



# The Value of Water Level Management

ENVIRONMENT



# INTRODUCTION

## **Foreword from the Chairman**

A healthy and rich environment is essential to provide the ecosystem services that support our economy, provide us with a good quality of life and provide resilience to changes in climate. This report shows the significant contribution made by the work of IDBs to maintaining and improving the environment and biodiversity.

Freshwater and wetland habitats are amongst the most diverse, supporting a wide range of plants and invertebrates, and birds, fish and mammals that feed on them. IDBs play a major part in maintaining these habitats and their connectivity, and controlling the non-native species that threaten native species and habitats.

Catchment Partnerships have a key role in improving the water environment and water quality. IDBs work with farmers, communities and conservation groups as key members of these partnerships. IDBs also play an important part in establishing, maintaining and improving nationally and internationally important environments, with 1 in 10 SSSIs in IDB areas.

The quality of local environments created and maintained by the work of IDBs is vital for the recreation, tourism and farming that maintains local economies and people's health and wellbeing.

ADA and the Internal Drainage Boards are committed to protecting and enhancing the environment as an integral part of our work to manage water levels.



Henry Cator OBE DL FRICS FRAgS

**Chairman**

**Association of Drainage Authorities**

# INTRODUCTION

## About this report

This report is the fourth in a series of reports highlighting the value of water level management in England and Wales. The first report focused on the value of water level management to electricity supply, revealing that 53% of installed capacity of major power stations in England and Wales are situated within an IDB, the second concentrated on the transportation network, explaining that water level management, particularly in Yorkshire and the East of England enables both road and rail to keep moving, and the third showed how important water level management is to our economy, with the majority of Grade 1 agricultural land; significant parts of the nation's food processing industry; access for ports handling almost 20% of England's imports and exports; significant tourist sites; and over 25% of UK's oil refining capacity within IDB areas.

## About ADA

The Association of Drainage Authorities (ADA) is the membership organisation for water level management organisations in the United Kingdom.

Our members include IDBs, the Environment Agency, Regional Flood & Coastal Committees (RFCCs), Flood Risk Management Wales and the Northern Ireland Rivers Agency. Associate Members include local authorities, consultants, contractors and suppliers. ADA was established in 1937 to watch over and support the interests of drainage authorities at a national and parliamentary level, provide a forum for the exchange of ideas and discussions, and disseminate information of common interest.

ADA is recognised as the national representative of the IDBs in England and Wales.

# WATER LEVEL MANAGEMENT



Figure 1: Geographical Distribution of IDDs in England and Wales

# WATER LEVEL MANAGEMENT

## About water level management

Water Level Management is the close management of water levels in watercourses and underground for the purpose of reducing the risk from flooding and for the sustaining of land uses and the environment. Low lying areas of England and Wales particularly require the daily close attention of specialist local water level management bodies to actively manage and reduce the risk of flooding and waterlogging. Internal Drainage Districts (IDD) across England and Wales (figure 1 – map of IDB areas) can be used as an effective proxy for areas where careful water level management is required. However, it should be noted that there are no longer Internal Drainage Districts in Cumbria, Essex, Lancashire, Lincolnshire, Northumbria and the Thames catchment even though parts of these areas are low-lying.

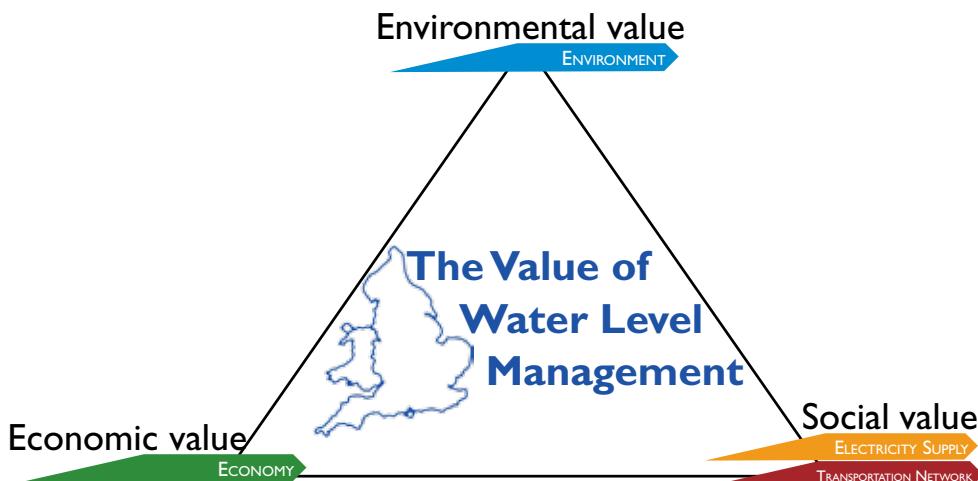
## About Internal Drainage Boards

Internal Drainage Boards (IDB) are local public bodies established by law in areas of special drainage need in England and Wales to undertake works to reduce flood risk and manage water levels on behalf of their community. Internal Drainage Boards cover 9.7% of the land area of England and 1.4% of Wales. They are geographically concentrated in the Broads and Fens of East Anglia, the Somerset Levels, Kent, Nottinghamshire and Yorkshire where there are extensive areas of low-lying land.

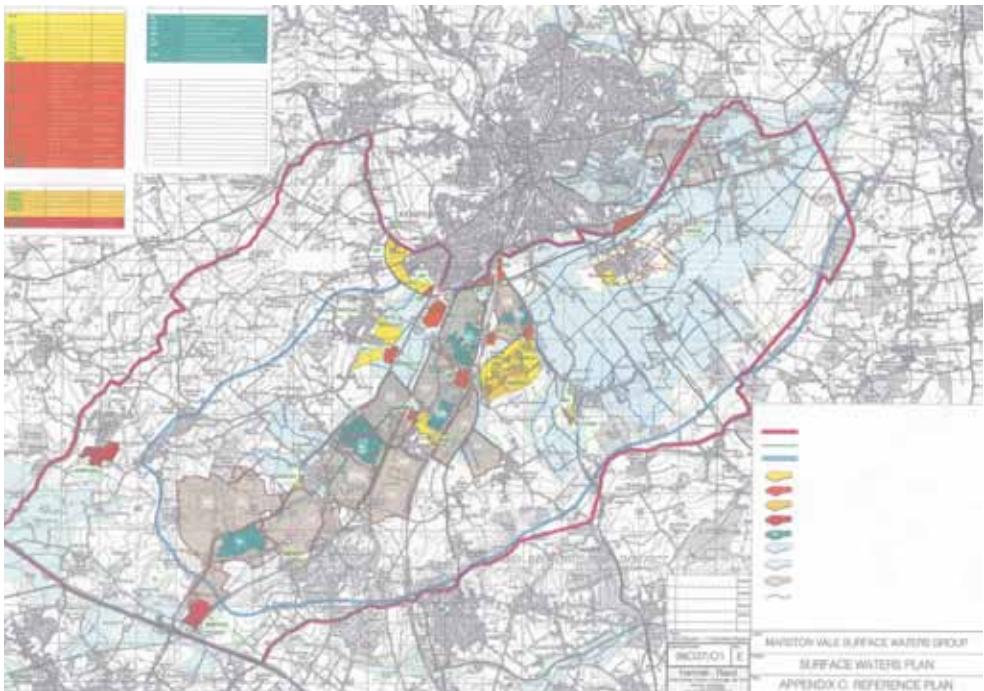
IDBs carefully manage water levels within their Internal Drainage Districts for land drainage, flood risk management, irrigation and environmental benefit, balancing the needs of society and the economy with the environment. Previous leaflets in this series have described the benefit of water level management to the economy, and to society in terms of benefits to the transport network and electricity supply. This leaflet describes how careful and sensitive water level management benefits the environment.

## The Value of Water Level Management

The Value of Water Level Management series of booklets have been produced to highlight the important work which IDBs carry out, much of which goes unnoticed. To date four booklets have been produced, investigating value to electricity supply, the transportation network, the economy, and now the environment.



# ENVIRONMENTAL MANAGEMENT



Sustainable development - Marston Vale Surface Waters Plan



# ENVIRONMENTAL MANAGEMENT

The actions of IDBs managing water courses and drainage ditches in an environmentally sensitive way plays a major part in maintaining wetland habitats and ecosystems. The creation and modification of water bodies over millennia has, as well as benefiting society, produced unique and important habitat. The total length of drainage channels in England is equal to the total length of main rivers. These drainage channels also provide a vital link between areas, helping prevent animal communities becoming isolated from each other, and also helping them move to adapt to a changing climate.

Freshwater and wetland habitats occupy just 3% of the UK's land surface but support around 10% of our species, over 660 species of plants and 7,500 invertebrates. The UK's rivers, lakes and waterways support a myriad of highly specialised plants and animals and are also home to some of the UK's best known mammals, such as the European otter and the water vole, as well as around 30 species of fish. Grass snakes, the great crested newt and common toad all live in and around wetlands. Areas such as the Somerset Levels and the Ouse washes provide migratory wintering habitat for around 100,000 and 60,000 individual birds respectively.



IDBs play a major part in maintaining our freshwater and wetland habitats. IDBs conduct their work in accordance with their environmental duties, and aim to promote sustainability and the ecological wellbeing within their districts. Every IDB has its own Biodiversity Action Plan and strives to maintain watercourses as sympathetically as possible. They have a specific duty to further the conservation and enhancement of all designated environmental sites within their districts, including 398 SSSIs.

## Case Study: Lindsey Marsh Drainage Board

The Water Management Consortium have conducted a biodiversity audit of its Districts and identified those habitats and species that would benefit from specific management or actions by the Board. The intention is to integrate biodiversity considerations into the Board's activities such as annual maintenance programmes and capital schemes. The action plan will help to safeguard and enhance the biodiversity of the drainage district now and for future generations. In particular, it is hoped that implementing the plan will contribute to the achievement of local and national targets for UK BAP priority species and habitats.



## Case Study: Bedford Group

The Bedford Group of IDBs (3 Boards in total) have their own individual Biodiversity Action Plan on top of an overarching group environmental strategy to further assist in fulfilling its statutory and other responsibilities for nature conservation. To help implement the policies in the strategy a Conservation Handbook has been published. This includes information on current legislation, relevant contacts in other organisations, arrangements for consultation and survey, and locations of protected sites and species, all of which need to be considered when planning works.

# HABITATS & BIODIVERSITY

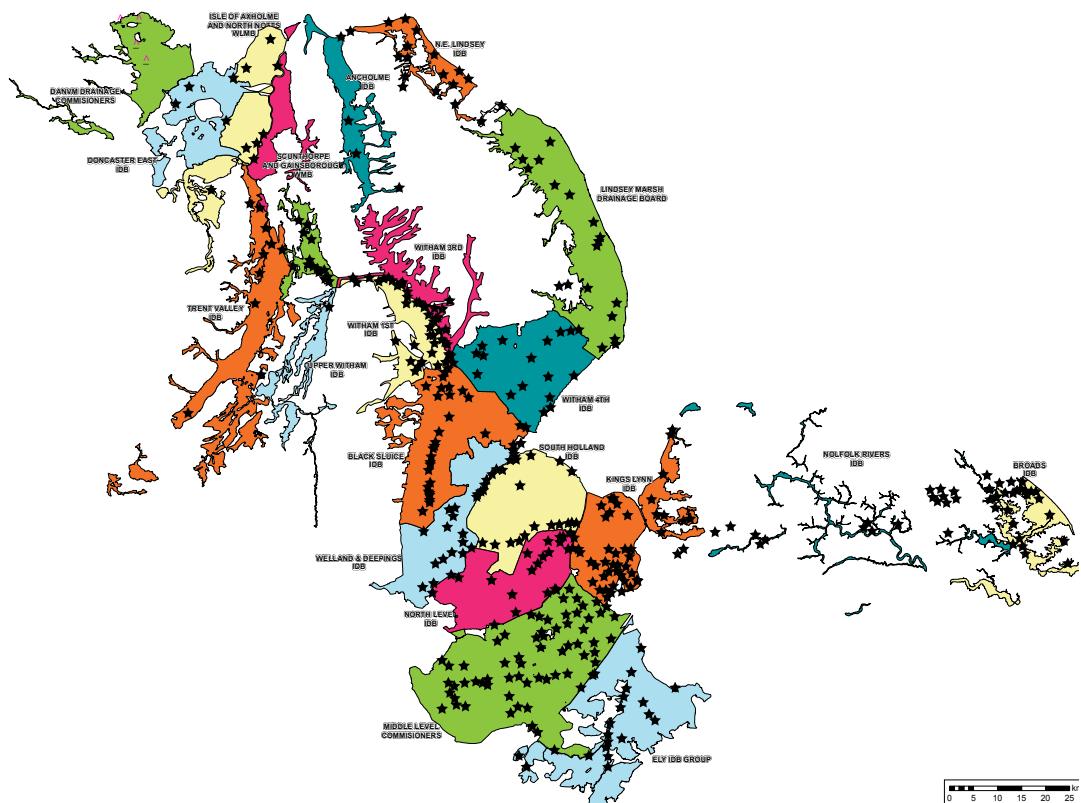


Figure 2: Locations of Barn Owl boxes in the Lincolnshire Area

# HABITATS & BIODIVERSITY

The water level management provided by IDBs plays a significant part in maintaining key habitats. Wetlands, water meadows and peatlands depend on careful management of water levels, keeping groundwater levels within controlled ranges to stop them becoming too wet or too dry. This is important for maintaining habitats and biodiversity. Many species require consistent water levels to survive. Aquatic animals such as water voles need the entrances to their burrows to remain below water, and waterways to be kept relatively free of weed so they can see their prey and predators. Fish and many invertebrates also benefit from keeping the majority of the waterway free of weed, which in addition to allowing them to move and see predators and prey, allows sunlight into the water to remediate organic pollution and keep oxygen levels up.

## Case Study: Restoring Barn Owl numbers



The Barn Owl population in England and Wales declined significantly between 1932 and 1985 due to a number of factors including loss of grassland habitat, second-hand poisoning from use of agricultural herbicides and increase in urbanisation. The Barn Owl Survey of Britain and Ireland conducted between 1982 and 1985 revealed that the breeding population had declined by 70% since the previous survey in 1932, to about 4,500 pairs, the remnant population had become highly fragmented and the decline was continuing. This research identified the ecological importance of lowland riparian networks to barn owls, not only for the prey-rich habitats they

support but to provide connectivity of these habitats, farm to farm and county to county.

Based on these findings the Barn Owl Conservation Network was formed. As part of this project the Wildlife Conservation Partnership in association with IDBs in eastern England began a habitat restoration programme to create a habitat matrix in eastern England by managing drainage banks to enhance the abundance of small mammals, largely field voles and provide artificial barn owl nest sites. The project aims to provide new linear grassland habitats for feeding and movement, particularly prey-rich flight routes for young owls moving out of their natal areas in their annual quest to find new breeding territories and vacant nest sites. The IDBs and the Wildlife Conservation Partnership have produced barn owl and kestrel Species Action Plans.

Annual monitoring of the 375 specially designed twin-chambered nestboxes mounted on poles on the banks of drainage channels and rivers has demonstrated the success of this initiative. The barn owl population in eastern England has increased by between five and ten times and over 3,000 young have been produced since the project started in 1988. Ringing of the owls (as shown to the right) has shown that main aim of this project, to restore habitat connectivity, has been the major factor in restoring barn owl numbers.

In Lincolnshire, Operation Barn Owl is a collaborative project between 15 Lincolnshire IDBs and the Wildlife Conservation Partnership. The IDBs support over 285 owl boxes. As well as installing owl boxes, the boards have created owl-friendly habitats alongside drainage channel banks consisting of rough, tussocky grassland, which provides habitat for food sources for the owls. Through Operation Barn Owl, Lincolnshire now has more Barn Owls than any other county and the partnership also won the 2009 Lincolnshire Environment Award.



# HABITATS & BIODIVERSITY

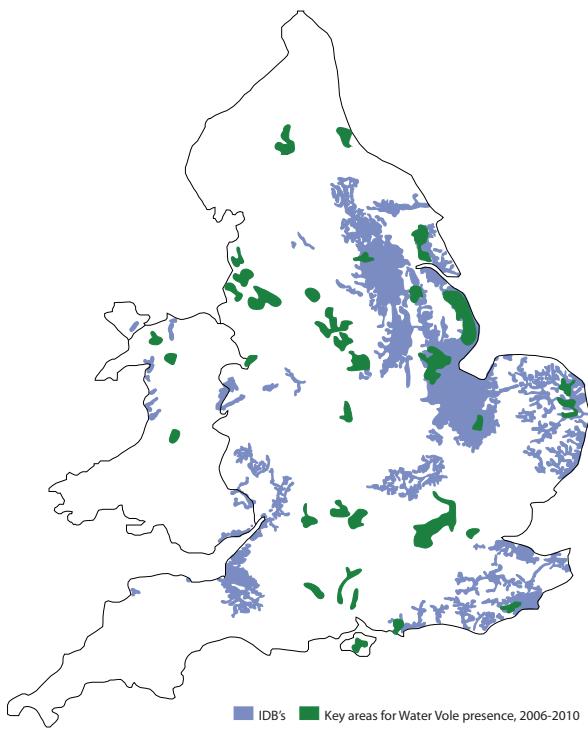


Figure 3: Water vole presence (key areas) in relation to IDB areas



Water vole habitat in the Huntspill River National Nature Reserve (Natural England/Paul Glendell)

## Case Study: Water Voles populations in IDBs

The water vole is in decline in the UK, partly due to the release of the American mink. The Environment Agency has recently announced that numbers may be down by more than 20%. However there are areas where water voles continue to thrive (see figure 3), and many of these are in IDB areas. Management of water levels by IDBs, allied to the environmentally sensitive way that IDBs manage the banks of waterways, is critical to water vole survival. Water voles in IDB areas are protected from lowered water levels that expose their burrows to predators.



Neil Smith

Strongholds for water voles are: the Lincolnshire Coastal Grazing Marshes, from the foot of the Lincolnshire Wolds to the coast; Humberhead Levels, west of Scunthorpe; South Forty Foot Drain and associated ditches, west from Boston to the River Glen; River Ancholme, south of Brigg; and the fens to the north of Billinghay. Annual recording by operational staff has identified the Lindsey Marsh Drainage Board's District as the largest key site in the UK for the water vole (recording 1,412 individuals in 2012).

In response to the Environment Agency announcement, The Wildlife Trust said 'These areas are all characterised by their networks of interconnected drainage ditches and rivers. How these waterways are managed is critical to the survival of water voles and other wildlife. We are fortunate in Lincolnshire that the Internal Drainage Boards (IDBs) record sightings of water voles, ensure that maintenance disrupts them as little as possible and create berms in the channels that are beneficial for flood protection and wildlife.'

Elsewhere in the UK, populations continue to decline due to long-term habitat loss, mink predation and extreme weather events, including floods and drought.

## Case Study: Great Crested Newt – Romney Marsh IDB

According to Defra there are 75,000 populations of great crested newts in the UK. This may seem a lot but this is significantly under the UK Biodiversity Action Plan target of 200,000. Great crested newts flourish in healthy natural ponds which suit their mating rituals and egg laying preferences, and contain their main food source (invertebrates) in abundance. However, intense farming and urban development have drastically reduced the number of these natural ponds and left many remaining ponds in 'bad'



Rachael Brady

ecological condition (only 8% of ponds in England and Wales are in 'good' condition). A Defra report in 2010 showed that 80% of current UK ponds are polluted. Pollutants include fertilisers, pesticides and runoff from streets and housing. Two thirds of these ponds are polluted by nitrogen and phosphorus from agricultural fertilisers.

Over 130 ponds on Romney Marsh are known to have been lost over the last 16 years due to changing agricultural practices. The Romney Marsh Countryside Project (RMCP) surveyed around

350 sites within the Romney Marsh Natural Area for great crested newts between 1998 and 2000 (with funding from English Nature/Natural England) and found great-crested newts at 101 of the sites, with populations ranging from 1 to 358 individuals. The majority of sites with newts are waterbodies on grazing marsh or on shingle, whilst only a small number of ponds on arable land support the species. Maintenance of existing great crested newt sites on the Romney Marsh is an important part of the RMCP's annual programme of volunteer tasks and IDBs, including Romney Marsh IDB, promote ecological good practice and collaboration between boards and land owners to protect great crested newt habitats and numbers.

IDBs seek opportunities to enhance habitats and biodiversity as they manage the banks of their drainage channels. The length and connectivity of drainage channels make their banks important habitat for a wide range of animals, birds and insects as well as pathways for wildlife, connecting animal communities at a variety of scales, from farm to farm and from county to county. IDBs manage banks and the vegetation on them in ways that maintain the function of the drainage channel and at the same time provide habitat for wildlife.

# HABITAT RESTORATION



Starling murmuration at Potteric Carr Nature Reserve, Humberhead Levels NIA (©Jim Horsfall, Yorkshire Wildlife Trust)

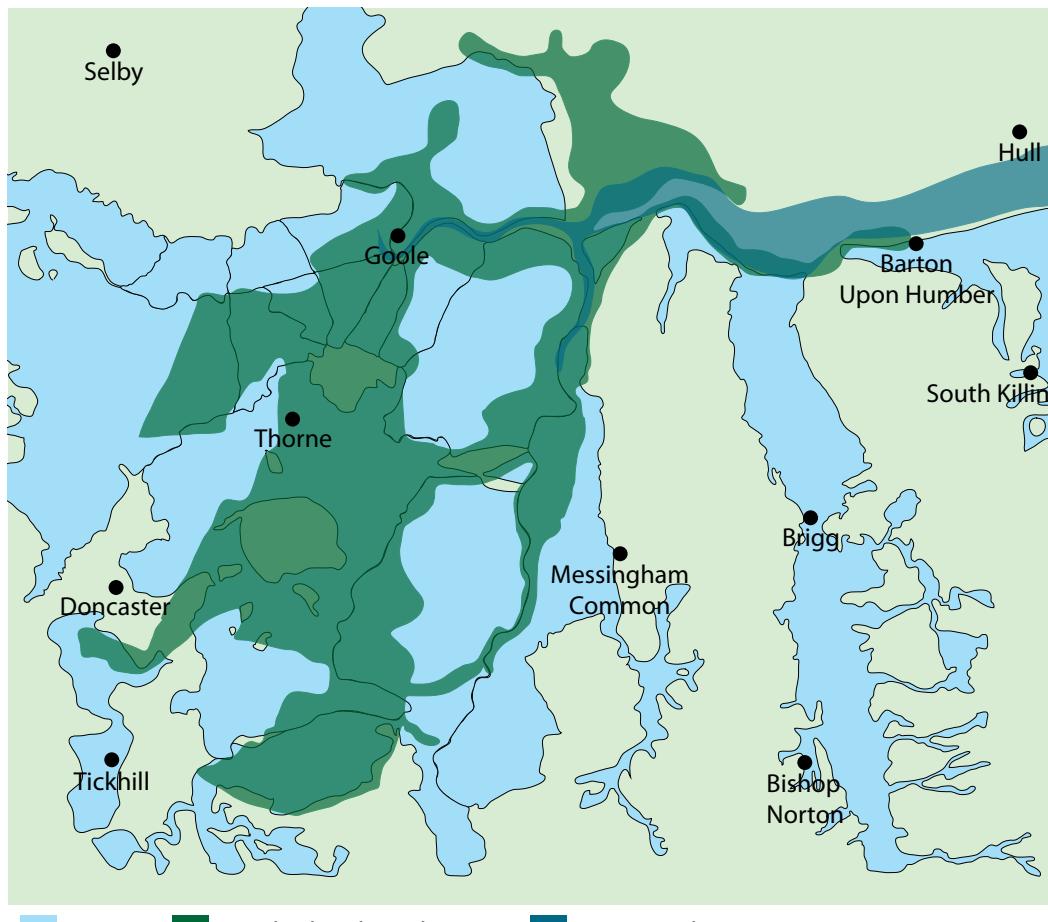


Figure 4: The area of Humberhead Levels NIA, spanning 15 IDBs

# HABITAT RESTORATION

The 2013 'State of Nature' report produced by UK wildlife organisations revealed that 60% of British animal and plant species have declined in the past 50 years, with 31% declining strongly and one in 10 under threat from disappearing from Britain altogether. The report noted that this was in large part due to loss and degradation of habitat. However the report also noted that creation of new ponds and wetland habitat for freshwater wildlife such as bitterns, great crested newts and nutrient-sensitive water plants seems to be particularly successful. Compared to many other habitats, functioning and wildlife-rich wetlands can be restored or created in a relatively short time. IDBs play a significant part in restoring and maintaining wetlands.

Nature Improvement Areas (NIAs) were established to enhance the environment on a landscape scale in response to Sir John Lawton's report 'Making Space for Nature' on the state of England's ecosystems. The aim of NIAs, set out in the Natural Environment White Paper 'The Natural Choice', is to improve the quality of the natural environment across England, halt the decline in habitats and species, and strengthen the connection between people and nature. Two of the 12 NIAs that have been set up (Humberhead Levels (left) and Greater Thames Marshes (right)) include IDB areas, and IDBs have key roles in the partnerships making them happen.



Greater Thames Estuary, West Mersea, Essex (©Natural England/Fiona Taylor)

## Case Study: The Humberhead Levels Nature Improvement Area

The Humberhead Levels are vast flatlands straddling the borders of Yorkshire, Lincolnshire and Nottinghamshire, where rivers draining one fifth of England meet the Humber Estuary. (figure 4) Covering 2,000 square kilometres and occupying the area of the former pro-glacial Lake Humber; the Humberhead Levels stretch north from Retford to beyond Selby and from Doncaster East to Scunthorpe. This land is mostly less than 10m above sea level, and in some areas lies below sea level. It comprises large expanses of arable farming, rivers, dykes and a mosaic of wetlands which is rich in wildlife and human heritage. It offers significant potential to deliver wider ecosystem services including food and fuel production, flood attenuation and biodiversity.

The Humberhead Levels NIA is restoring at least 1,427 hectares of this wetland habitat through a £1.7 million action programme. This is being done by a partnership which includes the IDBs in the area (Ouse and Humber Drainage Board, Isle of Axholme and North Nottinghamshire Water Level Management Board, and the Shire Group of IDBs); the three local authorities in the area; Natural England; the Environment Agency; English Heritage; three Wildlife Trusts; the RSPB; and two universities.

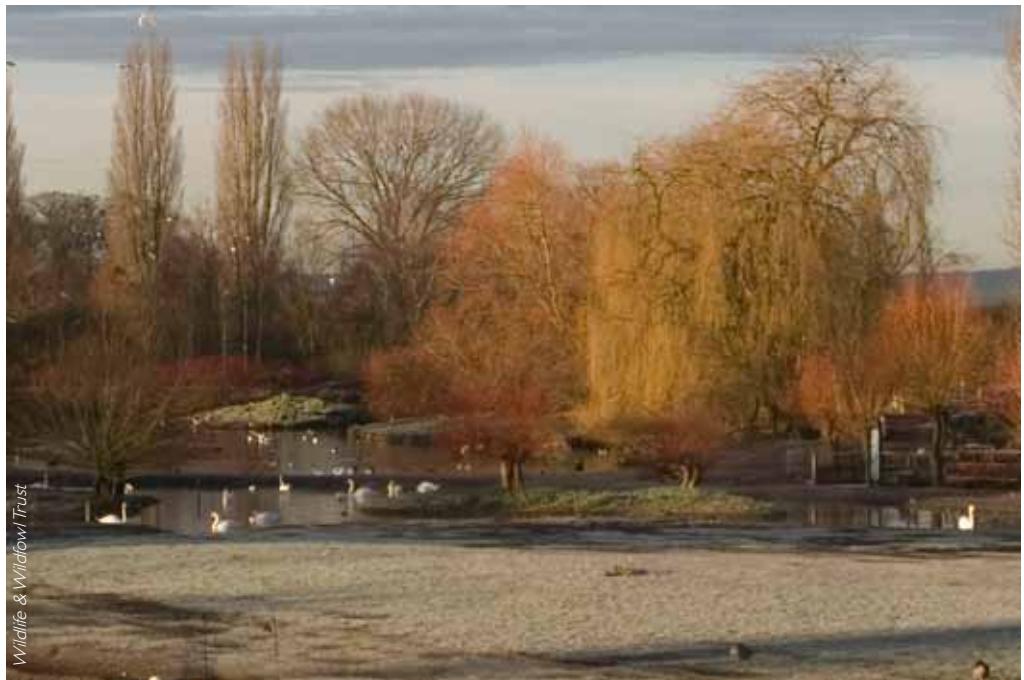
The Humberhead Levels NIA aims to create key habitats including lowland raised peat bogs and achieve sustainable water management in an arable landscape through enhancement of riparian habitats along connecting rivers and drains. It will increase the hydrological integrity of England's largest lowland raised mire system and aims to deliver sustainable management of existing biodiversity assets through the development of the local green economy. It also aims to connect people to the environment by increasing community links to biodiversity sites to increase volunteer support for site management, heritage conservation and interpretation.

In its first year of operation the NIA has made significant progress. IDB contributions include works to rehabilitate wetland habitats including 4 hectares of reedbed at Broomfleet (Ouse & Humber IDB) and introducing water level controls on Thorne Moors (The Doncaster East IDB, part of the Shire Group of IDBs).

# ENVIRONMENTAL QUALITY



Wildlife & Wetland Trust



Wildlife & Wetland Trust

# ENVIRONMENTAL QUALITY

In low lying areas of England and Wales water level management plays an important part in maintaining the quality of local environments. Local environmental quality is vitally important not just to wildlife, but also to people and local economies. Good quality local environments encourage sport and recreation, including walking, cycling, horse riding, boating and angling. This has direct importance for people's health, but the quality of people's environment has also been shown to affect happiness and well-being as well as sense of community. Local economies depend on the quality of the local environment. Tourism, which is important to the economy of areas such as the Somerset Levels and the Fens, depends on good quality environment. So too do traditional industries in low-lying areas such as willow cultivation for wickerwork (and more recently for biofuel), and modern agricultural applications such as hydroponics.



Wildlife & Wetland Trust

## Case Study: Slimbridge Wetland Centre, Gloucestershire

Slimbridge Wetland Centre depends on the quality of the local environment maintained by the Lower Severn IDB. Slimbridge is one of nine wetland centres across the UK. It is a world-renowned reserve for water birds, and has international significance as the headquarters of the Wildfowl & Wetlands Trust (WWT) and is the base for WWT's Consulting and Species Conservation programme. Slimbridge reserve covers 120 acres (0.49 km<sup>2</sup>), including a Site of Specific Scientific Interest (SSSI), a Ramsar Site and Special Protection Area (SPA). It is home to the world's largest collection of swans, geese, and ducks. It is an important wintering area for migrating water birds and is also the only place in the world where all six species of Flamingo can be seen.

Slimbridge has been involved in schemes to save endangered species of birds from around the world and reintroduce them to the wild since the 1950s. Slimbridge is currently restoring population levels of Common cranes in the Somerset Moors and Levels, raising birds at a specially built "Crane School". This project has resulted in 23 cranes being released onto the Moors and Levels in September 2013.

## Case Study: Welney Wetlands Centre, Norfolk

Welney Wetlands Centre is a wildlife reserve that relies on the quality of the local environment maintained by the Hundred Foot Washes IDB. It comprises 1,000 acres of the northernmost part of the Ouse Washes – Britain's largest area of seasonally-flooded land, which hosts mass winter gatherings of many thousands of wild ducks, geese and swans. Welney also supports breeding populations of black-tailed godwit, redshank, snipe, little ringed plover, marsh harrier, gadwall, garganey, teal, skylark, yellow wagtail and reed bunting. Avocets settled in Welney during World War



Wildlife & Wetland Trust

Two and are thriving, re-establishing a species which had been extinct in Britain for around 100 years.

In summer, the site is carpeted with wildflowers, among them rarities such as the hair-like pondweed and the greater water-parsnip. More than 300 species of butterfly and moth have been recorded along with different species of bats, dragonfly and hawk. Scarce fish such as the spined loach and a Red Book-listed mussel are in the waterways, and there are three kinds of fly-killing snail. Grass snakes live in the reed-beds.

# MAINTAINING AND ENHANCING HABITATS

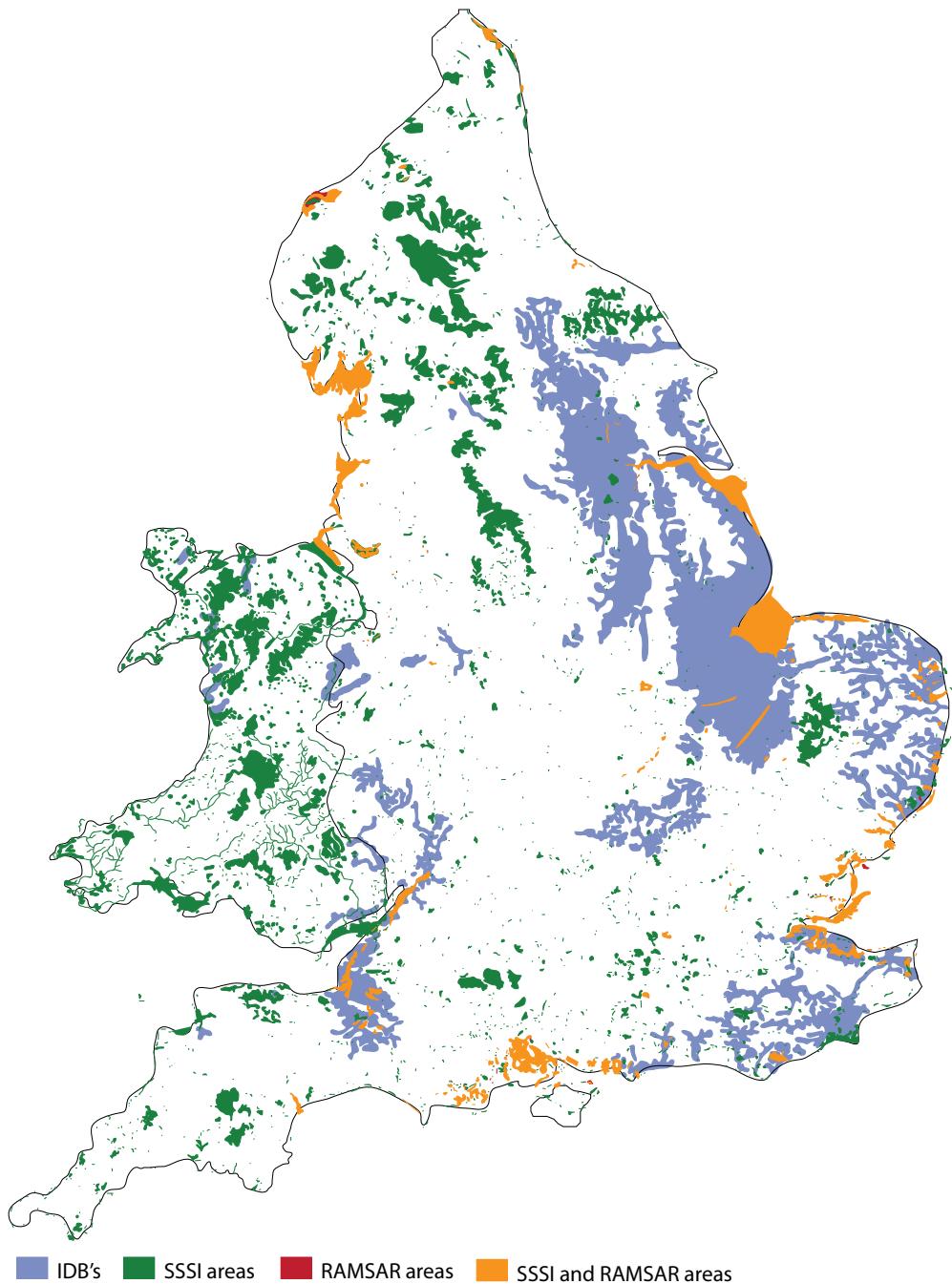


Figure 5: Geographical Distribution of RAMSAR and SSSI sites in England and Wales in relation to IDBs

# MAINTAINING AND ENHANCING HABITATS

Water level management and associated work by IDBs is important to the establishment, maintenance and improvement of nationally and internationally important environments and habitats. England and Wales contains a wide variety of species and habitats, many of which are in lowland areas managed by IDBs.

Special legal protection is given to key areas to conserve important habitats and species by preventing damaging activities. Within the UK sites that are nationally important for plants, animals or geological or physiographical features are protected by law as Sites of Special Scientific Interest (SSSIs). This system provides the underpinning statutory protection for all sites, including those which are also of international importance. More than 70% of English SSSIs (by area) are internationally important for their wildlife. Some of these sites, known as Special Protection Areas (SPAs) for Birds and Special Areas of Conservation (SACs), are of European importance. In addition, England and Wales also contribute to global networks of protected wetlands of international importance, designated under the Ramsar Convention. Of the over 4,100 SSSIs in England, 398, about 1 in 10, are in IDB areas (totalling almost 56,000 ha). There are 68 RAMSAR sites in England and 10 in Wales, with 23 of these sites (totalling around 35,700 ha) located within an Internal Drainage District – about 1 in 3.



©Natural England/Peter Wakey

## Case Study: SSSIs maintained by IDBs

The Gwent Levels, managed by the Caldicot & Wentlooge Levels IDB, is one of the most extensive areas of reclaimed wet pasture in Great Britain and the largest area of its kind in Wales. Because of the abundance of rare species and habitats in the Gwent Levels ditches, seven Sites of Special Scientific Interest (SSSIs) are located within the board's area – totalling over 6,000 hectares – over 50% of the Board's total area.

The Somerset Moors and Levels has international status as one of the most important 'wetland' areas of its type in the world. It is internationally important for migrating birds, such as lapwing, and for breeding waders, making it a Special Protection Area (and RAMSAR Site).

The Swale SSSI in Kent is a SPA and Ramsar Site. It covers the estuarine area that separates the Isle of Sheppey from the Kent mainland, in the Lower Medway IDB area. It is a complex of brackish and freshwater, floodplain grazing marsh with ditches, and intertidal saltmarshes and mud-flats. It includes the Elmley National Nature Reserve, a nationally important area

of coastal grazing marsh. The wide diversity of habitats found on the Swale support important numbers of birds, such as the Pied Avocet (left) throughout the year as well as a variety of lizards and amphibians and grasses and wildflowers, and a large range of insects including several species of rare bees. The mudflats of the Swale are extremely rich in invertebrates, over 350 species having been recorded. The saltmarshes are among the richest for plant life in Britain. In spring and autumn migration periods, as well as during winter, the Swale supports very large numbers of geese, ducks and waders.

©Natural England/Alan Drewitt





A drain within Hundred of Wisbech IDB catchment, blanketed with North American Water Fern, prior to application of *stenopelmus rufinasus* (Cliff Carson)



North American Water Fern (Cliff Carson)



*Stenopelmus rufinasus* (©Rob Reeder; CABI)



The same drain two months after application of *stenopelmus rufinasus*, which has cleared large amounts of the Water Fern (Cliff Carson)

# BIOSECURITY

Invasive non-native species are on the Environment Agency's list of the most important issues that challenge the current and potential future uses and benefits of the water environment. This is because of the negative effects on the health of the water environment and native plants and animals from species originating outside the UK and introduced to UK waters. Freshwater habitats are often isolated and so are particularly vulnerable to the impacts of invasive non-native species. As well as harming native species, invasive non-native species also cause physical damage to habitats, for instance: weed such as American water fern and New Zealand pigmyweed blanketing or blocking waterways; erosion of banks caused by die back of invasive weeds, such as Japanese knotweed and Himalayan balsam; or excavation of banks by signal crayfish or mitten crabs.

The maintenance work undertaken by IDBs is important in keeping non-native invasive species in waterways under control, such as American water fern and American Signal crayfish, and IDB staff, working with the Environment Agency and conservation groups, provide early warning and rapid response systems to deal with newly-established introduced species to protect these habitats in the future.

## Case Study: Protecting white clawed crayfish – Trent Valley IDB

The white clawed crayfish (*austropotamobius pallipes*) is the only native species amongst the seven species of crayfish in Britain (top right). However it is under threat from one of the non-native species, the American signal crayfish (*pacifastacus leniusculus*). The larger American signal crayfish (bottom right) outcompetes native crayfish and carries the fungus *aphanomyces astaci* which causes crayfish plague. Once American signal crayfish are within a catchment the native white clawed crayfish population faces extinction.

The only remaining population of native white clawed crayfish in Lincolnshire, of national importance due to its size, occurs in a 27km stretch of the Upper Witham and adjoining tributaries. However, American Signal Crayfish are present in neighbouring catchments, which is why IDB staff are trained in good practice during maintenance, such as thoroughly drying and cleaning plant and machinery with disinfectants, to stop the spread of both the crayfish themselves and the fungus that causes crayfish plague.



## Case Study: American Water Fern – Middle Level Commissioners

The floating North American water fern (*Azolla Filiculoides*) has a remarkable reproduction capacity and is able to expand very rapidly until it completely blankets channels, cutting out light. It is very hard to control by mechanical methods or by herbicide but fortunately there is a host-specific weevil (*Stenopelmus rufinasus*) that eats only the American water fern, and nothing else. This weevil also increases its numbers very fast but it takes a couple of months to get the upper hand. Trials of the weevil started in 2011 at Hundred of Wisbech IDB in the Middle Level catchment. Despite being released relatively late in the season (in June 2011) the weevils had cleared significant amounts of the water fern by late August. Some were moved to other ditches in the district where they cleared the water fern by the end of September 2011.

The fern was also present elsewhere in the catchment and by mid-summer 2012 it was covering most of the major drainage channels. At just 2mm long, the weevils were predicted not to survive the English winter conditions in any significant numbers; however, July 2012 inspections revealed that weevils were already present in large enough populations. By early September weevil numbers had increased sufficiently to consume the mats of water fern leaving only small residues.

It is now hoped that this invasive non-native plant will be controlled by residual weevil populations. However a particularly cold winter with extended periods of low temperatures may suppress weevil numbers, requiring them to be re-introduced to kick-start the control process again.

# WATER QUALITY & AGRI-ENVIRONMENT SCHEMES

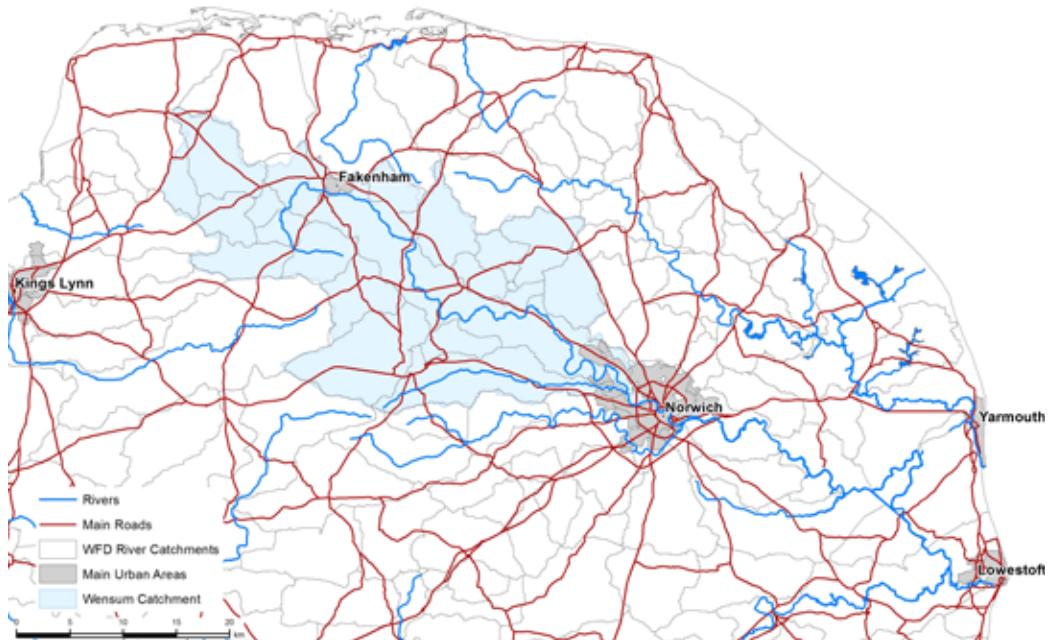


Figure: 6: Wensum Demonstration Test Catchment (Gisela Sunnenberg, University of East Anglia using Ordnance Survey OpenData and the European Commission JRC River and Catchment database)



## IMPROVING WATER QUALITY

The way IDBs manage water courses can make a big difference to the quality of water. IDB management of banks and water bodies helps keep oxygen and suspended sediment levels right for aquatic life and ensures that watercourses aren't blocked by weed which restricts habitats and biodiversity. Careful management of bank tops helps control diffuse pollution by nitrates and phosphates from fertilisers, by controlling run-off from fields into watercourses. IDBs are key members of the Catchment Partnerships at the core of the Government's Catchment Based Approach to managing water to improve the water environment and meet our obligations under the Water Framework Directive. The Catchment Based Approach relies on local collaboration to secure positive environmental improvements for rivers and catchments, including tackling diffuse agricultural pollution.

### Case Study: River Wensum Demonstration Test Catchment

The River Wensum in Norfolk is recognised as one of the most important chalk river habitats in the country with over 100 plant species and a rich invertebrate fauna. 71 km of the Wensum is designated as a Site of Special Scientific Interest and Special Area of Conservation. It is one of three rivers in the Demonstration Test Catchments project, a joint Defra, Environment Agency (EA) and Welsh Assembly Government initiative to test the idea that the impact of agricultural diffuse water pollution on the environment and ecology can be reduced cost-effectively while maintaining food security by a variety of on-farm measures across whole river catchments using local expertise to solve local problems. The Wensum project is using a 'ground upwards' approach involving land owners and managers, as well as farming and environmental organisations, the Norfolk Rivers IDB, government agencies and researchers in long-term monitoring to both identify and record pollutants and to test the effectiveness of a variety of land management measures to reduce diffuse pollution. Through measuring the impacts and effects on ecosystems and sustainable production the project aims to improve understanding of how to predict and control diffuse pollution from agriculture.

## AGRI-ENVIRONMENT SCHEMES

Caring for the natural environment is a vital part of a sustainable farming system. Farmers have shaped the natural environment throughout history and play an important part in ensuring its continuing health. Agri-environment schemes help farmers maintain the traditional, much loved character of the countryside and our rich natural heritage without compromising farmers' ability to produce food.

Agri-environmental schemes are voluntary agreements that pay farmers and other land managers to manage their land in an environmentally friendly way.

There are over 58,000 agri-environment schemes covering 66% of agricultural land in England. Many agri-environmental schemes depend for their success on IDB services. Examples include the creation and maintenance of wet grassland for wading bird habitat in lowland grazing marsh areas such as the Somerset Moors and Levels and the North Kent Marshes. These areas also contain ditches of very high environmental value, supporting uncommon species such as water soldier, greater water-parsnip and shining ram's-horn snail.



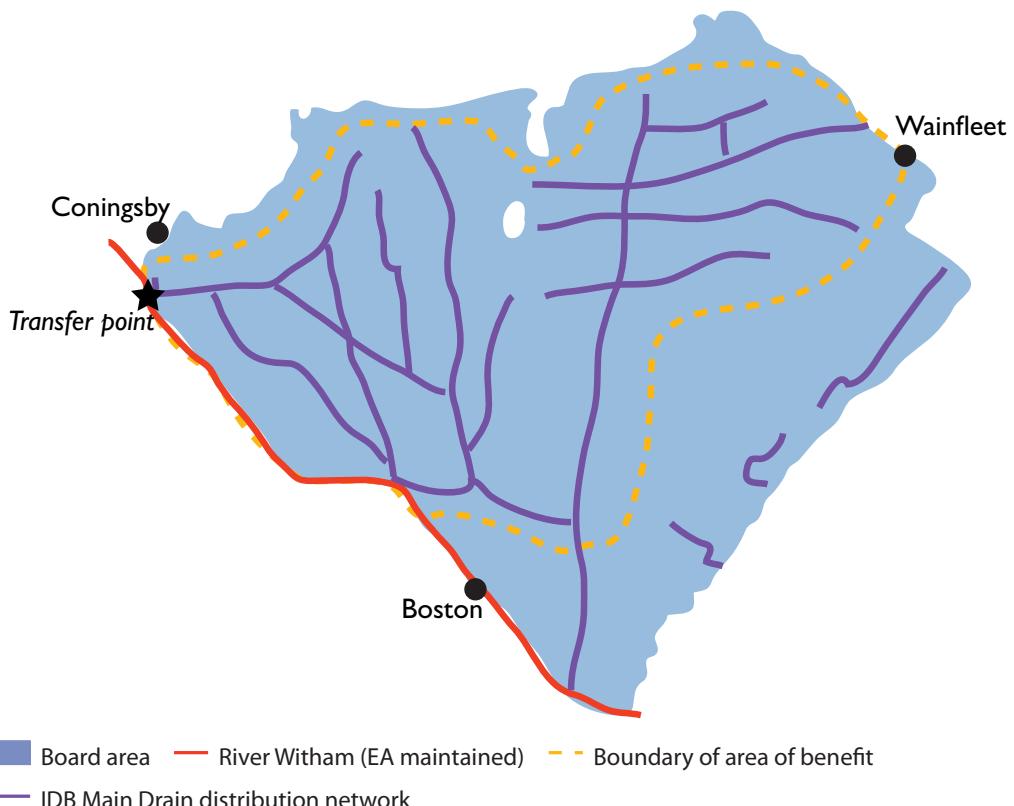


Figure 7: Witham Fourth Ltd area and the area Water Transfer Ltd benefits



# WATER SUPPLIES

IDB water level management helps with provision of water, by providing direct supplies of irrigation water to farmland in IDB areas in times of drought to reduce pressure on public water supplies; by supplementing public water supplies directly; and also to maintain wetland areas in times of drought.

## Case Study: Witham Fourth District IDB water transfer scheme

In the 1980's growers in Witham Fourth District IDB's area had become increasingly concerned about water supply during dry years with the National Rivers Authority threatening not to renew irrigation licences due to a lack of resource in the system. Agreement was reached between National Rivers Authority (now the Environment Agency) and Witham Fourth IDB that a scheme to transfer water was possible if growers met the cost. Approximately 50 growers joined forces and formed Water Transfer Ltd.

A structure was built to transfer water from the River Witham into the upper reaches of the Witham Fourth catchment, at a total cost of £60,000. Water Transfer Ltd has an Environment Agency licence to transfer up to 850,000m<sup>3</sup> of water from the River Witham. Members' contributions are based on the size of their abstraction licence. The transfer point consists of a simple penstock arrangement with weed screen and water is distributed around the area via gravity. An impact on levels can be achieved in watercourses over 30km away.

The Witham Fouth IDB manages the transfer point liaising with Water Transfer Ltd and the Environment Agency to maintain adequate levels across the catchment. The abstraction is metered and weekly returns are sent to the Environment Agency. Water quality is an issue so salinity levels are also monitored and reported. The returns also include a forecast of the coming week's demand. The cost of general supervision of water levels is met by the IDB as part of its routine operations but Water Transfer Ltd pay for the weekly salinity testing and reporting, administrative costs and all costs relating to the upkeep of the transfer point and meter, including cleaning of the inlet weedscreen.

Through this arrangement the IDB retains control of water level management in its catchment, the Environment Agency can balance its own network (at critical times water is pumped by the Environment Agency from the River Trent into the Witham via the Fossdyke Canal), and abstractors have access to water.

In addition to providing the additional quantity of water for abstraction the transfer also provides improvements to water quality to benefit both agriculture and the environment (including reduced likelihood of algal blooms). There is also a more consistent depth of water for navigation, recreation and angling. The transfer structure has also been used to benefit the environment by transferring water to freshen up the usually static network of watercourses downstream. It has provided connectivity within the catchment where previously there was none.

There is only one disadvantage: the transferred water can have a higher nutrient content which can result in higher levels of weed growth than would normally be expected. The scheme is acknowledged as a good example of best practice by the Environment Agency and is used to promote good water management in other areas.



# CONCLUSIONS

- IDBs manage water courses, drainage ditches and their banks in an environmentally sensitive way to maintain wetland habitats and ecosystems. The total length of drainage channels in England is equal to the total length of main rivers, providing large areas of connected habitat which make a significant contribution to nature conservation.
- IDB's have their own Biodiversity Action Plan which aims to promote sustainability and the ecological wellbeing within their districts in accordance with a number of environmental duties
- Careful water level management provided by IDBs plays a significant part in maintaining key habitats such as wetlands, water meadows and peatlands, to stop them becoming too wet or too dry.
- Water level management plays an important part in maintaining the quality of local environments vital for the recreation, tourism and farming that maintains local economies and people's health and wellbeing.
- 1 in 10 of the SSSIs in England are in IDB areas and water level management and associated work by IDBs is important to the establishment, maintenance and improvement of nationally and internationally important environments and habitats.
- Non-native invasive species in waterways are a growing problem, but IDBs' maintenance work keeps them under control. IDBs, working with the Environment Agency and conservation groups, provide early warning and rapid response to deal with newly-established introduced species to protect native species and habitats.
- The way IDBs manage water courses can make a big difference to the quality of water. IDBs are key members of the Catchment Partnerships working to improve the water environment and meet statutory objectives for water quality.
- IDB water level management helps with provision of water, providing water to irrigate farmland to reduce pressure on public water supplies as well as supplementing public water supplies directly, and also to maintain wetlands in times of drought.

## References

State of nature report - [www.rspb.org.uk/Images/stateofnature\\_tcm9-345839.pdf](http://www.rspb.org.uk/Images/stateofnature_tcm9-345839.pdf)

England's waters: Challenges and choices - <https://consult.environment-agency.gov.uk/portal/ho/wfd/water/choices?pointId=s1359025359987#section-s1359025359987>

Great crested newt in Great Britain - <http://publications.naturalengland.org.uk/publication/41017> ; <http://jncc.defra.gov.uk/pdf/Article17/FCS2007-S1166-audit-Final.pdf>

Making Space for Nature - <http://archive.defra.gov.uk/environment/biodiversity/documents/201009space-for-nature.pdf>

Nature Improvement Areas - [www.naturalengland.org.uk/about\\_us/news/2013/180913.aspx](http://www.naturalengland.org.uk/about_us/news/2013/180913.aspx)

Agri-environmental schemes - [www.naturalengland.org.uk/ourwork/farming/funding/aesiereport.aspx](http://www.naturalengland.org.uk/ourwork/farming/funding/aesiereport.aspx)

Water voles - [www.lincstrust.org.uk/news/press-release.php?article=549](http://www.lincstrust.org.uk/news/press-release.php?article=549)

UK Lowland Wetland Habitats - JNCC  
<http://jncc.defra.gov.uk/page-1433>

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