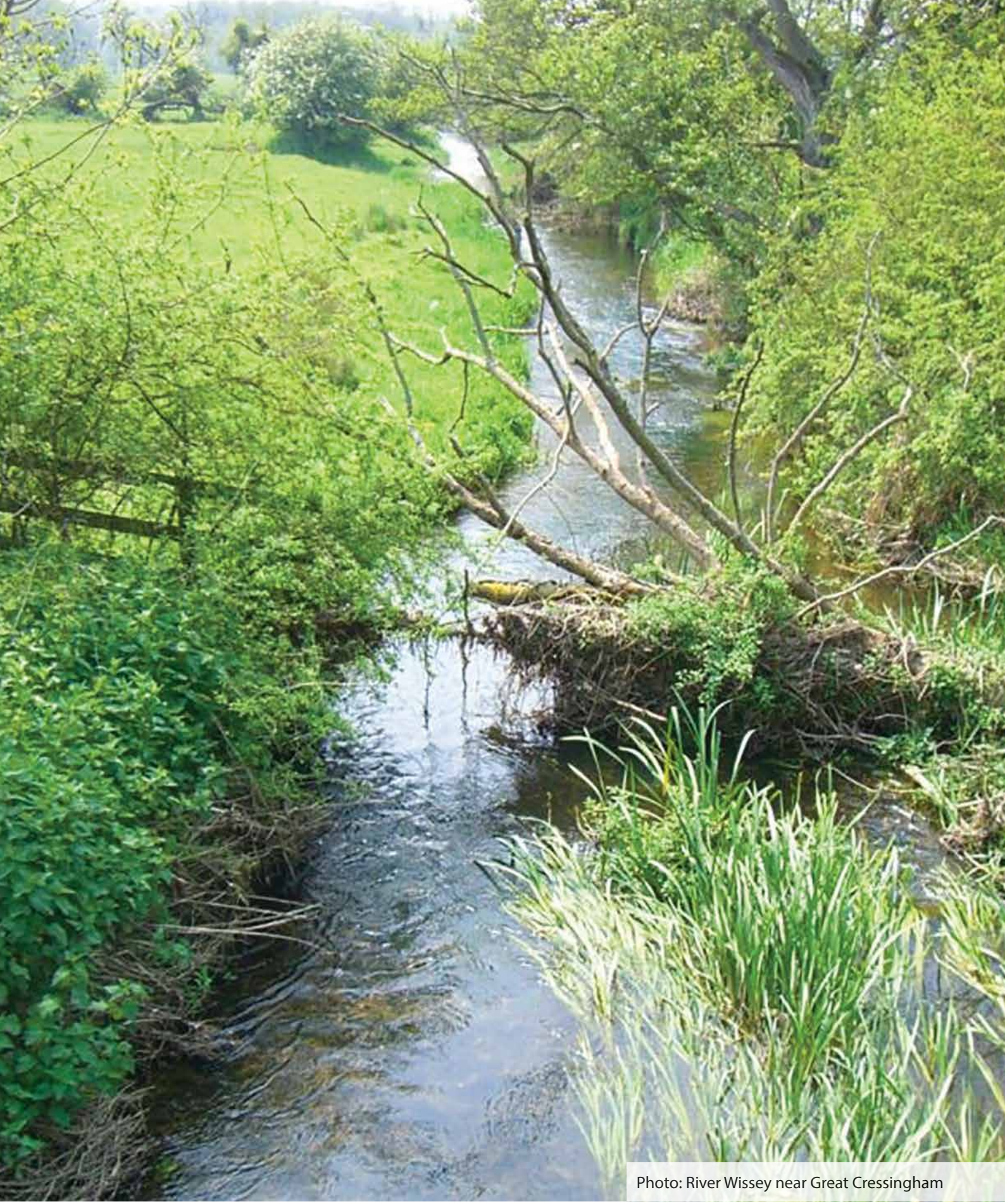

Photo: River Wissey near Great Cressingham

THE RIVER WISSEY

A PLAN TO IMPROVE THE RIVER AND AN INVITATION TO GET INVOLVED

CONTENTS

Introduction

"Water is one of our most precious natural resources. It is vital to people's health and happiness, the environment, our wildlife and our economy.

But water catchments need our help. Growing populations, climate change, agriculture, industry and recreation all put pressure on water resources, rivers and catchment areas. The River Wissey itself faces many of these pressures.

We believe a balance can be struck though; one where we keep our wetlands wet and our rivers flowing, clean and healthy.

This is our plan to improve the River Wissey, its catchment and the water moving through the rocks beneath it.

By outlining our aspirations, the main problems, and what people are already doing in the Wissey catchment we hope to show how you can help."

THE RIVER WISSEY PARTNERSHIP:

We are one of many similar groups across the UK made up of experienced, passionate and enthusiastic individuals and organisations, all looking to understand the issues in our local catchment area and make a positive difference. The partnership is a voluntary body currently set up with a steering group (see back page for members) and several working groups.

Our plan for the Wissey dovetails with the Government's vision of a local approach to managing water and aim of bringing all our rivers into a 'good' condition, as required by European legislation called the Water Framework Directive.

Many individuals and organisations from across the catchment area have helped us understand what they want from the river and what the issues are. These views form the backbone of this River Improvement Plan and particular thanks go to:

- Residents
- Parish, District and County Councils
- Farmers
- Boat owners
- Anglers
- Scientists
- Local businesses
- The Angling Trust
- Anglian Water
- Catchment Sensitive Farming
- The Country Land and Business Association
- The Environment Agency
- National Farmers Union
- Natural England
- Norfolk Rivers Trust
- Norfolk Wildlife Trust

Our next step is to start more local initiatives based on this plan. We also want to hear from those interested in running their own projects, or people who would like to get involved in one of our existing projects outlined later in this document.

This is just the beginning but by working together we can combine expertise and resources to make a real difference to the river and its tributaries, now and in the future.

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HOW YOU CAN HELP

We want more people to get involved in the River Wissey and there are plenty of opportunities no matter where your interests or expertise lie. This plan provides the background to the key issues affecting the Wissey, but there are some simple ways you can help right now:

EVERYONE CAN

- Provide information and photographs, past and present, to help us understand the river's history and wildlife.
- Tell us how you use the river at the moment and your ideas or aspirations for the river near you.
- Use water responsibly.
- Switch to using low-phosphate laundry and dishwasher detergents.
- Dispose of used cooking oil, wipes and sanitary waste in the bin, not down the sink or toilet, to reduce sewer pipe blockages that can lead to river pollution.

BUSINESSES

Could you sponsor a project or provide volunteers to help make practical improvements across the catchment?

FARMERS

Are you aware of all the best practice advice available from the Voluntary Initiative, Catchment Sensitive Farming, Campaign for the Farmed Environment, Environmental Stewardship and other similar schemes? If not, we can help.

WILDLIFE ENTHUSIASTS, ANGLERS AND BOAT OWNERS

Could you set-up a volunteer group to carry out nature projects or promote best practice among your peers?

HOUSEHOLDERS WITH SEPTIC TANKS

Could you follow an action plan to manage your septic tank?

PARISH COUNCILS

Could you encourage local people to support our projects?

SCHOOLS

Could you encourage a school project to raise awareness about the river?

If you have your own suggestions, knowledge of the river or want to get involved in another way, we'd love to hear from you.

GET IN TOUCH:

Fiona Wood
WISSEY PROJECT OFFICER
wisseypartnership@anglianwater.co.uk
01223 542775

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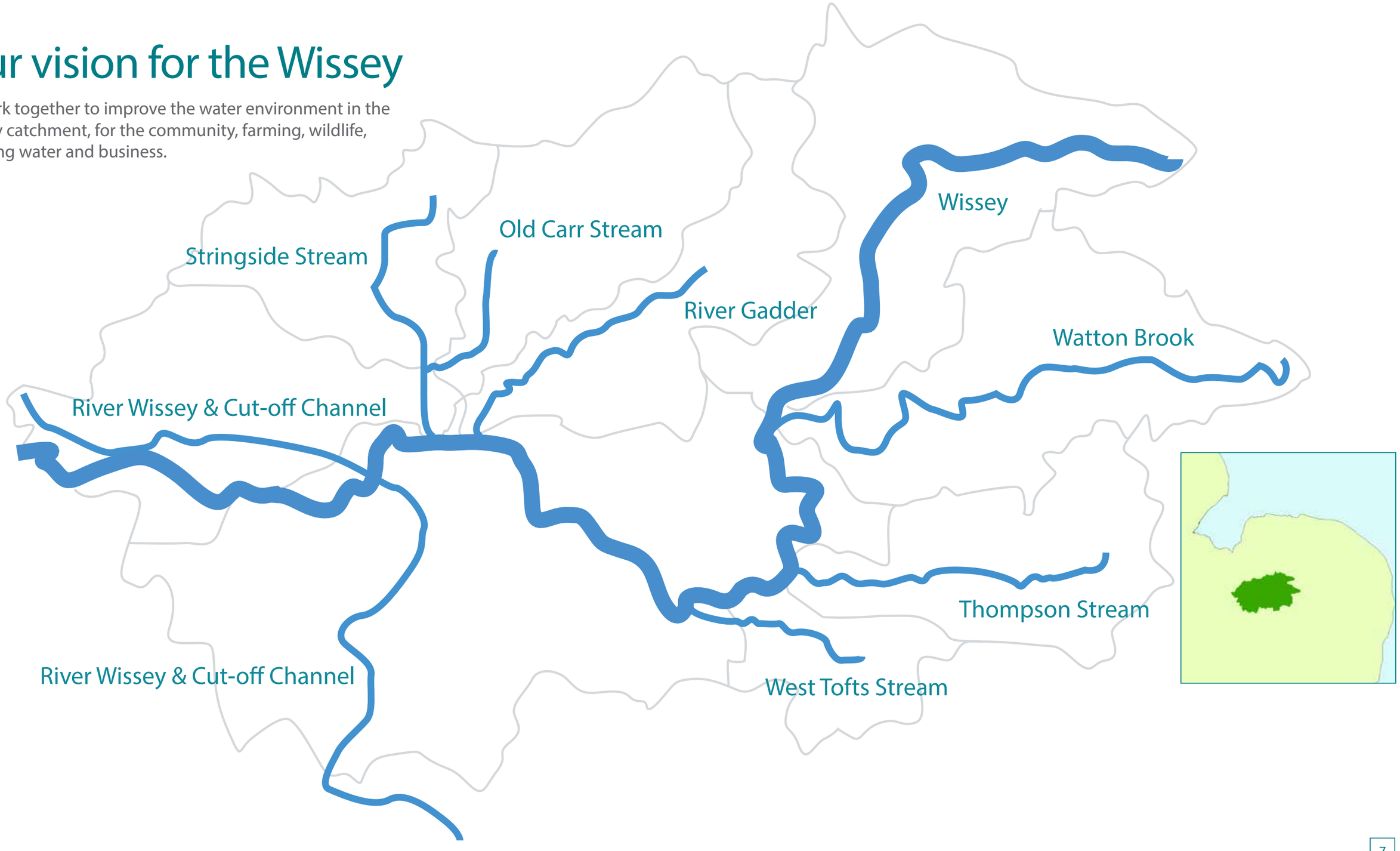
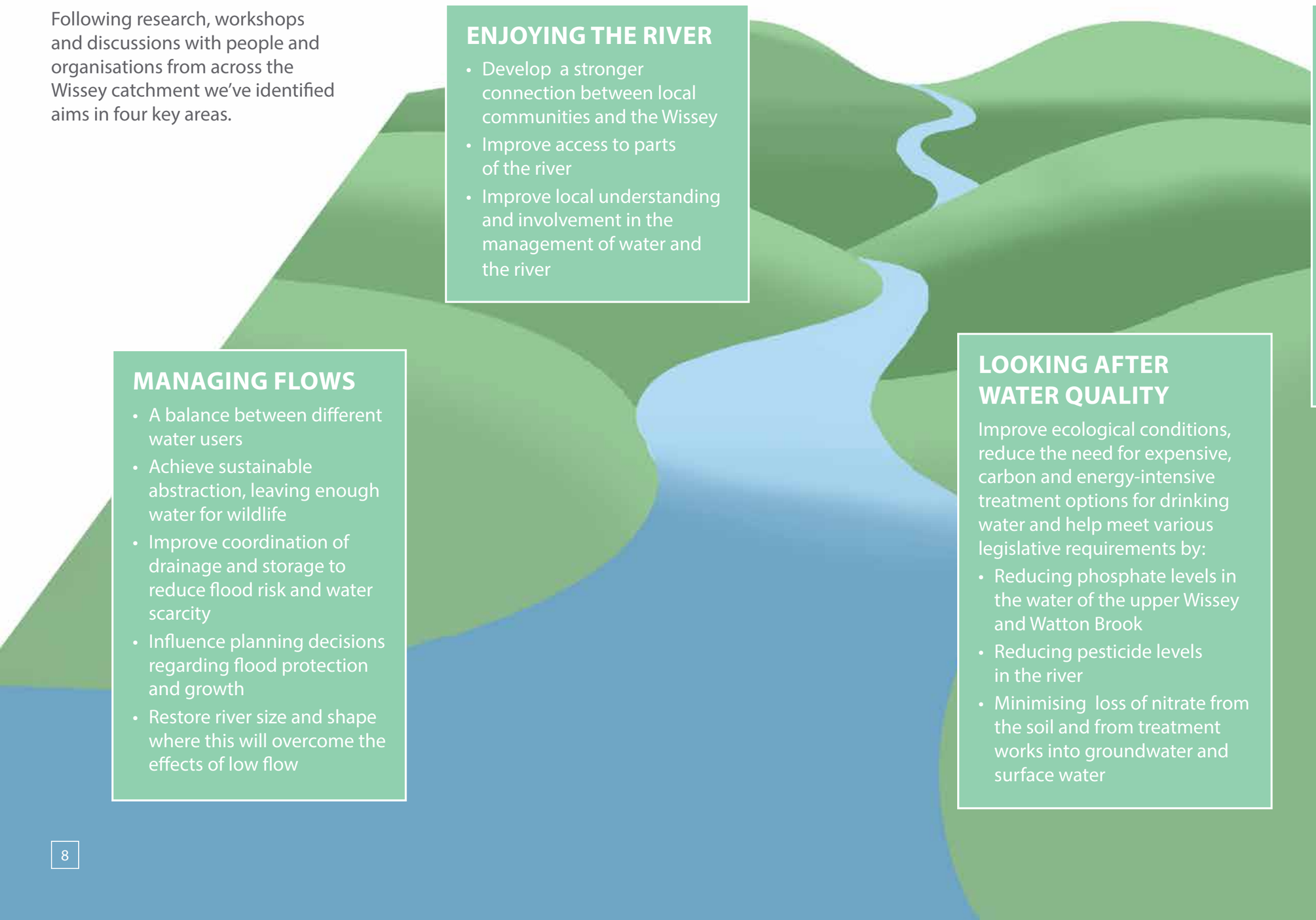
Our vision for the Wissey

To work together to improve the water environment in the Wissey catchment, for the community, farming, wildlife, drinking water and business.



Our aims

Following research, workshops and discussions with people and organisations from across the Wissey catchment we've identified aims in four key areas.



ENJOYING THE RIVER

- Develop a stronger connection between local communities and the Wissey
- Improve access to parts of the river
- Improve local understanding and involvement in the management of water and the river

MANAGING FLOWS

- A balance between different water users
- Achieve sustainable abstraction, leaving enough water for wildlife
- Improve coordination of drainage and storage to reduce flood risk and water scarcity
- Influence planning decisions regarding flood protection and growth
- Restore river size and shape where this will overcome the effects of low flow

LOOKING AFTER WATER QUALITY

Improve ecological conditions, reduce the need for expensive, carbon and energy-intensive treatment options for drinking water and help meet various legislative requirements by:

- Reducing phosphate levels in the water of the upper Wissey and Watton Brook
- Reducing pesticide levels in the river
- Minimising loss of nitrate from the soil and from treatment works into groundwater and surface water

WILDLIFE AND LANDSCAPE

- Protect endangered wetland species and look after wildlife sites in the river, its tributaries and flood plain
- Control non-native invasive species
- Protect and improve fish populations
- Manage plants to accommodate boating, angling, wildlife and other uses

Photo: The nationally rare Water Vole is found in the Wissey. Courtesy of Elizabeth Dack

Getting to know the Wissey

The Wissey and surrounding catchment area plays a vital role in the water cycle, provides an important environment for wildlife and a benefit to our local community and economy.

To protect the river and continue to enjoy its benefits we all need to understand it and help to meet the challenges it faces.

The Wissey rises just east of Bradenham in central Norfolk and flows in a westerly direction for nearly 35 miles until it joins the Ely Ouse downstream of Ten Mile Bank.

Underneath the Wissey is an extensive chalk aquifer – a natural underground reservoir formed by porous rock beds – that evens out the flow of the river. This steady flow of water from below ground supports diverse wildlife, and is one of the reasons the Wissey is such a vital river to our region.

The Wissey catchment area is mainly rural, with centres of population in the market towns of Swaffham and Watton in the east and the village of Stoke Ferry in the west.

Like much of East Anglia, agriculture remains a key use of land and makes it one of the most important arable areas in England. Cereals are the major crop with potatoes, oilseed rape, sugar beet and vegetables also common. The value of these crops means, in summer, up to 14% of the arable area may be irrigated using water from the river or groundwater.

Photo: Gary Buttle

Photo: Vegetable production is common in the Wissey catchment

This strong agricultural tradition sits alongside large tracts of conifer plantations and heathland with Thetford Forest at the centre – one of the area's many local hubs for recreation and tourism.

From our recent workshops we also know people living in the Wissey catchment would like to enjoy the river more. Mini parks and multi-purpose wildlife and wetland sites offering educational opportunities would be popular.

The River Wissey is one of the best lowland trout streams in Eastern England, and with its tributaries, the wider catchment provides a refuge for a variety of wildlife. A large military training area encompasses the Wissey just upstream of Ickburgh, the downstream section of Watton Brook, and most of Thompson Stream. This area provides a glimpse of how the river might have looked in the past.

Much of this military area is designated as a Site of Special Scientific Interest (SSSI), with large tracts retained as very rare heathland habitat, particularly abundant with wildlife. Access is limited but possible via a permissive footpath, two organised tours per year or, in special cases, by arrangement with the range control office. See the Defence Training website for more details.

Thompson Stream is also important for supplying water of very good quality into the main river, diluting the richer run-off coming from other parts of the catchment.

Despite these important wildlife areas, some of the Wissey's native species are under threat from non-native introductions.

Photo: Avenues of pine trees - a typical Wissey landscape

Photo: A relatively untouched section of Watton Brook

Photo: Brown Trout

Fish populations are also lower than they should be. The reasons for this include lack of appropriate habitat, barriers to migration, in a few cases low flows, and occasionally poor water quality.

Sediment eroded from roadsides, clearing out watercourses and from fields themselves contributes to lack of habitat by clogging up river gravels used by spawning fish. It also carries phosphate, which adds to the phosphate coming from septic tanks, household washing detergents and that discharged from sewage treatment works. Too much phosphate can alter the balance of river wildlife.

The Wissey catchment is a key water source for public water supply and irrigation. However, the amount of water abstracted from some of the tributaries is now thought to be affecting the river's health, and may need adjusting.

Similarly, traces of pesticides washed off surrounding farmland can also make it difficult to meet European standards for drinking water quality. This has a substantial impact on the cost of treating river water and groundwater before it can go into public supply.

Detail on all these issues and how we can tackle them is outlined next.

"It was full of fish and wild flowers, and, for all I knew, crayfish and naiads, wonderfully remote from any sort of civilisation. The banks were thick with purple water-mint, forget-me-not, hawkbit, and clouds of yellow brimstones and cabbage whites browsing on the purple loosestrife along the banks. The water was polished, deep green and gold, shining from its velvet bed of crowfoot and fine gravel; it seemed quite out of time, flowing as sweetly as the river in Millais' painting of the drowned Ophelia, decked with wild flowers."

Roger Deakin, Waterlog (1999) near Ickburgh Bridge in summer. (Literary Norfolk)

Photo: Water Mint by Chris Roberts

Photo: Riverside flowers - Purple Loosetrife and Hemp Agrimony

Managing water flow

Water is one of our most precious natural resources. It is vital to people's health and happiness, the environment, our wildlife and our economy.

The flow of water in streams and rivers is an important part of the water cycle. So much depends on it, from whether fish can spawn to whether water can be abstracted for homes, businesses and crop irrigation. Managing the water flows is therefore crucial.

Photo: River Wissey near Mundford

Photo: Fenced off stream section with waterside plants starting to colonise. This is leading to a more natural edge habitat and meandering flow pattern

Photo: Flow gauging weir

Photo: Canalised stream section

NATURAL WATER FLOWS

The Wissey is predominantly a chalk stream, except for the tops of the north eastern streams where it cuts through the layer of clay covering the chalk, and the western end of the catchment where there are a variety of soils and rock types.

Because chalk is a porous rock, and a lot of the catchment is covered in permeable soils, rain falling onto it filters through the soil and into the chalk and re-emerges lower down in springs.

The chalk acts as a reservoir, regulating the amount of water that goes into the river – a trait which means many chalk streams have a stable flow.

Thanks to the chalk filter, the Wissey's water is usually clear and alkaline – properties that give rise to its internationally important chalk stream ecology. However, it is also vulnerable in dry conditions and droughts, when the groundwater level falls.

Photo: Upper Wissey

The Wissey's smallest tributaries often dry out naturally at the end of summer. The Old Carr Stream may also follow this pattern, for example.

Because the Watton Brook and upper Wissey have a clay base they are less influenced by these underground water flows. In turn, they respond more to rainfall, and may wash more sediment from the land. This fast response to rainfall can be increased by impermeable surfaces in built-up areas.

These streams are what experts call more 'flashy', and their influence is felt all the way down to Nothwold. At other times. the generally brisk and stable water flow of most of the Wissey keeps its gravel beds clear of sediment.

The ecology in both flashy tributaries and those more influenced by water coming out from the chalk can be affected by the unreliable nature of flows caused by rainfall patterns.

MANAGING ABSTRACTION

Water is taken out of the Wissey both from the groundwater via boreholes and directly from the river for public supply, industry, agriculture and a few wildlife sites.

To ensure there is water available for people and businesses while protecting the natural rivers and wetlands, the Environment Agency issues abstraction licences which restrict the amount that can be taken out.

Photo: Adult Mayfly - a favourite food source for fish. The young are called nymphs or naiads

Careful monitoring of the ecology of the river, especially when the water flow is at its lowest, enables the Environment Agency to work with licence holders to reduce any impact on the rivers and wetlands.

In the Wissey, the Environment Agency's improved methods of assessing rivers has now indicated that in three tributaries: the River Gadder, Old Carr Stream and the Stringside Stream, the ecology is potentially at risk because of low flows. If further monitoring confirms this, measures will be put in place to reduce abstraction in the catchment.

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DRAINAGE, FLOODING AND THE ELY OUSE ESSEX TRANSFER

The Wissey has undergone various man-made alterations over the years to run mills, supply water, offer flood protection and for navigation. The whole of the Wissey below Hilborough and the Watton Brook is classed as 'heavily modified' and this often reduces the available habitat for wildlife.

Drainage and flood controls have been used across The Fens since the 1630s.

They can be used to conserve water levels in certain areas, to redirect water or to drain areas needed for other uses.

At the western (downstream) end of the Wissey, the Environment Agency controls water levels using a sluice across the Ely Ouse at Denver.

>>>

Photo: Denver sluice

This allows them to direct excess water from the Ely Ouse into the man-made Relief Channel which runs parallel to the tidal Great Ouse when water levels in the Great Ouse are high.

This water can then drain into the Great Ouse just south of King's Lynn where water levels are often lower.

Storm water from the Wissey, Little Ouse and Lark tributaries can also be diverted into the Relief Channel via the man-made Cut-off Channel, which opened in 1964.

This Cut-off Channel is also used to divert surplus water from the Ely Ouse system to Essex as part of a transfer agreement with Essex and Suffolk Water. In a dry year, this important transfer can supply between 15% and 35% of the water needed by Essex.

Beyond these main purposes, the Denver sluice also holds water in the lower reaches of the Wissey, Little Ouse, Lark and Cam at a similar level which makes them ideal for leisure boating.

Photo: Cut-off Channel

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Photo: Pleasure boats on the River Ouse above Denver Sluice

WHAT ARE THE FLOW ISSUES?

- The Environment Agency's 2013 abstraction management report classes the Wissey groundwater as over abstracted and the surface water as over abstracted at low and moderate flows. Investigations are underway in three tributaries to confirm whether or not this is having an effect on stream ecology.
- Fish are particularly affected by low flows. As well as loss of habitat, low flows combined with hot spells in the summer can cause oxygen levels in the water to fall to very low levels.
- Ponding of water in the lower Wissey as it flows across the Fenland sometimes also results in high water temperatures and low oxygen levels.
- Sections of the Wissey have been known to cause flooding to the surrounding land.
- Man-made modifications to the water flow in the catchment can cause changes to natural processes in the river. For instance, increased amounts of water running over the land due to urbanisation or soil compaction increases the risk of washing sediment, phosphate and pesticides into the river.
- Although treated water from sewage treatment works is often beneficial in maintaining river flows downstream of the treatment works, it can also cause an increase in phosphate in the river and other pollutants.
- During hot spells or drought, demand for water for both public water supply and irrigation increases. As well as the effect this may have on wildlife, a recent survey of local farmers found that in a dry year, water scarcity is felt by some.

Achieving our goals

We're already working to protect flow in the Wissey.

Here are a few of the projects already underway.

MANAGING WATER FLOWS IN THE LANDSCAPE

The Partnership is identifying potential locations in the Wissey catchment to help manage water flow, for instance through flood storage, restoring stream channels, creating wetlands and filling farm reservoirs during high flows. All of these could bring wide ranging benefits for water users and the public in the Wissey catchment.

The next step is to work out how many such sites are needed to make a significant positive difference to river flow patterns. Potential work at each site can then be reviewed against the costs, risks and benefits, and funding sought.

USING WATER RESPONSIBLY

Anglian Water launched its 'Love Every Drop' campaign in 2010 to encourage responsible water use and put water at the heart of day-to-day living. www.anglianwater.co.uk/loveeverydrop. It is working with everyone who influences water use in its region, from housing developers and retailers, to government and customers and its 'Drop 20' initiative encourages everyone to reduce their water usage by 20-litres per day.

Through significant investment, Anglian Water is also driving down leakage and as a result it has the lowest rate of any water and sewerage company in England and Wales.

Photo: Areas of naturally managed habitat along a river.

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Photo: A new reservoir being filled

SUSTAINABLE WATER RESOURCE MANAGEMENT

Early in 2013 Cranfield University students were commissioned to carry out a simple 'options appraisal' for alleviating local water scarcity.

The project group (part of the River Wissey Partnership) is now developing plans to take forward the work started by the Cranfield study. While a range of options will be developed, arguably the most exciting and bold project underway is the development of a collaborative Multi-Sector Water Resources Management Plan for the Wissey. This plan will set out the volume of water needed by different businesses and sectors, calculate how much water is available, and then cost out various options for relieving scarcity.

Additional water storage is key to many of the options. New approaches to the funding and governance of storage are being developed by the Cambridge Programme for Sustainability Leadership. They are working in collaboration with the River Wissey Partnership and the Wissey Abstractors Group, plus a range of businesses such as food retailers, insurers, banks and the property sector, to develop these new approaches.

Get involved

What more can we do to address some of the issues with water flow in the Wissey?
Here's a list of projects that have been suggested in the research for this plan.
We've colour coded them to make it easier to find one that suits you.

Share information widely

- Promote the need to protect and support the River Wissey catchment with and through others
- Improve understanding between different groups of the constraints affecting different users of water
- Provide opportunities to discuss and feed views into Defra abstraction reforms
- Provide information to the public about who has powers to manage which stretch of river
- Draw up an information sheet for parish councils on how to influence planning

RIVERS TRUST **RIVERS WISSEY PARTNERSHIP**

JOINTLY LED BY RIVER WISSEY PARTNERSHIP AND OTHERS

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Improve technical understanding of flows

- Improve flow monitoring by the EA
- Collect local information about historic flows, e.g. which tributaries have always dried out
- Calculate how much landscape water storage is needed to significantly reduce flood flows

Flow improvement works

- Promotion and support of domestic rainwater harvesting and water efficiency measures
- Exploration of Sustainable Drainage Systems (SuDS) where appropriate
- Channel restoration, particularly where it would allow existing flows to support a better ecology

Wildlife and landscape

A healthy natural environment is one of the foundations of personal wellbeing, prospering communities and a sustainable economy. So as you'd expect, many organisations have a legal duty to protect it.

Biodiversity is a key pillar in the health and wealth of that natural environment and something chalk streams have in abundance.

All rivers provide wildlife with important natural corridors to move between fragmented habitats, but chalk streams are special. They get the majority of their water from underground chalk aquifers and the only place on earth where that happens is in southern England and Europe.

As well as supporting an immense variety of wildlife, wetlands adjoining the main river also have an economic value. They provide an important source of food, fresh water and building materials, and also provide valuable services such as water purification, flood defence and filtering out of some of the sediment carried into the water from erosion.

Photo: Wetlands being created at Hilgay will provide breeding habitat for Bitterns in the Wissey by Brian McFarlane

Photo: Brimstone Butterfly

WISSEY ECOSYSTEM

All except the very tops of the Wissey, Watton Brook, and the western end of the catchment is a chalk stream.

This gives rise to particular river characteristics, including good water quality, steady flow and a gravelly river bed which mean they can support an ecosystem of rare and endangered species, making it hugely important on the global environmental stage.

Aquatic and emergent plants such as Water-Crowfoots and pondweeds provide cover for insects that in turn provide food for fish. So, it's no surprise therefore that the Wissey is one of the best lowland trout streams in eastern England, and much of the middle reach of the river is managed as a trout fishery.

The Wissey was also once a stronghold for the native White Clawed Crayfish but numbers have dwindled in recent years. Otters and Water Vole are widespread although rarely seen, and the alien Mink is also present.

A HABITAT OF TWO HALVES

Once the river begins to flow in man-made channels through The Fens, the habitat becomes distinctly different. The river channel often flows at a much higher level than the surrounding land which has sunk because of the drainage and resulting shrinkage of the peat.

The Cut-off Channel marks the boundary of this fenland area, and itself supports a distinctive community of plants and wildlife thanks to the chalk used to build the banks. Its scrub and tall hedges are also a stronghold for the declining Nightingale and Turtle Dove.

Photo: Turtle Dove

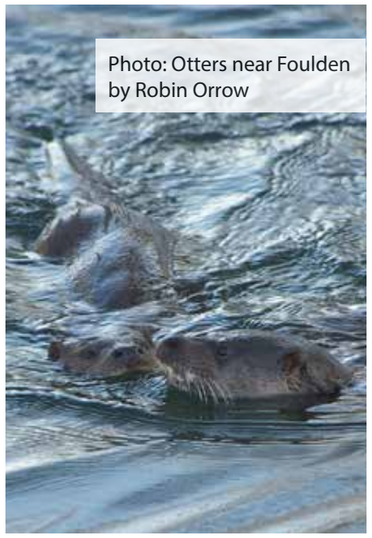

Photo: Otters near Foulden by Robin Orrow

Photo: Nightingale courtesy of the British Trust for Ornithology

PROTECTED SITES

The Wissey catchment is home to several protected Sites of Special Scientific Interest (SSSI), such as the large Breckland heathland SSSI in the south of the catchment and a number of wetland SSSIs.

A large number of wetland County Wildlife Sites are also associated with the river and the chalk-banked Cut-off Channel.

These don't have official designated status like SSSIs but still form a valuable chain of wildlife areas that add to the rich biodiversity of the catchment.

The Norfolk Wildlife Trust offers free advice to landowners on management of such sites, and a full record of the sites is kept by the Norfolk Biodiversity Information Service.

How are the native Crayfish Doing?

The Wissey and the Thet are the last two tributaries on the Ouse to have native White Clawed Crayfish. There used to be a very healthy population in the Wissey, but in the last few years mass deaths due to outbreaks of Crayfish Plague have affected numbers.

Crayfish Plague is a fungal infection carried by introduced non-native Signal Crayfish. The Signals are carriers of the infection but are not affected by it.

However, as of late 2012, no Signal Crayfish have been recorded in the Wissey. Unfortunately though, the infection can also be transferred on fishing and trapping equipment, boats, and wellies. Supporting the 'Check Clean Dry' campaign designed to stop this spread of diseases and invasive species, is crucial in protecting the remaining population.

Photo: Signal Crayfish

Photo: White Clawed Crayfish

Fish Habitats

The Wissey has three main types of habitat for fish. Over half of the main river is suitable for Brown Trout and the stock has been altered to favour trout populations in these beats.

Under the right flow and temperatures, coarse river gravels are used for spawning by Trout. The fry (baby fish) then need well-oxygenated riffles to live in and the adults favour deeper scour pools and cover.

All these habitats are created by a natural channel shape and Brown Trout breeding grounds can be found in the upstream sections of the Wissey where these riffle-pool systems are found. Bullhead and Stone Loach are also found here.

Going downstream, Chub and Dace favour an intermediate habitat between the trout fisheries and the lowest reaches. They also use river gravels in the upper reaches to spawn in, but their young then prefer the slower flowing margins of the river rather than the faster riffle sections.

The slowest flowing, deeper, downstream reaches are more suitable for coarse species such as Roach, Common and Silver Bream, and Perch. Tench and Eels are also found. The non native Bitterling can also be found in the lower river. This lower section of the river is a very good winter fishery for Roach, Dace and Pike.

Many fish feed on a range of insects that live in the submerged deadwood, trees and vegetation on the banks of the Wissey. In winter, this vegetation also provides important cover and refuge from storms, while on warmer days shade keeps the water cool. Fish stocks are often found around areas where overhead cover is present, Hilgay Moorings being a prime example.

Photo: Trout habitat

Photo: Chub habitat

Photo: Roach habitat

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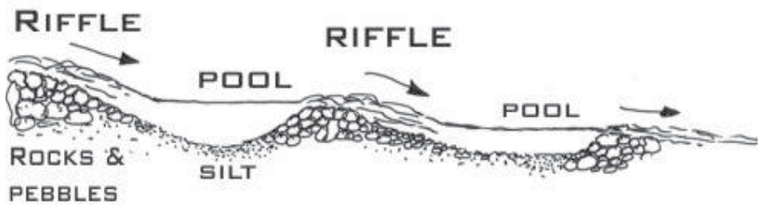
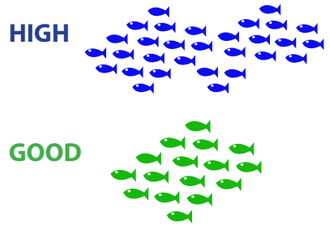
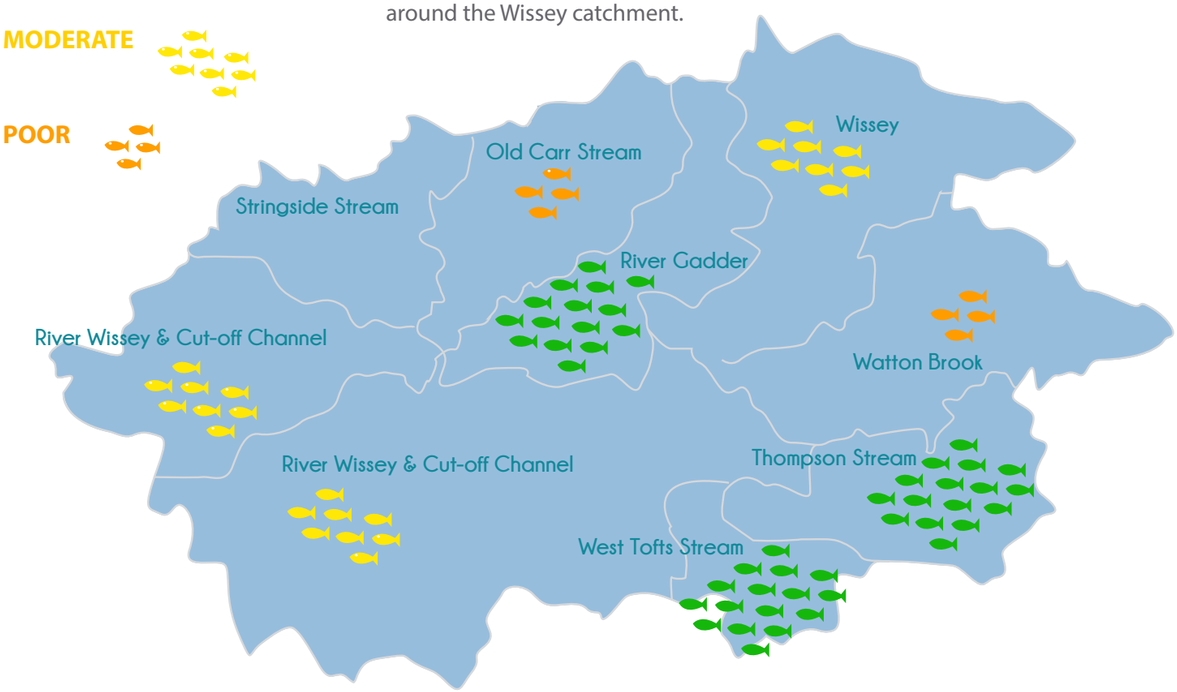


The illustration shows how riffle -pool sequences occur where the build-up of gravel in different parts of the river bed causes the river flow to alternate between shallow and deeper water.



The illustration shows the conservation status of fish around the Wissey catchment.



What are the issues with wildlife?

- Low flows can affect wildlife in certain areas of the catchment. For example in November 2011 substantial numbers of fish died in the lower Wissey when very low flows and algal blooms resulted in low dissolved oxygen levels. The incident would have been much worse but for a member of the public raising the alarm and the Environment Agency then artificially oxygenating the most affected areas.
- Invasive non-native species can pose a serious threat to wildlife indigenous to the Wissey. Signal Crayfish are a threat to native White Clawed Crayfish, and are known to be present in the Cut-off Channel south of the Wissey catchment. Mitten Crabs and an invasive shrimp have been found in the Ely Ouse. There are also pockets of invasive non-native plants along the Wissey which, although largely under control, do need monitoring and further control where necessary.
- Insufficient habitat for fish and their food sources in some areas.
- Increased levels of phosphate, as found in the upper Wissey and Watton Brook, can stimulate algae or weed growth which can clog up fish spawning gravels and suppress the natural variety of plants which the Wissey's wildlife relies on.
- Sluices and weirs can act as barriers preventing the seasonal migration of fish and causing populations to decline in certain areas. The sluices can be modified or removed, but this is often expensive. Plus, the benefit of this has to be considered against the risk of removing the protective barrier they provide against the movement of alien species, such as Signal Crayfish.
- Sadly, fish poaching does happen and the Wissey is no exception. But, an Environment Agency Fisheries Enforcement Officer is proving successful in tackling this problem.
- Other wildlife can prey on fish and put pressure on populations. By providing increased cover for both fish and the food sources they rely on we can implement natural checks to maintain fish numbers.
- Some of the protected wetland sites are suffering from unwanted growth of scrub and trees. These threaten the rare plants, insects and birds that rely on the specialised protected habitat. Although this is a natural process, there are few alternative places for these species to go if their habitat evolves.
- There are also concerns about the water levels at some protected wetland sites. However, these issues have tended to be local and related to surface water drainage, rather than being a more widespread problem with the level of water held in the rocks underground.

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Achieving our goals

Some wildlife and landscape projects are already underway.

Managing the river habitat

Encouraging better management of river, stream and ditch banks in the Wissey catchment is crucial for managing water and helping fish and other wildlife thrive.

By compiling advice and information for riparian owners - those who own land adjoining the river – this project aims to do just that, by helping local expertise and best practice to be shared between neighbouring landowners.

The group will also be sharing information about the roles, responsibilities, and powers of the various water management bodies, in different stretches of the river.

Photo: Naturalised riverside strip along the Wissey by Chris Roberts

Photo: Aerial photo of Hilgay wetland courtesy of the Environment Agency

Wetland creation at Hilgay & Methwold

Norfolk Wildlife Trust, the Environment Agency and Natural England have embarked on an ambitious programme to create new wetland habitats adjacent to the River Wissey.

Partly they are to replace reedbeds and grazing marshes on the coast that will be lost over the next few decades. They will also restore some of the wetland habitats that were present in The Fens prior to widespread drainage for agriculture.

The aim is to attract breeding Bitterns and Marsh Harriers, along with other wetland birds and species such as Water Vole and Otter. Although in its early days the site has already attracted birds such as Little and Great White Egrets, Whooper Swans, Crane, Little Ringed Plover, Avocet and Barn Owl.

The construction phase of the first 65 hectares, just east of Hilgay, is nearing completion after extensive reed planting in summer 2013. Work on another 66 hectares will be completed in the next two years.

Get involved

What more can we do to address some of the issues with wildlife in the Wissey? Here's a list of projects that have been suggested in the research for this plan. We've colour coded them to make it easier to find one that suits you.

Practical habitat improvements for wildlife

- Removal of barriers to fish movements up the river where appropriate
- Explore the potential for wetlands to be created which can have additional uses, such as for public amenity
- Improve the physical connection between the river and the floodplain habitats which fish use as storm refuges
- Local volunteer groups, potentially linked to Rivercare, to help 'nature works' such as tackling invasive plants on the river or nearby wildlife sites

Local involvement in wildlife management

- Help to monitor the remaining native crayfish by reporting any sightings
- Mount a vigilance and educational campaign to prevent the spread of invasive species and diseases
- Volunteer wildlife surveys, e.g. the Anglers Monitoring Initiative, run by the Riverfly Partnership

Sharing information

- Gather and share information about where the key places for wildlife are in the Wissey
- Find out if there are any conflicts about the amount of weed cutting and try to resolve them
- Explore the proposals of the Norfolk Biodiversity Partnership to restore the Burbot fish to England, beginning in the Wissey
- Promote ways of providing natural protection from predators

RIVERS TRUST **RIVERS WISSEY PARTNERSHIP**

JOINTLY LED BY RIVER WISSEY PARTNERSHIP AND OTHERS

Managing water quality

The quality of the water in our rivers and groundwater can have a profound effect on wildlife, people's enjoyment of the river, and the economy.

The impact of poor water quality can range from unsightly algal growths to chemicals in the water that require lots of energy and treatment to remove.

Photo: Litter picking on the banks of a river

Photo: Primary and secondary sewage treatment tanks - part of the overall treatment process

PHOSPHATE AND SEDIMENT

Too much phosphate in the river can stimulate excessive growth of algae or aquatic plants which are not only unsightly, but also clog up fish spawning gravels and smother more diverse vegetation. When the algae eventually dies and decays, it uses up oxygen in the water, reducing what's available for fish.

PHOSPHATE FROM HOUSEHOLDS

The largest source of phosphate in the Wissey is actually from households. It's found in foodstuffs, food additives, laundry powder, and dishwasher tablets.

There has been a significant amount of investment at the large sewage treatment works in the region to remove phosphate from the water, such as Watton which has additional treatment installed. However, removing phosphate through water treatment is expensive and it has a high carbon footprint because of the chemicals and energy required for treatment.

The treatment of sewage is all about recycling used water and returning it, as a valuable resource, to the environment. Nothing is wasted. To help people see the water leaving their houses and businesses in this same light, Anglian Water has renamed its sewage treatment works as water recycling centres. You will see this term used more and more, but for simplicity in this group document we're using the old term.

Although new technologies are being developed, it's more efficient and environmentally friendly to tackle the problem, particularly in smaller villages, by focussing on reducing the phosphate at source.

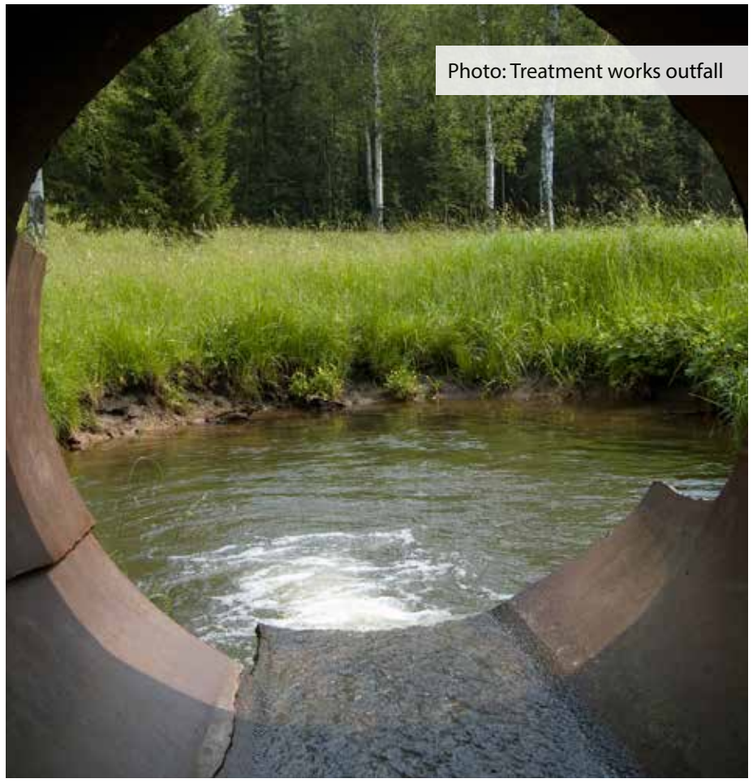

Photo: Treatment works outfall

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Trials are ongoing in the region to encourage people to cut down on products containing phosphate and replace them with alternatives like phosphate-free laundry powder and dishwasher tablets. Initial results look very promising with levels in water substantially reduced and seemingly without an increase to customers' shopping bills.

Alongside this work, continued investment in conventional phosphate removal (and treatment for other pollutants) will be carried out by Anglian Water at sewage treatment works around the region.

Photo: Excessive algal growth in a stream. Courtesy of Nigel Simpson

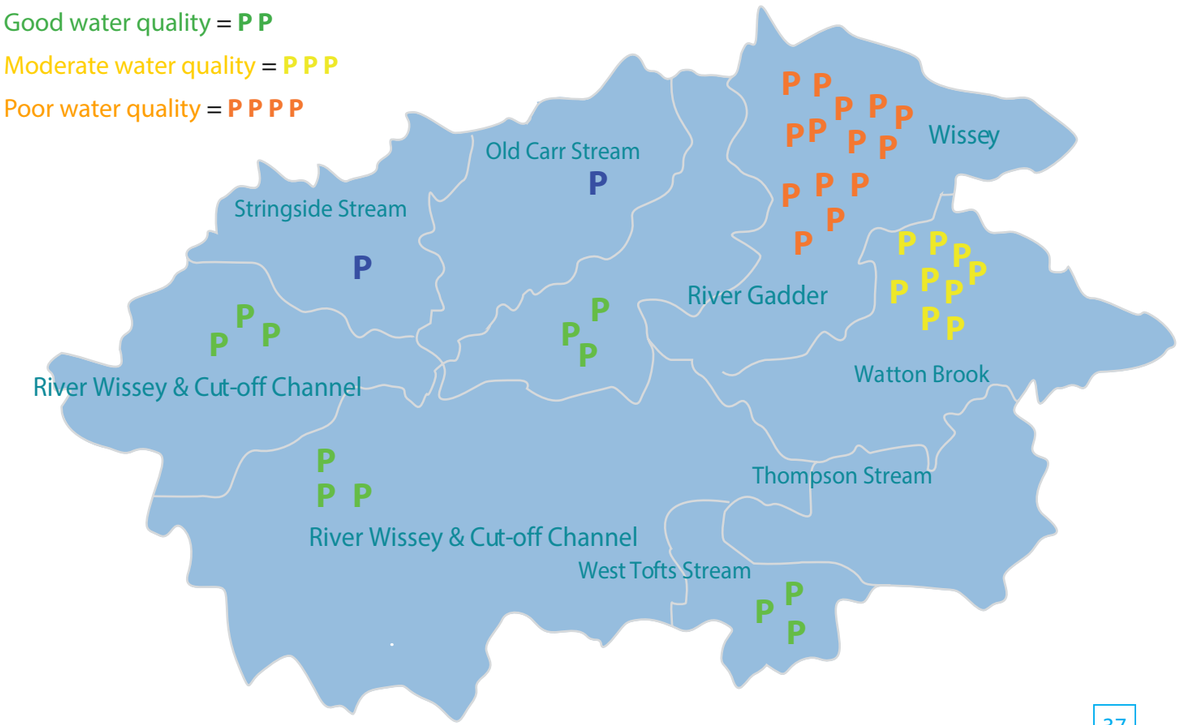
PHOSPHATE IN THE RIVER WISSEY

High water quality = **P**

Good water quality = **P P**

Moderate water quality = **P P P**

Poor water quality = **P P P P**



Agreements are made every five years between the Environment Agency, water companies and Ofwat, the water industry regulator, about what investment needs to be made to maintain or improve river water quality.

Local water quality monitoring can play a part in picking up early indications of phosphate or nitrate changes in streams. Working with the Environment Agency, one resident has indeed picked up likely elevated phosphate levels in one of the tributaries, which can now be investigated.

ADDING PHOSPHATE TO PROTECT LEAD PIPES

Perhaps surprisingly, phosphate actually needs to be added to drinking water at source, in the form of a very dilute acid, to prevent lead from old plumbing pipes dissolving into drinking water.

10% of the phopshate in used water arriving at the treatment works is believed to come from this source, though as lead pipes are gradually replaced, it will eventually be possible to stop this dosing.

PHOSPHATE FROM MISCONNECTED DRAINS

Another major source of phosphate is misconnected drains that cause foul sewage to enter the surface water system.

It's estimated around 300,000 homes in England and Wales have misconnected drains, generally because of poor quality building works and plumbing mistakes.

The Wissey region is no exception and therefore encouraging homeowners to use approved plumbers and builders for any renovations is key to tackling the problem.

Photo: Soil erosion down field tramlines

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PHOSPHATE AND SEDIMENT FROM FARMLAND AND ROADS

Phosphate also gets into the water when livestock have unrestricted access to the river and so dung and urine enters the watercourse, and also through uncontrolled soil and river bank erosion.

Outdoor pig production also needs careful management to avoid problems with excessive runoff and erosion.

Whilst erosion is a natural process, too much of it, especially that from farmland and road verges, brings with it attached nitrate, phosphate and pesticides, and all this ends up in the river. Like heavy algal growth, the sediment itself can also clog up fish spawning gravels.

Photo: Muddy water runs into a stream from a road

If livestock access to watercourses is not managed well, it can very easily cause pollution both by erosion of the channel bank, and by defecation in the water

NITRATE

Nitrate is essential for growing crops so it's a key component in fertilisers and manures used on farmland. This can easily leach through the soil into groundwater supplies when it rains.

Farmers have long worked to rules such as the Nitrate Vulnerable Zone regulations that limit the amount of nitrate that can be applied on their farms and govern other things like the management of manure heaps - another source of nitrate.

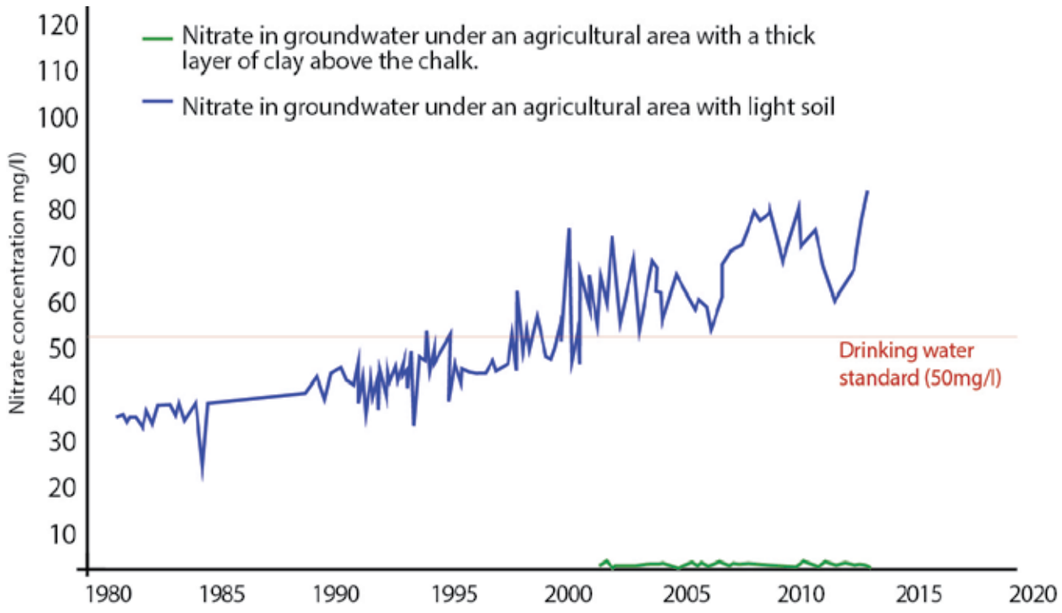
RISING AMOUNTS OF NITRATE IN GROUNDWATER

Whilst there has been a reduction in surface water nitrate seen at Stoke Ferry since 1990 (see page 42) public and private boreholes can still have high levels of nitrate. However, the land use and geology above an aquifer has an enormous effect on the amount of nitrate leaching down into groundwater, as illustrated opposite.

Water can be drawn from tens of metres below the surface, and groundwater moves down through the ground very slowly, meaning that any change on the land would take around 20 or 30 years to be seen as better water quality in the boreholes.

Anglian Water computer models of the catchment combined with other evidence suggest that where nitrate levels in groundwater are significant, they will continue to increase for several years as the effects of farming practices in the last part of the last century come through, before levelling off.

GRAPH: Groundwater nitrate under two different soil types in the Wissey catchment.



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There is some uncertainty about what will happen after that. If groundwater nitrate levels mirror those seen in river water, they will show a partial decline as the effects of improvements in farming practices feed through from the late 1980s.

WATER TREATMENT TO REDUCE NITRATE

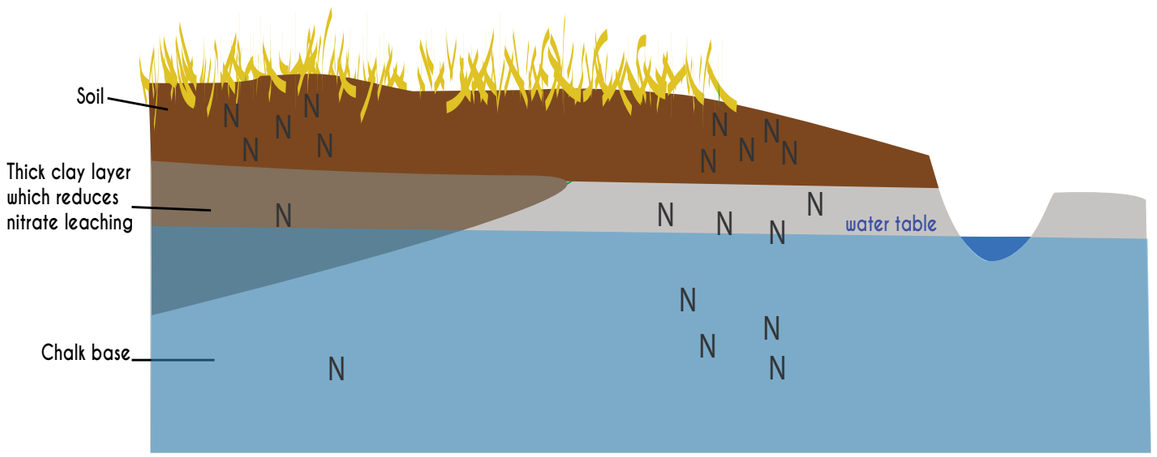
Where it is needed, water companies reduce nitrate from raw water before it goes into public supply through ion exchange - a form of treatment - or by blending high nitrate raw water with waters with lower nitrate amounts.

However, these are high-energy processes and the knock-on effect for customer bills mean that simply building additional water treatment is not a sustainable option long term.

Furthermore, legislation (the Water Framework Directive) will not allow ongoing deterioration of groundwater quality, and indeed expects a reversal of any current deteriorating trend.

Groundwater nitrate is likely to remain relatively high in those locations where there is a high proportion of agricultural land and little cover over the chalk. Nevertheless, reducing nitrate in groundwater to the lowest level consistent with productive farming will bring benefits to everyone. This can be achieved by continued development and uptake of improved farm practices.

DIAGRAM: The effect a clay layer has on nitrate leaching into groundwater.



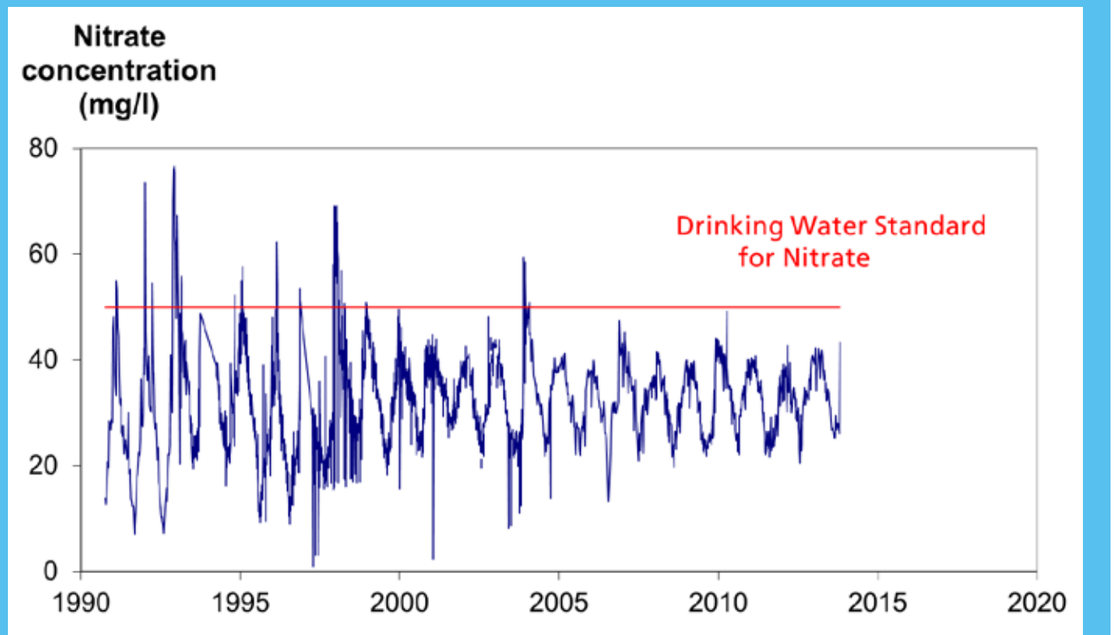
SUCCESS STORY - NITRATE IN RIVER WATER

Nitrate in surface water follows an annual pattern aligned with the seasonal wetting and drying of the soil. The highest concentrations are found in autumn when the land wets up after the summer and any surplus nitrate in the soil starts to get washed out.

The graph below shows that the peaks in nitrate entering river water in the Wissey have decreased steadily over the last 15 years. This means raw river water now rarely exceeds the drinking water standard and techniques for dealing with high nitrate levels are therefore required less and less.

The reasons for this reduction in nitrate are currently unclear and may not be due to one reason alone. Rather, a combination of factors has probably achieved it, including improved treatment at sewage treatment works and continuous developments in farm practices.

GRAPH: Nitrate peaks in the River Wissey



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PESTICIDES

The UK's growing population places ever increasing demands on food resources. In needing to respond to this and generate a reliable, sufficient source of food, farmers are reliant on a variety of pesticides, herbicides and fertilisers.

However, this does have a knock-on impact when these substances enter watercourses and groundwater, through spray drift, soil erosion and surface water run-off from farmland, and vertical leaching down though the soil. These and other chemicals need to be removed from the water before it can be used for public supply.

In England, we enjoy drinking water that is amongst the best in the world. It is treated to extremely high standards and tested to make sure that it is clean and safe to drink. These standards are extremely stringent; only 0.1 part of any one pesticide in every billion parts of water is allowed– equivalent to three grains of salt in an Olympic size swimming pool. These standards are set at a near zero value reflecting European Union legislation saying that pesticides should not be present in drinking water.

The downside of these stringent standards is the cost of achieving them. Some have suggested an alternative approach, which would set the standard for each chemical according to the risk from each type of substance, rather than a single standard applying to all pesticides.

Although pesticides are not the only chemicals that are found in raw water (e.g. medicines and cosmetic substances are also present), some are more difficult to remove. Metaldehyde, a chemical used to control slugs, is one.

METALDEHYDE

Metaldehyde is a pesticide, generally sold in pellet form, used by farmers and gardeners to control slugs and snails in a wide variety of crops.

This chemical can find its way into drains and water courses, particularly in wet autumns when the use on farmland is highest and rain water run-off greater. In the amounts detected in raw water, the pesticide poses no risk to aquatic life.

Photo: Metaldehyde pellets courtesy of CM Consulting (UK) Ltd and Metaldehyde Stewardship Group

RAW WATER TREATMENT TO REMOVE METALDEHYDE

Drinking water treatment methods designed to remove other pesticides are not effective at completely removing metaldehyde. Concentrations can therefore still occasionally exceed the drinking water standard, but nowhere near levels which might affect human health.

Currently, other than at one site in Anglian Water's region, the only way to ensure drinking water standards are met is by moderating the amount of water taken from rivers and reservoirs at certain times.

It is possible to remove metaldehyde from water using a process called reverse osmosis, or the use of ultraviolet rays and hydrogen peroxide.

These techniques are however either extremely energy intensive or use chemicals that are very dangerous to handle in their concentrated form. Expanding the use of these methods would mean a significant increase to customer bills, which public consultations have shown is not supported.

Furthermore, the treatment method also may not be possible at small water treatment sites because of the scale of treatment required.

However, without any slug protection, in a wet year farmers may suffer total crop loss. A viable alternative is therefore required.

BEST PRACTICE

Following best practice advice and using alternative products are two recommendations from industry bodies - The Voluntary Initiative and the Metaldehyde Stewardship Group - which formed to minimise the environmental impact of pesticides.

Thanks to the vigorous promotion of best practice by these bodies, there is already a high level of awareness and uptake of best practice amongst farmers.

But in drinking water catchments it's important that all users of the pesticides follow this guidance and strongly consider alternative products to metaldehyde.

WHAT ARE THE ISSUES WITH WATER QUALITY?

- Phosphate levels in the upper Wissey and Watton Brook are too high
- There are localised problems with too much sediment on the river bed, and until recently in storm run-off from some outdoor pig fields
- Nitrate concentrations in some groundwater boreholes are too high
- There have been autumn peaks in metaldehyde concentration in the river since 2008

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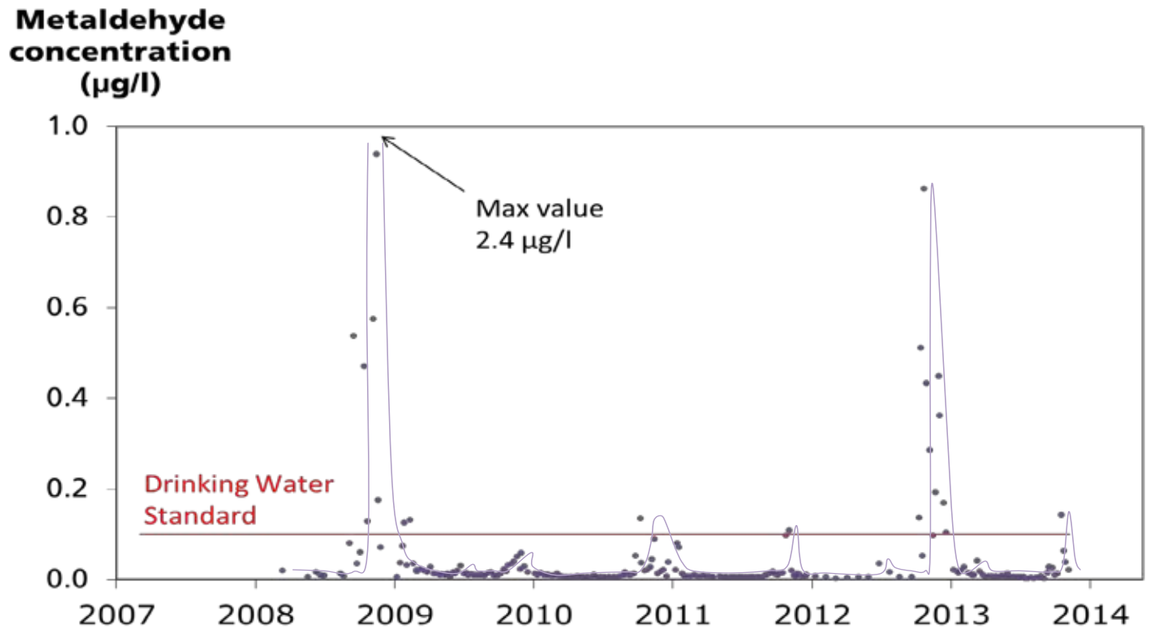
GRAPH: Metaldehyde concentrations in the River Wissey



Achieving our goals

Some projects are already making headway in reducing sediment run-off, nitrate leaching and the use of pesticides.

CATCHMENT SENSITIVE FARMING

This is a government-supported programme run by Natural England that aims for cleaner waters and more profitable farming. The Wissey was chosen as a target area because of its water quality issues, its use for drinking water, and the presence of SSSIs and other protected areas.

The programme offers one-to-one farm visits and group training days. These are available to improve sediment awareness, encourage the use of grass buffers and a change from cropland to grassland in sensitive locations, and share the best techniques for using metaldehyde. Visits looking particularly at managing rainfall and run-off on the farm are also encouraged.

Capital grants are also available as part of the programme, to help provide riverside fencing, work in farmyards to separate clean and dirty water, pesticide handling areas, sediment traps and livestock handling areas.

ANGLIAN WATER COMPUTER MODELLING OF NITRATE MOVEMENTS

Computer modelling of both nitrate and pesticide movements in drinking water catchments have been under development since 2010.

This modelling has been carried out to work out which are the most high-risk areas in each catchment for pollutant transport, and in the specific case of nitrate in groundwater, to predict the likely trends over the next 30 to 40 years.

The models for the Wissey are nearing completion and are helping to target decision making regarding feasible ways to maintain or improve raw water quality in future.

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SOIL NITROGEN MANAGEMENT ON FARMS

This project is gathering local information about the nitrogen from farmland soils in the Wissey catchment. The information is aimed at promoting best practice and innovations in farm nitrogen management, to reduce the amount of nitrogen leaching into groundwater.

Soil from 26 fields owned by five local farmers was tested using a new soil testing technique which estimates the amount of nitrogen that would be released in the soil during the growing season.

The five farms were selected because they had used manures within the last two years and were therefore most likely to have a significant amount of nitrate being released from the soil. Sampling was also targeted towards those areas of the Wissey catchment where nitrogen leaching is more of a problem.

In general, we found the new analytical method was more accurate than the standard method where there is a particularly high or low nitrate supply from the soil, and also in fields where management was unusual for some reason.

Improved knowledge of the nitrate being released naturally can not only reduce nitrate leaching, but give economic benefits through saved fertilizer use, or improved yields if the crop actually needed a bit more nitrate.

Once the findings have been checked and summarised, the information will be passed to other farmers in the Wissey. This will form part of the ongoing support the River Wissey Partnership can give to the Catchment Sensitive Farming initiative in targeting further improvements in nitrate use on farms.

Photo: Farm-based soil management workshop in the Wissey catchment

Photo: Sugar Beet growing in a typical Wissey agricultural landscape

Get involved

What more can we do to address some of the issues with water quality in the Wissey? Here's a list of projects that have been suggested in the research for this plan. We've colour coded them to make it easier to find one that suits you.

Improve understanding of the catchment

- Simple mapping could be done of the areas that are richest for wildlife, or other uses of the catchment such as the removal of carbon from the air, food production, recharge of groundwater, water provision, or amenity, to improve knowledge of how the catchment functions

Work with farmers

- Share the results of Anglian Water nitrate and pesticide modelling
- Carry out focussed metaldehyde awareness work with farmers in key areas
- Raise awareness of where water is collected for public drinking water supply
- Further partnership work to reduce runoff from farmland

Work with the community

- Volunteer water quality sampling to augment EA sampling
- Community 'Keep it Clear' awareness campaign aimed at the responsible disposal of used cooking oil, wipes and sanitary waste to reduce sewer pipe blockages that can lead to river pollution and sewer flooding incidents
- Reduce household phosphate use
- Community campaign to highlight the risk of misconnecting sewer pipes to storm drains during building works
- Community campaign to improve the maintenance of septic tanks
- Informing Highways about particular drainage issues around the catchment is an activity that local groups could get involved with

RIVERS TRUST **RIVERS WISSEY PARTNERSHIP**

JOINTLY LED BY RIVER WISSEY PARTNERSHIP AND OTHERS

Enjoying the River

Throughout history, people have been drawn to rivers - initially for drinking water, food and as a means of transport. Today, many of these uses are still vital to our society, but the simple enjoyment of the natural world is now just as important.

Over the past year, the River Wissey Partnership has spoken to people and businesses across the catchment to understand what they want from the river.
Their main priorities are to preserve the local wildlife habitat and to be able to enjoy the river more.
They are also concerned about water scarcity, flooding and the potential for water storage in the area.

Photo: Bird-watching with schoolchildren

Photo: Pond dipping with schoolchildren

WATER SCARCITY, FLOODING, DRAINAGE AND STORAGE

Rainwater harvesting is a popular idea with locals, as is the suggestion to use attractive ponds and wetlands for rainwater storage which could also be used as an educational feature. Some of these sites exist already, such as Anglian Water's Northwell drainage pond in Swaffham, which drains excess surface water into a groundwater borehole. This is already an attractive focal point in the town, but further improvements could be explored.

LOSS OF WILDLIFE AND HABITAT

People are interested in doing practical conservation work around the river. Here are just a few examples of the kinds of activities that would be of huge value:

- There are some wetland sites which are becoming overgrown with trees and volunteers might be able to help with ongoing management
- Control of some invasive plants such as Himalayan Balsam is also a very appropriate task for volunteers as it doesn't require chemicals, but just needs repeating over 2 or 3 years
- Riverside litter-picks are ever popular (along with fishing out the odd shopping trolley)
- Local monitoring of wildlife numbers and species is invaluable in adding to data gathered by government agencies
- Boat owners have been suggested as willing volunteers and parish councils and other local volunteering groups would be important vehicles for making this happen

Photo: The Wissey near Oxburgh by Chris Roberts

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ACCESS TO THE RIVER AND OUTDOOR SPACE

Most people surveyed (around 85% of them) in a study based around Swaffham, the River Gadder and Stoke Ferry think outdoor space is a very important part of the local community.

However, farms and other rural businesses are much more likely to feel a strong connection to the river and have opportunities to enjoy it. Adding wildlife and attractive features along the river would increase its appeal.

New footpaths, especially where there are few, are welcomed as an idea, and Pocket Parks – small areas with picnic and parking facilities, walks or launch areas for small boats – could make great additions and are an approach successfully used by the River Waveney Association.

A desire for access should always be considerately balanced though against the need not to disturb sites that are sensitive for wildlife, business or other reasons.

LOCAL SUPPORT

An overwhelming 60 per cent of residents and businesses said they would be keen to get involved in a community group and one in five said they would be willing to make a donation to a local cause.

With schemes like Rivercare – a joint initiative between Anglian Water and Keep Britain Tidy, and local groups who look after their stretch of river – already in existence elsewhere, there is much potential here.

The community also felt campaigns to encourage positive behaviours would help us all to improve the health of their river, such as:

- Using approved plumbers to avoid misconnected drains
- Disposing of fats and unflushable items, such as wipes and sanitary waste, responsibly to prevent sewer blockages that can lead to river pollution
- Reducing water use
- Improving management of septic tanks
- Using phosphate-free household products

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Get involved

What more can we do to address some of the issues with enjoying the Wissey? Here's a list of projects that have been suggested in the research for this plan. We've colour coded them to make it easier to find one that suits you.

Access

- We could identify opportunities for 'Pocket Parks'
- Parish councils and others could map out what outdoor countryside access opportunities exist, and where there is additional potential
- Explore any enhancements possible for Northwell drainage pond in Swaffham

Tourism

- Link river signage to existing leisure and tourist attractions (a joined up brand?)
- Develop an understanding of the economic value of visitors to the Wissey area, the contribution the river makes to this, and the potential to increase it

Sharing information, raising awareness

- Bring in parish/town council involvement in farming events where appropriate
- Set up guided walks along the river
- Develop information about the river - signage and interpretation
- Work with schools through Norfolk County Council 'water and enterprise programme' and the Ecotricity Green Britain Centre in Swaffham
- Improve public connection with the river e.g. schools to make small name signs for river bridges?
- Provide information about river and water management for parish magazines

Volunteer activities

- Support the formation of volunteer groups looking at any aspect of water care
- Find out if there is a proportion of the money from boat licences that could be directed locally

RIVERS TRUST
RIVERS WISSEY PARTNERSHIP
COMMUNITY TRUST
JOINTLY LED BY RIVER WISSEY PARTNERSHIP AND OTHERS

What happens now?

The River Wissey Partnership needs you and hopefully by now you know why and how you may want to get involved.

If you have a suggestion for your own project we'd love to hear from you. Or if you would like more information about the initiatives already underway, please get in touch.

One of our next activities will be to work out how easy each project might be to carry out, how much money it would cost, and how much improvement to the river or groundwater it would actually produce. We'll then be able to draw up a costed work programme. If you would like to contribute to this process, please get in touch.

If you have any other knowledge of the river, or you're already involved in a water related project, we'd also love to hear from you. We plan to update this River Improvement Plan every year to record what is happening in the catchment.

GET IN TOUCH:

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The work of the River Wissey Partnership is guided by a steering group made up of members from The Angling Trust, Anglia Ruskin University, Anglian Water, Catchment Sensitive Farming, the Country Land and Business Association, the Environment Agency, the National Farmers Union, Norfolk Wildlife Trust, the RSPB and Michael Payne - local farmer and consultant.

The River Wissey Partnership's coordinator is currently funded by Anglian Water, and Norfolk Rivers Trust will be co-hosting the partnership from April 2014 to help direct the next phase of our work.

PHOTOS: All photos not individually attributed throughout this plan appear courtesy of Kelvin Allen, Catchment Sensitive Farming, Bob Evans and Fiona Wood.

Please request permission before using any photos in a different context.