unusual use of term of “manipulation”.
- Balance needs of stakeholders and keep good relationship with Broads Authority. Doing well in above. Not using legislative approach.

- Biomanipulation budgets – increased cost – needs acknowledgement. Cost would be prohibitive in other parts of Europe.
- Surprised at extent of degraded habitat. Useful to have ecology explained.
- Stalham Sewage Treatment Works trip interesting:
  - sludge disposal problems – hearing the other side;
  - effective process. Making real efforts to comply.
- Multiple approach and stakeholder pressures realised.
- Comparison to large riparian site and impressed with boardwalk, although lack of funding in other EU countries.
- Application of techniques to other situations is difficult. But research acknowledged.
- Match funding possibilities – may not be helpful for habitat management.
- English Nature view on extensive restoration/recovery.
- Management Planning is required before further work continues.
- Rivers and Broads Strategy required and is being developed.
- Type of craft on Broads.
- Cobweb brushes interesting.
- Glad not re-vegetating whole broad:
  - too easy to take conservation view;
  - better to take holistic perspective;
  - artificial perspective;
  - parts of Broad good idea.
- Impressed by scale of ambition and cost of boardwalk:
  - large project attracts funding;
  - allows anyone to go into a totally inaccessible place.
- Phosphate reduction measures interesting:
  - using green filter to reduce nutrient in stream inflowing to lake. Airport terminal.
    - roots to trap sediment. Macroinvertebrates;
    - high surface area;
    - terminal treatment for Sewage Treatment Works;
    - low cost, applicable to many areas.
- ‘Ra’, quiet. Broads Authority or other sponsor an eco-craft locally built as demonstration.
- Deadline (2015ish) to ensure all new boats are environmentally friendly.
- Boardwalk construction, pre-consideration.
- Bird grazing techniques.
- Scale. Needs lots of money to do job.
- What is the future for Barton landscape? Scrub removal.

- Visitors to Boardwalk. How many?:
  - how should it be advertised;
  - considering local views;
  - balance needs to be achieved;
  - linking visitor activities on and off water.
- Trees in the landscape – past and future:
  - what do we want to see?;
  - what point in time do we want to ‘restore’ to?
- Is there sufficient area available for washlands? Yes. Need to be downstream. Areas are in Natura 2000 sites thus need to be considered carefully. In 50 years time there may have to be a barrier to manage area.
- Preserve ancient monuments? Similar discussion in other countries.

#### Thursday 3 October 2002

#### “Fens and Drained Marshes: Their Management and Restoration”

- Never knew there was quite so much to cows! Growing cattles’ diet.
- Liked fen harvester and scale of operation. Dealing with end product (votes 11).
- Farmer (Barry Brooks) cares about conservation. Useful in influencing others.
- Fen harvester – rotations – 5 years. Less intensive than traditional.
- Absence of fen monitoring – concern ref: species mixture/composition.
- Farm visit – environmental measures. Very important. Unusual. Integrated farming.
- Missed Eric! Fen harvester, dealing with management and scrub. Grass visit – good but still very intensive farming. Leave some areas very wet and see the potential development.
- Very impressed with crop production.
- Grazing marsh – conflict between water levels for agriculture and conservation. Need to own land, but good to see farm business and water level raising – OK together.
- Landscape used intensively for long time.
- Climate change, wetlands, hydrology.
- Should accept more forest/trees – beneficial as would have been woods previously – more of a ‘treed’ landscape (not necessarily commercial).
- Seeing on the ground, after GIS. Understanding of scale. Big landscape.
- Happy to be on the Broads. Saw the habitat we’re trying to approach. A good day.
- New Wetlands Harvests – problems with pipe. Need to get pipe and blowing correct. Lightweight, rigid, or stronger.
- Need for Barry Brooks to move slowly to take people with him.
- Very large farm compared with average German farm. Intensive (very) – demonstrated by very high yields. Therefore not that good for conservation – but a good start for the real world.
- Good opinion leader. Believes he is doing the right thing. Therefore, good despite intensity.

- A – E schemes try to promote conservation, but regulations for production work against this e.g. 30-month rule.
- Forestry has no subsidy. Not economically viable.
- Fen harvester - compaction – glad it's being considered.

**Friday 4<sup>th</sup> October 2002**

**“Working with Local Communities and Visitors”**

Canoeing and Recreational Opportunities

- Role of Broads Authority in Boat Hire Industry – conflict with conservation interests.
- Managing organisational change (British Trust for Conservation Volunteers).
- Quiet recreational opportunities.
- Lovely canoe trip.
- Need for Broads Authority to be clear and decisive regarding policies in developing sustainable boat hire industry – needs to develop policies and ensure they are implemented.
- Puppet show – good educational tool.
- Process of Broads Plan – participation visioning – development of long-term plan.
- Variety of recreational opportunities and relationship to La Nava.

Engagement of Stakeholders

- Less carbon emission recreation should be expanded and encouraged.
- See real life examples of sustainable tourism on your doorstep.
- Management plan process – need more detail – key to get people to sign up to this.

Aspects of Boat Industry – Design

- Should look at other international examples. How to influence private owner – as important as hire industry. Influence of climate change?
- Market alternative boat design fuels – also need for infrastructure.
- Strategic management planning – transferable to other countries.
- Staff involvement in sustainable tourism – Wherry. Also residents' involvement.

Promoting Visitor Understanding in Sustainable Tourism

- Need to offer additional services – guides, signs, picnic stops.
- Reconciling of recreation and conservation.
- Importance of people perceptions of an area – takes time to change these. Important for Broads Authority to portray image of Broads to help change perceptions.
- Importance of communicating changes to private boat owners and why.
- Co-operation of stakeholders may be more difficult in other countries.
- Many years of experience in Broads and greater public support.

**Feedback to Course**

<b>More of</b>	<b>Less of</b>
Brief on relevant UK organisations More about overseas organisations Lecture from Navigation interests Visit to normal (non committed) farmer Food for lunch Water for field trips Longer breaks to allow non English speakers to catch up mentally Latin for species names	Early starts

3.2 Evaluation at the end of the Trainingscourse – Course Evaluation Form

## EVALUATION FORM

*Training Course in Wetland Management and Restoration carried out by the Broads Authority, 30<sup>th</sup> September to 5<sup>th</sup> October 2002, Norwich, UK*

1. What do you think about Topic 1 on 'Understanding the Hydrology of Wetlands'?

- very interesting*
- interesting*
- satisfactory*
- less interesting*
- not interesting*

Was it useful for your work at home?

- very useful*
- useful*
- satisfactory*
- less useful*
- not useful*

2. What do you think about Topic 2 on 'Rivers and Broads: The Research, Management and Restoration'?

- very interesting*
- interesting*
- satisfactory*
- less interesting*
- not interesting*

Was it useful for your work at home?

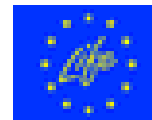
- very useful*
- useful*
- satisfactory*
- less useful*
- not useful*

3. What do you think about Topic 3 on 'Fens and Drained Marshes: Their Management and Restoration'?

- very interesting*
- interesting*
- satisfactory*
- less interesting*
- not interesting*

Was it useful for your work at home?

- very useful*



- useful*
- satisfactory*
- less useful*
- not useful*

4. What do you think about Topic 4 on 'Working with Local Communities and Visitors'?

- very interesting*
- interesting*
- satisfactory*
- less interesting*
- not interesting*

Was it useful for your work at home?

- very useful*
- useful*
- satisfactory*
- less useful*
- not useful*

5. Which of the topics did you like best? Why?

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6. What would you have liked more of or less of?

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7. What do you think of the timetable of the Training Course?

- very good*
- satisfactory*
- less satisfactory*
- not satisfactory*

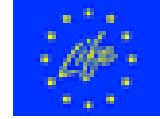
8. Were you happy with the general organisation of the course?

- very happy*
- happy*
- less happy*
- not happy*

9. Were you happy with the accommodation and the catering?

- very happy*
- happy*





- less happy*
- not happy*

10. How did you find the Training Course on the whole?

- very good*
- good*
- satisfactory*
- less satisfactory*
- not satisfactory*

11. Could you describe your expectations in applying for the Training Course?  
Which of your expectations did we meet?

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12. Do you have any suggestions for improvements?

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13. Further comments:

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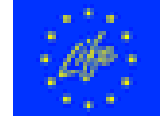
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*First Name and Surname:* \_\_\_\_\_

*Organisation:* \_\_\_\_\_

*Street or Postbox:* \_\_\_\_\_

*Postal Code, City:* \_\_\_\_\_



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Country: \_\_\_\_\_

Telephone: \_\_\_\_\_

Fax: \_\_\_\_\_

E-mail: \_\_\_\_\_

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*Please hand in the Evaluation Form after the course or send it to the following address:*

*Lesley Sayer  
Secretary/Administrative Assistant  
Broads Authority  
18 Colegate  
Norwich  
Norfolk NR3 1BQ  
UK*

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*Fax: +44 (0)1603 765710*

*Thank you*

### 3.3 Responses from Course Evaluation Form

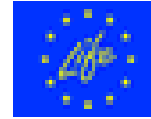
Note: The responses are summarised in the tables below. They are based on a total of 16 completed and returned evaluation forms. (The total number of participants was 22).

**N/A = Not Applicable**

Question 1		Very Interesting	Interesting	Satisfactory	Less Interesting	Not Interesting
(a)	<i>What do you think about Topic 1 on 'Understanding the Hydrology of Wetlands'?</i>	<b>12</b>	<b>3</b>	<b>1</b>		
		Very Useful	Useful	Satisfactory	Less Useful	Not Useful
(b)	<i>Was it useful for your work at home?</i>	<b>5</b>	<b>8</b>	<b>1</b>	<b>1</b>	<b>1 N/A</b>

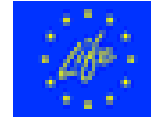
Question 2*		Very Interesting	Interesting	Satisfactory	Less Interesting	Not Interesting
(a)	<i>What do you think about Topic 2 on 'Rivers and Broads': The Research, Management and Restoration?</i>	<b>8</b>	<b>7</b>			
		Very Useful	Useful	Satisfactory	Less Useful	Not Useful
(b)	<i>Was it useful for your work at home?</i>	<b>4</b>	<b>8</b>		<b>1</b>	<b>1 N/A</b>

\*One participant absent on this day



Question 3		Very Interesting	Interesting	Satisfactory	Less Interesting	Not Interesting
(a)	<i>What do you think about Topic 3 on 'Fens and Drained Marshes: Their Management and Restoration'?</i>	<b>14</b>	<b>2</b>			
		Very Useful	Useful	Satisfactory	Less Useful	Not Useful
(b)	<i>Was it useful for your work at home?</i>	<b>10</b>	<b>5</b>			<b>1 N/A</b>

Question 4		Very Interesting	Interesting	Satisfactory	Less Interesting	Not Interesting
(a)	<i>What do you think about Topic 4 on 'Working with Local Communities and Visitors'?</i>	<b>6</b>	<b>7</b>	<b>2</b>	<b>1</b>	
		Very Useful	Useful	Satisfactory	Less Useful	Not Useful
(b)	<i>Was it useful for your work at home?</i>	<b>3</b>	<b>6</b>	<b>4</b>	<b>2</b>	<b>1 N/A</b>

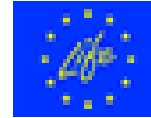


Question 5

*Which of the topics did you like best? Why?*

Comments

- I found topics 1 and 3 most useful and interesting. I thought the field trip to Redgrave and Lopham Fen was extremely valuable for the range of wetland issues discussed. Topic 4 was interesting but the sustainable tourism parts are less relevant to my own work. The canoeing was great!
- I liked the balance between lectures and the field trips. Guest lectures are a good idea.
- Hydrology – Upper Thurne case study particularly relevant. Also Rivers and Broads – Research Management – particularly nutrient stripping/clear water project. Sutton Fen/Wicken Fen visit good – missed Barry Brooks.
- Fens and drained marshes, their management and restoration. It's the most useful in my area.
- The research, management and restoration. Nutrient enrichment is from my point of view one of the main problems in wetlands that has to be a management priority.
- Fens and drained marshes because it is very interesting to try and change the Spanish farmers mentality.
- Fens and drained marshes – interesting to see large scale restoration “projects” and demonstration of the +/- aspects of techniques – Wicken Fen lecture very good.
- Topic 4 ‘nature’ should not be separated from the local community, or from the visitor. Nor should tourism be separated from nature. Interesting from the sustainability angle.
- Topics 1,2, & 3 because interested in these but not knowledgeable about them. Familiar with techniques in Topic 1 have used them but for civil engineering purposes.
- Topic 3.
- From my working perspective Topics 1,2, and 3 all had equal relevance and interest. They were all well presented and complemented with good examples.
- Working with local communities and visitors, because it is an interesting form to promote the knowledge about Wetlands.
- Topic 3. Particularly interested in Fens, but also the innovative ways in which the habitat is being managed. Impressed by the personal commitment of the individuals – i.e. owner of Sutton and farmer at Halvergate.
- Topics 1, 2 and 3 very interesting and relevant to work creating reedbed and grassland at Lakenheath Fen.
- Fens and drained marshes: their management and restoration.
- Cleaning up after nutrient enrichment and biomanipulation, ‘Ra’ boat and barriers - use of technology in conjunction with managing areas with public and problems inherent with the consultation process in the Broads.



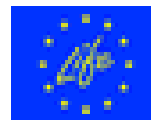
Question 6

*What would you have liked more of or less of?*

Comments

- More time for self.
- Whole course was very good balance of topics and field trips.
- More opportunity for discussion and “argument” rather than the evening feedback sessions. Would’ve been good to feed off of each other’s comments more.
- More practical management concepts and less of nothing.
- A little less time for speakers.
- Topic 4 was interesting in its explanation of tourist pressure and associated problems on the Broads, but possibly less relevant in terms of wetland restoration generally.
- I like the balance of lectures/field trips.
- Thought balance was good.
- More integrating of Topic 4 with the previous topics.
- Expert opinion on the effects of climate change and sea level rise and the localised effects. It was much discussed but an independent view (e.g. Tyndall Centre) would be beneficial.
- Having attended a CHAMPS meeting this week a little more on coastal defence/sea inundation/rise – fens cutting/grazing. More on monitoring of work undertaken – (is there any or just omitted?) would have liked to have seen examples of social involvement/inclusion in Broads.
- Maybe more participants from abroad apart from the participants from Greece and Spain involved in the project (costs?).
- I thought there was a good balance between formal presentations and field trips. I would have found it useful to have seen how the RSPB manage their grazing marsh at Halvergate in comparison to the surrounding farmland. Given the international flavour to the course, it would have been good if there was a session for participants to explain briefly what they are doing in their own work.

Question 7	Very Good	Satisfactory	Less Satisfactory	Not Satisfactory
<i>What do you think of the timetable of the Training Course?</i>	<b>8</b>	<b>8</b>		



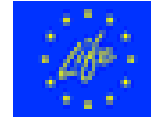
Question 8		Very Happy	Happy	Less Happy	Not Happy
	<i>Were you happy with the general organisation of the course?</i>	<b>12</b>	<b>4</b>		

Question 9**		Very Happy	Happy	Less Happy	Not Happy
	<i>Were you happy with the accommodation and the catering?</i>	<b>1</b>	<b>11</b>	<b>2</b>	<b>2 N/A</b>

\*\*One or two commented that more drink was needed with packed lunches.

Question 10		Very Good	Good	Satisfactory	Less Satisfactory	Not Satisfactory
	<i>How did you find the Training Course on the whole?</i>	<b>12</b>	<b>4</b>			

Question 11	
<i>Could you describe your expectations in applying for the Training Course? Which of your expectations did we meet?</i>	
<u>Comments</u>	
<ul style="list-style-type: none"> <li>• I expected to learn about wetland and lake management in general and with reference to the habitats found in the Broads in particular. The course met my expectations and also had the added value of learning from participants from other countries.</li> <li>• Background and up-to-date information on research, management and restoration in wider Broadland (outside Upper Thurne) context – grazing.</li> </ul>	



Question 11 continued

- Most of them.
- We are starting a restoration project in Spain. We can apply the contents of the training course in everything!!
- To improve my understanding of wetland management (i.e. “fill in the gaps”) and an update on the current Broads strategy. Most of these!
- To see the Broads management and to have it explained.
- I thought it would be very interesting. It was.
- I have learnt more than I expected.
- To receive a greater understanding of wetlands in terms of hydrology and wetland management and as an ecosystem. I now understand the hydrology and have picked up a few management ideas.
- I expected to learn about the challenges facing the Broads and the restoration techniques being used. These expectations were fully met.
- Knew little of what to expect but came to gain a wider knowledge of wetland management in general – this alone was greatly exceeded and also gave an insight into many other problems faced in the Broads and further afield.
- Expected to (a) learn more about current thinking in wetland management and (b) learn from the experiences of the international delegates. (a) was more than met, (b) less so.
- Wanted to hear of other management techniques and their success, also wanted to broaden own knowledge of a limited area in Norfolk. Wanted to learn from others’ experiences of management that could potentially be applied to Lakenheath Fen. All expectations were met.
- All expectations have been covered.
- I really accomplished the aims I expected from the training course in two senses: I got to see a management of a different ecosystem and different areas of management; (water quality, tourism, water level, biomanipulation...)

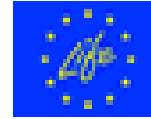
Question 12

*Do you have any suggestions for improvements?*

Comments

- Include in the training course some workshop working in small groups to discuss certain issues. I consider it important to leave some more free time in between the presentation because for foreign participants it’s hard to keep ourselves concentrated on language and contents (very technical) during so many hours.
- Try to get participants from as wide a range of geographical and industry fields as possible, as much of the information available is more beneficial when widely shared and issues differ, dependant on peoples’ experiences.





Question 12 continued

- In an international conference such as this a half hour presentation showing the breakdown of Government, NGOs, statutory authorities and voluntary organisations in the UK would have been of benefit at the beginning of the course.
- More wetland management techniques. Practical conservation.
- More information on the project management methodology would have been of interest.
- To be balanced a viewpoint from a boating/navigation interest group would be a valuable addition to debate.
- All the things are all right. Only a small comment, not so important, but a little more time for breaks could be OK. For me, I need some time for relax, speaking in English all the day is so tiring!!!
- Perhaps showing aspects of "nature" to people – NWT Hickling, water trail and tower (very few places you can look down on Broads, that and Horsey Windpump. Had EU LIFE money for Bittern project. Lunches - bit more food but especially drinks during day (especially field trips).
- Opportunity for the participants to briefly introduce their background and organisation in the beginning.
- To have seen how RSPB manage their grazing marsh at Halvergate in comparison to the surrounding farmland would have been useful. Also, a session for participants to explain their backgrounds/their own work.

Question 13

*Further comments:*

- Generally a good and enjoyable course.
- The course has made me realise how much we have neglected wetland habitats. If I could find the resources I would like to manage them better.
- I found the course very useful in learning new views, opinions and methods of wetland management and would say it was an excellent four days spent.
- Particular commendations to Sandie for the Fen and Marshes Day, the whole of which was inspirational yet practical and pragmatic.

## 4 List of Participants

Name	Country	Institution
Udo Gattenlöhner	D	Global Nature Fund
Clara Casanova	ES	Fundacion Global Nature, Project Partner
Jesus Gutierrez	ES	Fundacion Global Nature, Project Partner
Jose Antonio Mucientes	ES	Fundacion Global Nature, Project Partner
Ma. del Pilar Tartilan	ES	Fundacion Global Nature, Project Partner
Maria de los Angeles Munoz	ES	Fundacion Global Nature, Project Partner
Fernando Jubete	ES	Fundación Global Nature, Project Partner
Dimitris Papadopoulos	GR	EPO, Project Partner
Hans Jerrentrup	GR	EPO, Project partner
Maria Nikolaou	GR	EPO, Project Partner
Colin Hart	UK	Broads Authority, Project Partner
Gervase Charmley	UK	Broads Authority, Project Partner
Ian Walker	UK	Broads Authority, Project Partner
Lesley Sayer	UK	Broads Authority, Project Partner
Martin Joslin	UK	Broads Authority, Project Partner
Michael Ashton	UK	Civil Engineer
Glen Cooper	UK	DEFRA Rural Development Service
David Sutton	UK	Derbyshire Wildlife Trust
Philip Precey	UK	Derbyshire Wildlife Trust
Tara Richardson	UK	Derbyshire Wildlife Trust
Allan Stewart	UK	English Nature
Simon Parker	UK	Imperial College
Lou Mayer	UK	King's Lynn Consortium of Internal Drainage Boards
Ben Scotting	UK	Nottinghamshire Wildlife Trust
Sophie Leadsom	UK	Royal Society for the Protection of Birds
Stephen Prowse	UK	The National Trust

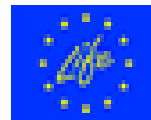
## 5 Contact details for all presentations during the Training Course

Speaker(s) and Job Title	Country	Institution	Address	Phone Fax E-Mail
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Andrea Kelly Assistant Conservation Officer	UK	Broads Authority	18 Colegate Norwich Norfolk UK NR3 1BQ	+44-1603-61 07 34 +44-1603-76 57 10 <a href="mailto:broads@broads-authority.gov.uk">broads@broads-authority.gov.uk</a> <a href="http://www.broads-authority.gov.uk">www.broads-authority.gov.uk</a>
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Karen Sayer Head of Information and Design	UK	Broads Authority	18 Colegate Norwich Norfolk UK NR3 1BQ	+44-1603-61 07 34 +44-1603-76 57 10 <a href="mailto:broads@broads-authority.gov.uk">broads@broads-authority.gov.uk</a> <a href="http://www.broads-authority.gov.uk">www.broads-authority.gov.uk</a>
Louise Reynolds Project Manager Broads Boating Holidays Project	UK	Broads Authority	18 Colegate Norwich Norfolk UK NR3 1BQ	+44-1603-61 07 34 +44-1603-76 57 10 <a href="mailto:broads@broads-authority.gov.uk">broads@broads-authority.gov.uk</a> <a href="http://www.broads-authority.gov.uk">www.broads-authority.gov.uk</a>

Speaker(s) and Job Title	Country	Institution	Address	Phone Fax E-Mail
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Rob Andrews Senior Conservation Officer	UK	Broads Authority	18 Colegate Norwich Norfolk UK NR3 1BQ	+44-1603-61 07 34 +44-1603-76 57 10 <a href="mailto:broads@broads-authority.gov.uk">broads@broads-authority.gov.uk</a> <a href="http://www.broads-authority.gov.uk">www.broads-authority.gov.uk</a>
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Andrew Excell	UK	Redgrave and Lopham Fen		
Ben Hornigold	UK	Kings Lynn Consortium of Interna Drainage Boards		
Bruce Hanson	UK	Broads Authority		
Dawid Steward	UK	Anglian Water		
Richard Slaughter	UK	Anglian Water		

:-+:- Broads Authority



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**Speaker(s) and Job Title**

**Country**

**Institution**

**Address**

**Phone  
Fax  
E-Mail**

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Sue McQueen

UK

Broads Authority

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Trevor Thorley

UK

Broads Authority

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