SOUTH HOLLAND

INTERNAL DRAINAGE BOARD

BIODIVERSITY ACTION PLAN

JULY 2015

South Holland
Drainage Board

This Biodiversity Action Plan (second Edition) has been prepared by the South Holland Internal Drainage Board in accordance with the commitment in the Implementation Plan of the DEFRA Internal Drainage Board Review for IDBs to produce their own Biodiversity Action Plans by April, 2010. The original version was published in February 2010. This updated version aims to bring the South Holland Biodiversity Action Plan into line with the Lincolnshire biodiversity action plan and also reflects changes in organisations and policies which have occurred since 2010.

It also demonstrates the Board's commitment to fulfilling its duty as a public body under the Natural Environment and Rural Communities Act 2006 to conserve biodiversity.

Many of the Board's activities have benefits for biodiversity, not least its water level management and ditch maintenance work. It is hoped that this Biodiversity Action Plan will help the Board to maximise the biodiversity benefits from its activities and demonstrate its contribution to the Government's UK Biodiversity Action Plan targets, whilst actively managing water and reducing flood risk.

The Board has adopted the Biodiversity Action Plan as one of its policies and subject to available resources is committed to its implementation. It will continue to review the plan periodically and update it as appropriate.

Duncan Worth

Chairman of the Board

This Biodiversity Action Plan is a public statement by the Board of its biodiversity objectives and the methods by which it intends to achieve them.

We would welcome appropriate involvement in the delivery of the Plan from interested organisations, companies, and individuals.

You can contact us about this Biodiversity Action Plan by writing to the following address:

South Holland Internal Drainage Board
Water Management Alliance
Kettlewell House
Austin Fields Industrial Estate
King's Lynn
Norfolk
PE30 1PH

or by email: info@wlma.org.uk

Further information is available on the Board's website: www.wlma.org.uk

Contents

TABLES

FIGURES

1 IDB BIODIVERSITY – AN INTRODUCTION

1.1 Introduction

The IDB has conducted a biodiversity audit of its district and identified those habitats and species that would benefit from particular management or actions by the IDB. Using this information, which is presented in later sections, the IDB's Biodiversity Action Plan has been developed. The Plan identifies objectives for the conservation and enhancement of biodiversity within the drainage district, and goes on to describe targets and actions that will hopefully deliver these objectives. The intention is to integrate, as appropriate, biodiversity into the Board's activities, such as annual maintenance programmes and capital works projects, subject to available resources.

The action plan will help to safeguard 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. Species and habitats which are not listed in the UK BAP but may be locally significant for a variety of reasons have also been considered.

The Plan is an evolving document that will be reviewed and updated on a regular basis. This document is the first revision of the original which was published in 2010. It covers the entire drainage district of the IDB, as shown in Figure 1.

1.2 What is Biodiversity?

The Convention on Biodiversity agreed at the Earth Summit in Rio de Janeiro in 1992 defined biodiversity as:

"The variability among living organisms from all sources, including terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part; this includes diversity within species, between species and of ecosystems."

Biodiversity can be defined simply as "the variety of life" and encompasses the whole spectrum of living organisms, including plants, birds, mammals, and insects. It includes both common and rare species, as well as the genetic diversity within species. Biodiversity also refers to the habitats and ecosystems that support these species.

1.3 The Importance of Conserving Biodiversity

Biodiversity is a vital resource and it is essential to acknowledge its importance to our lives along with the range of benefits that it produces:

- Supply of ecosystem services – water, nutrients, climate change mitigation, pollination
- Life resources – food, medicine, energy and raw materials
- Improved health and well-being
- Landscape and cultural distinctiveness
- Direct economic benefits from biodiversity resources and 'added value' through local economic activity and tourism

- Educational, recreational and amenity resources

1.4 Biodiversity – The International Context

The international commitment to halt the worldwide loss of habitats and species and their genetic resources was agreed in 1992 at the United Nations Conference on the Environment and Development, commonly known as the Rio Earth Summit. Over 150 countries, including the United Kingdom, signed the Convention on Biological Diversity, pledging to contribute to the conservation of biodiversity at the global level. These states made a commitment to draw up national strategies to address the losses to global biodiversity and to resolve how economic development could go hand in hand with the maintenance of biodiversity.

The Rio Convention includes a global commitment to achieve by 2010 a significant reduction of the current rate of biodiversity loss at the global, regional and national level (www.biodiv.org/convention/default.html). The 2002 World Summit in Johannesburg on Sustainable Development subsequently endorsed this target.

1.5 Biodiversity – The National Context

The UK Biodiversity Action Plan (UK BAP) is the UK commitment to Article 6A of the Rio Convention on Biological Diversity. It describes the UK's priority species and habitats, and seeks to benefit 65 priority habitats and 1149 species in total. It identifies other key areas for action such as the building of partnerships for conserving biodiversity and gathering vital biodiversity data.

In England, Biodiversity 2020: A strategy for England's wildlife and ecosystem services (published in 2011) sets out the Government's strategy for conserving and enhancing biological diversity, and establishes programmes of action for integrating biodiversity into policy and planning for key sectors, together with appropriate targets and indicators. The Strategy has a Water and Wetlands Working Group and an associated programme of action that includes:

- Integrating biodiversity into whole-catchment management.
- Achieving net gain in water and wetland BAP priority habitats through Water Level Management Plans, Catchment Flood Management Plans, and sustainable flood management approaches.

1.6 The Biodiversity Action Planning Framework and local context

This IDB Biodiversity Action Plan is part of a much larger biodiversity framework that encompasses international, national and local levels of biodiversity action planning and conservation. For the UK Biodiversity Action Plan to be implemented successfully it requires some means of ensuring that the national strategy is translated into effective action at the local level. The UK targets for the management, enhancement, restoration, and creation of habitats and species populations have therefore been translated into targets in Local Biodiversity Action Plans (LBAPs), which tend to operate at the county level. A principle aim of the IDB Biodiversity Action Plan is that it reflects the biodiversity target of Lincolnshire as a whole and complements the Lincolnshire Biodiversity Action Plan.

1.7 Internal Drainage Boards and Biodiversity

The Natural Environment and Rural Communities Act 2006 places a duty on IDBs to conserve biodiversity. As a public body, every IDB must have regard in exercising its functions, so far as is consistent with the proper exercise of those functions, to the purpose of conserving biodiversity.

The Act states that conserving biodiversity includes restoring or enhancing a population or habitat. In so doing, an IDB should have regard to the list published by the Secretary of State, of living organisms and types of habitat that are of principal importance for the purpose of conserving biodiversity. In effect, this list comprises the Biodiversity Action Plan priority species and habitats for England.

In 2007, the Government's IDB Review Implementation Plan established a commitment that IDBs should produce their own Biodiversity Action Plans.

This IDB Biodiversity Action Plan has been produced to help fulfil these requirements and seeks to set out targets and actions that complement the UK Biodiversity Action Plan and Local Biodiversity Action Plans.

1.8 The Aims of the IDB Biodiversity Action Plan

The aims of this IDB BAP are:

- To positively demonstrate that the Board's watercourse maintenance, water level management and capital works are undertaken in a manner that, whilst reducing flood risk and managing flows, also safeguards biodiversity and, wherever possible, makes a positive contribution to the enhancement of the biodiversity and the natural environment.

- To ensure that habitat and species targets from the UK Biodiversity Action Plan and the local LBAP are translated into effective action within the drainage district.

- To identify targets for other habitats and species of local importance within the drainage district.

- To develop effective local partnerships to ensure that programmes for biodiversity conservation are maintained in the long term.

- To raise awareness within the IDB and locally of the need for biodiversity conservation, and to provide guidance to landowners, occupiers and their representatives on biodiversity and inland water management.

- To ensure that opportunities for conservation and enhancement of biodiversity are fully considered throughout the IDB's operations, and

- To monitor and report on progress in biodiversity conservation.

Figure 1 – Map illustrating the Board's Area

2 THE IDB BAP PROCESS

2.1 The Biodiversity Audit

To produce the original IDB Biodiversity Action Plan, information on the habitats and species present in the catchment was first obtained. This "Biodiversity Audit" involved the collation of existing data held by the IDB and by other biodiversity partners.

2.2 Evaluating and Prioritising Habitats and Species

The Biodiversity Audit identified those priority habitats and species in the UK Biodiversity Action Plan and the Local Biodiversity Action Plan that can be found in the drainage district. Additional non-BAP habitats and species deemed to be important within the drainage district were also identified.

Further habitats and species, together with revised targets and actions, may be made in the future, as knowledge is improved and delivery of the IDB BAP is reviewed.

A range of criteria was then used to select those species and habitats that are of particular importance to the IDB – that is to say, those habitats and species that could benefit from IDB actions. The criteria used included their national and local status, the opportunities for effective IDB action and the resources available.

The latest revision of the Board's Biodiversity Action Plan aims to deliver benefits to a range of species via appropriate protection, management and enhancement of important habitats present within the Board's area.

2.3 Setting Objectives, Targets and Indicators

For each habitat identified as being important to the IDB, conservation objectives and targets have been drawn up and set out in the Plan; this includes the identification of certain species which may benefit from the plan. The objectives express the IDB's broad aims for benefiting a particular habitat or species. The related targets have been set to focus IDB programmes of action and to identify outcomes that can be monitored to measure achievement. For each target an indicator has been set – a measurable feature of the target that, when monitored over time, allows delivery to be assessed.

In order for this BAP to be as effective as possible the targets and actions have been devised to be SMART (Specific, Measurable, Achievable, Relevant and Time-limited). The targets are ambitious, but are also considered to be proportionate and practicable given the resources available.

Procedural targets and actions have also been considered. These are targets that the Board will use to measure the way in which it considers, and incorporates biodiversity across the whole range of its operations. These may involve changes to administrative, management and operating procedures.

2.4 Implementation

Once targets have been set for habitats and species, it is important that the actions to deliver the Biodiversity Action Plan are described. The Plan sets out how the Board intends to implement the actions in the plan, often in partnership with other organisations or individuals.

2.5 Monitoring

Achievement of the Plan targets will be measured by a programme of monitoring which the Board will undertake, in some instances with assistance from its partners, and the methods to be used are described in the Plan.

2.6 Reporting and Reviewing Progress

It is important to review the implementation of the BAP, assess changes in the status of habitats and species and the overall feasibility of objectives and targets. In addition, it is vital that the successful achievement of targets is recorded and the gains for biodiversity are registered in the public domain.

The Plan sets out the methods the IDB will be using to review the delivery of targets and to communicate progress to partner organisations and the public.

3 CURRENT ECOLOGICAL / GEOLOGICAL STATUS

3.1 The Drainage District

The South Holland Drainage District covers an area of 384.61 km^2 and contains 709km of IDB-maintained watercourses; 406 km of these are designated high priority water course by the Board. Water levels are constantly regulated by 17 pumping stations and 6 tidal sluices. The drainage district location runs along the landward toe of the sea defence of the Wash and the district is bounded to the east and west by the Rivers Nene and River Welland, respectively. South Holland IDB infrastructure takes surface water from the market towns of Long Sutton and Holbeach and the many and various outlying villages and homesteads, draining a catchment of an estimated 60,000 individuals. Much of the arable land to the north of the catchment has been reclaimed from the sea and the drainage district as a whole includes some of the most fertile arable land in the country.

3.2 Geology

The Wash and the Fenland area, occupy a shallow clay vale, which through coming to lie close to sea level over the last 5,000 years, has become progressively filled with alluvium to a depth of around 20-30 metres: marine alluvium to the north and east and over-riding freshwater alluvium and locally peat to the south and west. The alluvial plain was built up by several rivers with varying courses, but these deposits were later overwhelmed by the greater quantities of sediments brought from the sea, which now exhibits a significant tidal range. In the last two millennia the highest ground became increasingly settled. Drainage and reclamation works have extended out from the settlements, creating areas with a greatly reduced risk of flooding. The inland fenland is now almost completely reclaimed and a series of artificial banks has established a boundary between land and sea. Where they can be drained, these alluvial deposits have been cultivated to produce fertile silt soils.

3.3 Landscape

3.3.1 Landscape Character

Natural England has divided the whole of England into a number of National Character Areas (NCA) based on characteristic landforms, wildlife and land use. They are not designations and are not confined by traditional administrative boundaries. For each NCA, Natural England has prepared a profile that characterises the wildlife and natural features, identifies the influences that act upon those features and sets objectives for nature conservation. South Holland IDB falls within an area defined as The Fens.

The key characteristics of the Fens are:

- Large-scale, flat, open landscape with extensive vistas to level horizons and huge skies.
- A hierarchy of rivers, drains and ditches provide a strong influence throughout the area. Embanked rivers and roddons create local enclosure and elevation. Banks provide good grazing and grassland habitats.
- Modestly elevated 'islands' within fens provide isolated higher ground for most settlement. A higher proportion of grassland, tree cover and hedgerows are associated with these areas.
- Settled Fens or 'Townlands', exhibit an ancient medieval and irregular field pattern. Typically smaller-scale with scattered farmsteads and dispersed ribbon settlements along the main arterial routes.
- Peaty Fens drained in 17th century comprise large rectilinear fields of black soil. A geometric road and drainage pattern with major high-level drains, washes and associated pumping stations. Roads and rail links are often on elevated banks.
- Area south of Lincolnshire Wolds is most recently drained, with Wolds providing marked 'Upland' horizon to the north.
- Woodland cover sparse. Occasional avenues to roads, elsewhere isolated field trees have marked significance. Shelter belts including poplar, willow and leylandii hedges found around farmsteads. Numerous orchards in Wisbech area.
- Fragments of relic wet fen areas at Wicken, Woodwalton and Holme.

- Built forms exhibit strong influence ranging from historic cathedrals and churches, like Ely and Boston to large agricultural and industrial structures. Domestic architecture displays a combination of elegant Georgian brick houses and bland 20th century bungalows.

- Marshes directly adjacent to the Wash exhibit an exceptionally open aspect, broken only by a series of sea walls. Associated river outfall structures, tidal saltmarshes and mudflats.

- Rich and varied intensive agricultural land use including wide range of arable crops, root crops, bulbs, vegetables and livestock. Field labourers prevalent at harvesting. Horticultural glasshouses and general agricultural clutter are a significant feature.

- Bronze Age, Iron Age and Roman landscapes emerging from below the falling peat. Very rich archaeology especially on fen margins.

3.3.2 Tree Preservation Orders

The Board hold some information on tree preservation orders. The Board will continue to carry out searches prior to work, as required, to prevent any new Tree Preservation Orders being missed.

3.4 Statutory Nature Conservation Sites

3.4.1 Nationally and Internationally Designated Nature Conservation Sites

There are no national or international sites within the Board's area, however the following nationally and internationally-designated conservation sites are found adjoining the area.

All maps of the nationally and internationally designated nature conservation sites are shown in Appendix I.

Table 1 – Nationally and Internationally Designated Nature Conservation Sites

Site name	National Designation	International Designation	UK BAP Priority Habitat Description
The Wash	SSSI, NNR	The Wash & Norfolk Coast SAC The Wash RAMSAR The Wash SPA	Littoral sediment

3.4.2 Local Nature Reserves

The following Local Nature Reserves, which are designated by local authorities under Section 21 of the National Parks and Access to the Countryside Act 1949, are found within the district:

Table 2 – Local Designations

Site name	Designation	Features Relevant to IDB
The Shrubberies Nature Reserve	Local Nature Reserve, Lincolnshire Wildlife Trust Reserve, Site Of Nature Conservation Interest	Mature Lime, Oak and Walnut trees, various bird and butterfly species

3.5 Non-statutory Local Sites

A number of sites have been identified locally as being important for wildlife. Only the sites within 500 metres of an IDB drain have been listed; for non-statutory sites anything beyond this is very unlikely to be impacted by the drainage board's activities.

Whilst these designations do not have statutory status, the sites themselves are important for their contribution to biodiversity and planning policy requires that they are given consideration. The following local sites are to be found within or bordering the waterbodies managed by South Holland IDB:

Table 3 – Local Wildlife Sites (LWS) present within the Board's area

Site name
South Bank Fosdyke
Boatmere Creek
Guy Wells Pit
Gedney Dyke Pits
Arnold's Meadow
Moulton Marsh
South Holland Main Drain Banks
River Welland Corridor
Coronation Channel
River Welland in Spalding

Site name
South Holland Main Drain, West
New River
Little South Holland Drain
Moulton Park and River
Wheatmere Drain
Lambert Drain
Slys Connection
Lambert Drain to Highstock Drain Connection
Moulton River

4 HABITATS – OBJECTIVES AND TARGETS

4.1 Introduction and rationale

The broad aim of the latest revision of the South Holland IDB Biodiversity Action Plan is to shift the emphasis towards a more habitat focused plan. The rationale is that by managing and enhancing habitats, there is an increased potential to provide broad spectrum benefits to a wide range of species. The species which could potentially benefit from these Habitats Action Plans are included within the sections covering each Habitat Action Plan.

4.2 Habitat Audit Summary

This habitat audit summary lists the broad habitat types and UK BAP priority habitats that occur within the IDB district as identified by the information gathering exercise. Also listed are habitats deemed to be of local importance and/or featured in the county Local Biodiversity Action Plan that occur in the IDB district. Habitats that are of potential importance for the IDB, where water level management or other IDB activities may be of benefit, are identified.

Table 4 – Habitat Audit Summary

Broad Habitat Types	UK BAP Priority Habitat	Local Biodiversity Action Plan Habitat	Habitat of Importance for IDB
Farmland	Lowland Calcareous Grassland		Yes
	Arable Field Margins	Arable Field Margins	Yes

Broad Habitat Types	UK BAP Priority Habitat	Local Biodiversity Action Plan Habitat	Habitat of Importance for IDB
	Hedgerow and Hedgerow Trees	Hedgerow and Hedgerow Trees	-
	Coastal and Floodplain Grazing Marsh	Coastal and Floodplain Grazing Marsh	-
Rivers and Wetlands	Rivers Canals and Drains	Rivers Canals and Drains	Yes
	Fenland	Fens	Yes
	Reedbed	Reedbed and Bittern	Yes
	Ponds, Lakes and Reservoirs	Ponds, Lakes and Reservoirs	Yes (Ponds)
Coastal	Saline ditches	Saline ditches	Yes
	Mudflats		-
Trees and Woodland	Wet Woodland	Wet Woodland	Yes

4.3 Habitats of Importance for the IDB

The following section provides more information on the status and location of the habitats within the drainage district that are of importance for the IDB and may benefit from water level management or other IDB activities. The information is taken, for most part, from the Lincolnshire Biodiversity Action Plan and has the IDB objectives and actions identified for each habitat.

- Lowland Calcareous Grassland
- Arable Field Margins
- Rivers, Canals and Drains
- Fens
- Reedbed and Bittern
- Ponds
- Saline ditches
- Wet Woodland

The IDB have considered the actions proposed in the Lincolnshire BAP and have used this as guidance in the synthesis of IDB actions. A summary of the Lincolnshire BAP for the key habitats follows with IDB actions formalised and presented as a table.

4.3.1 Lowland Calcareous Grassland

In the UK, calcareous grasslands are developed on shallow, lime rich soils derived from limestone and chalk strata. This habitat supports a range of lime loving plant communities and is important for various invertebrate and bird species. Calcareous grassland is often part of a mosaic of habitats, of which scrub plays an important part, providing cover for various species.

Current Status:

It is estimated that 142 ha of calcareous grassland still exists in Lincolnshire, much of which has been given SSSI status. The majority of calcareous grassland sites however are relatively small and scattered. They have no protection, are small and fragmented and in severe risk of grazing abandonment. Twenty eight nationally scarce plant species are listed as occurring on Lincolnshire calcareous grassland. In recent years however, loss of habitat has continued due to ploughing, re-seeding, improvement by fertilizer, tree planting and loss of grazing rights, leading to the invasion of coarse grasses and scrub. There are however many semi-natural calcareous areas that with the appropriate management could be restored.

Species which will benefit from the Lowland Calcareous Grassland Habitat Action Plan:

- Farmland birds

Threats in Lincolnshire:

- Undergrazing or overgrazing ultimately affects species richness. The type and timing of the grazing is also important. Overgrazing by rabbits can also cause a problem.
- Decline in traditional livestock farming leading toward arable conversion.
- Spray drift and fertilizer run-off. Small sites are particularly vulnerable to this.
- Unmanaged access leading to disturbance and trampling.
- Damage to road verges – by vehicles, road repair, building and unsympathetic tree planting. Management issues are also a problem where there is a lack of management or cuttings are not removed from the site.

Lincolnshire BAP Objectives:

- To prevent further reduction in extent and quality of existing calcareous grassland sites.

- To re-create extensive areas of well managed, flower rich calcareous grassland in appropriate areas, linking and buffering existing fragmented sites.
- To re-develop a network of well-managed flower rich calcareous grassland alongside public highways on the chalk of the Lincolnshire Wolds and the limestone in the west of the county.

South Holland IDB Objectives

- To maintain the calcareous grassland sites on South Holland main drain in favourable condition.

Table 5 – South Holland IDB actions/targets for calcareous grassland

Details of action	Action date	Corresponding Lincolnshire BAP target
Map the areas of calcareous grassland on South Holland main drain.	2020	LIN3_LCG_TO1 Update the 2010 baseline by 2015 to include details of conditions (as well as extant) of calcareous grassland in Lincolnshire
Ensure appropriate habitat management for calcareous grassland species on the South Holland main drain through the development of a 10 year management plan.	2020	LIN3_LCG_TO2 No nett loss of calcareous grassland in Lincolnshire between 2010 and 2015

4.3.2 Arable Field Margins

Arable field margins are effectively wildlife corridors which provide connectivity between fragmented or isolated habitats. The arable strip is a planned strip of uncropped land lying between the crop and the field boundary which is managed to create conditions that benefit key farmland species, or minimise pesticide leakage or sediment runoff. There is an estimated 400,000km of cereal field margin in the UK and if all boundaries included a 6m managed margin, this would increase the conservation value for wildlife on farmland by 200,000 ha.

In the fens, fields abutting drains should be of utmost importance to the farmer as these drains are one of the few features on which contribute to agri-environment schemes.

Current Status

Rules under Cross compliance, introduction of Local Environmental Risk Assessment for Pesticides to control pesticides, and funding from agri- environmental schemes is resulting in the promotion of field margins. There is still potential for new field margins and the management of existing field margins however.

Species which will benefit from the Arable Field Margins Habitat Action Plan

- Farmland birds

Threats

- Spay drift of pesticides into the field-edge environment, which reduces plant and invertebrate biomass and diversity.
- Overspreading of fertilizers into the field edge causing vigorous plants to gain the competitive edge.
- Lack of cultivation. A mix of cultivated and non-cultivated margins are needed to provide maximum benefit for biodiversity.
- Erosion from crop land may carry silt containing high levels of phosphate and some pesticides.

Lincolnshire BAP Objectives

- To ensure survival of the full number and range of arable plant species currently present in Lincolnshire
- To increase the proportion of cultivated, low input margins and those sown for birds and invertebrates through agri-environment schemes
- To maximise the value of permanent grass strips by locating them where they buffer and link habitats of particular value for wildlife, provide effective green infra structure and provide feeding habitats for vertebrates such as barn owls.

South Holland IDB Objectives

- To maintain, enhance and expand the area of arable field margins within the Boards' Area.

Table 6 – South Holland IDB actions/targets for arable field margins

Details of action	Action date	Corresponding Lincolnshire BAP target
Map the existing area of arable field margins along drains maintained by the Board and on Board-owned land.	2020	LIN3_AFM_TO1 7000ha of arable field margins of a range of types management for biodiversity in agri-environmental schemes
Explore the potential for expanding arable field margins along Board maintained drains and on Board-owned land, and set SMART Actions as appropriate.	2020	As above
In collaboration with Natural England, work with tenants to encourage the expansion of arable margins within agri-enviromental schemes.	2020	As above
Monitor the benefits to farmland birds by establishing links with the RSPB's Farm Monitoring Scheme.	2020	-

4.3.3 Rivers, Canals and Drains

Current Status:

The drainage system of Lincolnshire is an historical epitaph to the engineers who created it; from Roman to Post-War eras. Much of the county now presides over a uniform, canalised and largely maintenance dependent waterway. The many hundreds of miles of watercourse however, supports a vast proportion of South Holland wildlife; otter and water vole can be regularly found and Barn owl are prolific hunters along the complex matrix of linear freshwater features. A diverse plant community including several orchid species proliferate on some of the more calcareous banksides.

Species which will benefit from the Rivers, Canals and Drains Habitats Management Plan

- Water vole
- Otter
- Barn owl
- Kestrel

- Sand martin
- Kingfisher
- Fish species - particularly bream, roach, and pike

Threats in Lincolnshire:

- Land Drainage and Management of watercourses may impact on watercourses particularly where there is an increase in arable production right to the edge of a watercourse. This potentially results in the loss of instream, marginal and bankside vegetation and habitats, increased siltation, increased agrochemical input into the watercourse and increased algal blooms.
- Water Abstraction particularly for spray irrigation may lead to low flow conditions potentially leading toward low oxygen and water quality issues.
- Chemical enrichment and pollution has a potentially huge and damaging influence on water quality. Fertilizer enrichment may cause the deoxygenation of watercourses and subsequent fish kills. Long term problems with heavy metals and pesticides may also be an issue.
- Flood defence structures may prevent the migratory movements of fish and invertebrates.
- Climate change is expected to impact on East Anglia, with drier summers and wetter winters.

Lincolnshire BAP Objectives:

- To improve water quality, water resources and habitat diversity of key rivers, canals and drains and to maintain their current extent
- To enhance the characteristic flora and fauna of Lincolnshire's key rivers, canals and drainage ditches**.**

South Holland IDB Objectives:

- To improve habitat diversity on watercourses maintained by the Board.
- To enhance the flora and fauna of the watercourses maintained by the Board.
- To maintain populations of riparian mammals (particularly water voles and otters) within the watercourses managed by the Board.
- To maintain populations of riparian birds (particularly kestrel, barn owl, sand martin and kingfisher) associated with watercourses managed by the Board.
- To maintain water at a level that will support healthy fish stocks and a productive fishery. Maintaining appropriate water level management will also make an overall positive contribution to biodiversity

Table 7 – South Holland IDB actions/targets for rivers, canals and drains

Details of action	Action date	Corresponding Lincolnshire BAP target
Establish a Standard Maintenance Operations Policy which ensures best practice with regard to water voles.	2020	LIN3_WAV_TO1 Maintain or increase the current distribution of the water vole in Lincolnshire
Explore the potential for implementing habitat improvements on suitable watercourses and set SMART Actions as appropriate.	2020	As above
Undertake a study to establish the extent and distribution of water vole populations within the boards area	2020	As above
Develop a Standard proforma for biodiversity and protected species surveys by 2020 (particularly with reference to water voles and otters).	2020	As above
Ensure appropriate protection of drains/ ditches within new development (via the planning process) and encourage appropriate management to enhance wildlife value.	2020	LIN3_RIV_TO3 No net reduction in area of IDB managed drains (e.e. due to culverting) between 2011 and 2015
Identify five potential sites for enhancing the watercourses/riparian habitat for use by nesting riparian birds such as kingfisher and sand martin.	2020	-
Continue programme installing and monitoring nest boxes for bird of prey associated with banksides of drains/water courses (barn owls and kestrels).	Ongoing	-
Encourage and support land owners to install further nest boxes for barn owls and kestrels	Ongoing	-

Details of action	Action date	Corresponding Lincolnshire BAP target
Undertake survey work and/or enhancement works for fish species (undertake discussions and liaison with the EA in relation to fish species listed as BAP priority species)	2020	LIN09_FWF_TO3 Increase habitat quantity for BAP priority fish species

4.3.4 Fens

The term 'fen' can cover a variety of wetland habitats, but Lincolnshire's fenland is primarily 'rich-fens' fed by mineral rich calcareous water of pH5 or more. It consists mainly of aquatic plants, mosses, sedges, rushes, reeds and wet-grasses. As part of a larger wetland habitat, fens are of great conservation value, supporting rare plants and animals, many of which are specially adapted to, and reliant upon, this habitat for their survival. These include the greater water-parsnip and the fenland diving beetle.

Fens are becoming increasingly more important for economic reasons. They may form deep peatlands of partly decayed plant material which act as an important carbon dioxide sink, as they capture and store organic material derived from atmospheric gases. They can be used for livestock, as well as for recreational purposes, and they also provide flood protection.

Current Status:

There has been a dramatic decline in fen habitat throughout Europe in the last century, and the UK now has a large proportion of the surviving habitat. Even though Lincolnshire once had extensive fen habitat, it is now rare in Lincolnshire with only 100-150ha remaining. Many of these areas are small and isolated. Baston Fen is one of the few and largest remaining examples of this habitat which has been designated as a SSSI.

There are a number of areas along the Fen-edge that may provide opportunities to create additional areas of wet-fenland, where rapid surface water run-off and spring lines from the high ground along the Wold- and limestone edge, meet the low, flat, slow-draining historic fenland.

Species which will benefit from the Fens Habitats Management Plan:

- Bittern
- Reed bunting

Threats:

- Lack of appropriate management has led to fenland habitats drying out, allowing scrub encroachment and natural succession to woodland.
- Water abstraction for public water supply and irrigation of crops which has lowered the water table and disrupted river flow and springs.
- Pollution of fresh water supplies through siltation, toxic chemicals and eutrophication.
- Sea level rise and climate change is predicted to result in the loss of further fenland habitat.
- Land drainage and conversion to agriculture significantly contributed to historical losses of fenland habitat. Although not currently a threat, future fenland restoration could be threatened by food security issues.

Lincolnshire BAP Objectives:

- To achieve large-scale fen habitat restoration especially through the South Lincolnshire Fenlands initiative and wider partnerships.
- To create a county wide network of well-managed fenland.

South Holland IDB objectives:

- To establish the extent of fenland habitat within the Board's area.
- To maintain existing areas of fenland habitat within the Board's area.
- To look for opportunities for fenland habitat restoration.

Table 8 – South Holland IDB actions/targets for Fens

Details of actions	Action date	Corresponding Lincolnshire BAP target
Map existing fen habitat within the Board's area	Ongoing	LIN3_FEN_TO1 Establish a baseline by 2012 for the existing extent and condition of all fens in Lincolnshire of 0.4ha or more
Develop appropriate management plans to maintain water levels in fenland areas and to remove encroaching scrub.	Ongoing	-
Identify potential sites for habitat	2020	LIN3_FEN-TO4

recreation and expansion in the South Lincolnshire Fenland target area.		Expand the area of fenland in Lincolnshire – 1000ha total by 2020

4.3.5 Reedbed (and Bittern)

Reedbeds are wetland habitats dominated by stands of common reed *Phragmites australis* where the water table is at or above ground level for most of the year. They also incorporate areas of open water and ditches. Reedbeds are of great conservation value, supporting birds such as the bittern and the marsh harrier. This habitat has declined drastically in the last century in Europe. In the UK it is estimated that there are 12000 ha over 1000 sites with the majority of sites being less than 20ha.

Current Status:

Reedbed and fen was once extensive in Lincolnshire but is now rare, as much of the area has been drained since 17th century for agriculture. Reedbed can be found fringing former clay pits and are found in association with wet woodland, ponds, lakes, rivers, drains, fen, marsh and saline lagoons. These tend to be small, but linear reed stands along drains and rivers can be quite extensive.

Species which will benefit from the Reedbed and Bittern Habitats Management Plan:

- Bittern
- Reed bunting

Threats:

- Lack of appropriate management, resulting in natural succession to woodland.
- Sea Level rise due to climatic change is predicted to result in loss of further reed bed habitat in coastal areas.
- Pollution of freshwater supplies to reedbed through siltation, toxic chemicals and eutrophication.
- Land drainage and conversion to agriculture

Lincolnshire BAP Objectives:

- To create a countywide network of well managed reed beds to and associated habitats capable of supporting key species

- To establish areas in Lincolnshire, particularly inland, that provide a safeguard against sea-level rise

South Holland IDB Objectives:

- To maintain the current extent of Reedbed within the Board's Area.

Table 9 – South Holland IDB actions/targets for reed beds (and bittern)

Details of actions	Action date	Corresponding Lincolnshire BAP target
Map existing reed cover on the drains covered by the reed management Policy by 2015.	Ongoing	LIN3_RDB_TO1 Update the 2010 baseline for reed beds by 2012 with details of condition, including extent of inland areas suitable for restoration or creation of breeding habitats for bittern
Review current reed management policy.	Ongoing	-
Identify opportunities to link in and collaborate with the Wet Fens partnership.	Ongoing	-

4.3.6 Ponds

Ponds are defined as small water bodies between 1m^2 and 2 hectares in area, which hold water for more than four months in the year. Ponds have suffered a huge decline (a loss of more than 75%) over the last century. This is thought to be due to a decline in water quality as a result of agricultural intensification, pollution or poor management. Ponds are of great importance for wildlife with around 3500 of the UK's invertebrate species living in freshwater and up to half of these in ponds. Two thirds of red data book species occur in ponds, as do 300 vascular plants including half of the UK's wetland plants. They are often fringed by other wetland habitats such as reed bed, fen, grassland and wet woodland.

Current Status:

Many of the pits and ponds in Lincolnshire have come about as the result of clay extraction for brick and tile making, and for the manufacture of cement in the 19th and 20th centuries. School, garden and community ponds have assumed importance in sustaining populations of amphibians and other aquatic organisms.

Species which will benefit from The Ponds Habitat Management Plan:

- Newts
- Common toad
- Grass snake

Threats:

- Neglect /Lack of management –natural succession occurring.
- Non-native species may result in the loss of native flora.
- Over zealous pond clearance – valuable habitat round the edge of ponds such as reedbed may be cleared during the reestablishment of open water.
- Damage and disturbance caused by recreational usage.
- Pollution from road run off or pesticides in an agricultural setting.
- Eutrophication caused by agricultural fertilizer runoff may cause blanketing by duckweed or algae.
- Direct loss of ponds by infilling.
- Dumping and infilling of ponds with waste.
- Climate change causing ponds to dry out.

Lincolnshire BAP Objectives:

- To determine the extent and condition of waterbodies in the county and to ensure that waterbodies known to be in favourable condition are maintained in that state.
- To enhance existing ponds, lakes and reservoirs through appropriate management and to create new wildlife ponds.

South Holland IDB Objectives:

- To identify the current resource and where possible create new ponds within the Board's area.

Table 10 – South Holland IDB actions/targets for ponds

Details of actions	Action date	Corresponding Lincolnshire BAP target
Map the current extent of ponds associated with land owned/managed by the Board.	Ongoing	LIN3__PND_TO1 Update the 2010 baseline for waterbodies in Lincolnshire
Explore the potential for pond creation within the Board's area and set SMART Actions as appropriate. Develop partnerships with appropriate bodies in order to establish new ponds where feasible.	Ongoing	LIN3_PND_TO3 Create 200 new wildlife ponds and scrapes/flushes where appropriate in Lincolnshire
Train key staff to advise on pond restoration and creation.	Ongoing	-
Identify opportunities to record amphibian species present in the watercourses and ponds managed by the Board.	Ongoing	-

4.3.7 Saline ditches

Current Status:

Many agricultural ditches adjacent to sea defences contain brackish water. Some are poor in Nature Conservation value due to nutrient enrichment, but some are thought to contain plants and invertebrates characteristic of slightly and moderately saline conditions. Many of these have not been surveyed in many years however.

Species which will benefit from Saline ditch Habitat Management Plan:

- Lagoon sand shrimp *Gammarus insensibilis*

Threats:

- Inappropriate management for saline plant specialists.
- Natural succession into other habitats.
- Pollution via nutrient runoff from fields can have detrimental effects on saline ditches.

- Artificial control of brackish and freshwater can have profound influence on habitats.
- Sea Level Rise. It is estimated that 120 ha of coastal lagoon/ditches may be lost in the next 20 years.

Lincolnshire BAP Objectives:

- To maintain the current area and number of saline lagoons/ditches in the county.
- To improve/restore conditions of existing lagoons where necessary
- To create new saline lagoons/ditches where opportunities arise through coastal works

South Holland IDB Objectives:

- To establish the extent and importance of saline ditches within the drainage network in the Board's area via monitoring saline levels and supporting current monitoring efforts
- To support and assist **if possible** with monitoring the status of Saline lagoons within the Board's area (particularly at Moulton Marsh Nature Reserve)

Table 11 – South Holland IDB actions/targets for saline lagoons

Details of action	Action date	Corresponding Lincolnshire BAP target
Survey the Board's drains around the Wash to establish current state by 2015.	Ongoing	LIN3_SAL_TO1 Maintain the current number and extent of saline lagoon and saline/brackish ditch habitats

4.3.8 Wet Woodland

Wet woodland occurs on poorly drained and seasonally wet soils, for example on floodplains alongside rivers and streams, on fens, mires, bogs and in wet areas of other woodland types. Typically, wet woodlands have historically been managed by coppicing, but many have now become neglected. Many areas have also been lost as a result of drainage work on watercourses and surrounding farmland.

Dominant tree species are usually alder, willow and birch which are associated with large numbers of invertebrates. Dead wood in association with water also provides specialised habitats which are not found in dry woodland types. Bryophytes can thrive in the humid conditions and the wet woodland can also provide cover and breeding sites for otters.

Current Status:

In Lincolnshire, wet woodlands fall into several categories:

- Springline alder woods found in the Wolds
- Wet woods on the fen edge sands and gravels
- Recently formed wet woodland as a result of high water tables, especially around old gravel workings or on former wet heathland
- Wet woodland around blow wells
- Carr woodland bordering rivers

It can be difficult to find areas suitable for wet woodland restoration or creation. However some opportunities can arise as part of larger forestry schemes and through Environmental Stewardship.

Species which will benefit from Wet Woodland Habitat Management Plan:

- Farmland birds
- Bats

Threats:

- Clearance/ felling and conversion to other land uses. The greatest threat is to small woods which could be progressively removed without the need for a felling licence.
- Perceived low conservation value compared to other wetland habitats may lead to management intervention which prevents wetlands from developing into woodlands through natural succession.
- Inappropriate management or lack of management can lead to a loss of ground flora, a shrub layer and prevent regeneration to trees.
- Lack of opportunity for natural expansion of wet woodland as there are few suitable sites for wet woodland creation. Sites are often important as wetland conservation sites, or are used for agriculture or other development.
- Drainage or water abstraction causes a reduced water table level and a change to drier woodlands.
- Invasion or planting of non-native species
- Rubbish dumping
- Water pollution such as nutrient enrichment, changing ground flora composition.

Lincolnshire BAP Objectives:

- To determine the extent and condition of wet woodlands in Lincolnshire.
- To change the perception of wet woodland as not being a high priority for conservation.
- To improve management of all wet woodland in Lincolnshire.

South Holland IDB Objectives:

- To establish the extent and importance of wet woodland within the drainage network in the Board's area.
- To monitor the status of existing wet woodlands within the Boards' area.
- To manage wet woodland appropriately to encourage regeneration of trees.

Table 12 – South Holland IDB actions/targets for wet woodlands

Details of actions	Action date	Corresponding Lincolnshire BAP target
Survey the Board's area to identify existing areas of wet woodland.	2020	LIN3_WWO_TO1 Update the 2010 baseline by 2015 to include details of condition (as well as extent) of wet woodland in Lincolnshire
Review current management practices to be sympathetic to wet woodland, allow natural expansion of wet woodlands where possible.	2020	LIN3_WWO_T02 No net loss of wet woodland between 2010 and 2020 (based on 2010 figures)

5 SPECIES – OBJECTIVES AND TARGETS

5.1 Introduction and rationale

A species audit was undertaken in 2010, ahead of the preparation of the original South Holland IDB Biodiversity Action Plan.

The drainage board supports many species of local and national conservation value. As discussed above, appropriate habitat management plans can fulfil the requirements of many of these species. A small number of species have particular importance within the drainage board's area and these species have dedicated Species Action Plans. The following section provides more information on the status and location of these species within the drainage district that are of importance for the IDB and may benefit from water level management or other IDB activities. The information is taken, for the most part, from the Lincolnshire Biodiversity Action Plan and has the IDB objectives and actions identified for each species.

- Otter
- Bats
- Grass Snake
- Eel
- Non-native Invasive Species

5.2 Otter

The European otter *Lutra lutra* is a large carnivorous mammal that feeds mainly on fish but also takes molluscs, small mammals and water birds. It lives predominantly in rivers, streams, lakes, ponds wetlands and suitable coastal waters. The species was widespread during the 1950s, but as a result of extensive use of organochloride insecticides, by the 1980s otters were found at only 5% of sites at which they had previously been recorded.

Otters are now protected under Schedule 5 of the Wildlife and Countryside Act 1981 (as amended) and Schedule 2 of the Conservation (Natural Habitats) Regulations (2010). The otter is listed on Appendix I of CITES, Appendix II of the Bern Convention and Annexes II and IV of the Habitats Directive 2010. It is listed in the national Red Data book.

As a result of the banning of organochlorides and more sympathetic bank management otters are naturally re-colonising watercourses and numbers are increasing.

Current status:

Otters are present in Lincolnshire and are thought to be present on nearly all catchments. Recent surveys suggest the population in the county is increasing. Surveys commissioned by South Holland IDB in 2014, identified the presence of otter at several of its pumping stations; this species is more widespread in the board's area than was previously thought.

Threats in Lincolnshire:

- Impoverished bankside habitats through intensive watercourse management, tree removal and habitat destruction.
- Incidental road death and drowning in eel traps.
- Insufficient food associated with poor water quality.
- Persecution – otters are still illegally trapped.
- Recreational and developmental disturbances.

South Holland IDB Objectives:

- To maintain and enhance the range and population of otter within the Board's area.

Table 13 – South Holland IDB actions/targets for otters

Details 0f IDB action	Action date
Carry out a survey for otters at five key sites within the Boards' Area.	Ongoing
Ensure regard to wildlife law, by promoting compliance with the standard pro forma for biodiversity and protected species surveys.	2020
Identify five potential sites for artificial otter holt creation within the Board's area and investigate potential sources of funding.	2020

5.3 Bats

Bats are probably widespread throughout the board's area, using the watercourses for foraging and commuting. Buildings and old culverts may be used for roosting. Certain species of bats are UK bap priority species; the Lincolnshire BAP covers all eleven species recorded in the county. Of particular interest to the drainage boards are Daubenton's bat and soprano pipistrelle bats, both of which are associated with proximity to water.

All species of bats are protected under section 9 of the Wildlife and Countryside Act 1981 (schedule 5); as amended by the Environmental Protection act 1990, and the conservation (Natural Habitats, &c) Regulations 2010.

Threats in Lincolnshire:

- Reduction in insect prey due to widespread pesticide use.
- Reduction in quality and quantity of habitats including hedgerows, old trees, ditches, drains, ponds, riverside and pasture habitats.
- Loss of breeding and winter hibernation sites in buildings, old trees and farmyard features.
- Continued loss and removal of old trees that provide food, habitat and roost sites.
- Floodlighting of churches and buildings causing disturbance.
- Destruction and disturbance of roosts during reproofing processes.
- Widespread confusion over/ ignorance of/ ignoring the law regarding bats.
- Deterioration of water quality has also been shown to affect food supply. Pesticides, oil and fertilizers still affect invertebrate populations.

Lincolnshire BAP Objectives:

- To protect roosts in trees as well as buildings.
- To continue to improve and widen understanding of the needs of bats, the threats to them, and the rationale for their legal status.
- To ensure that the available legal protection is fully used by local authorities, in development control and all other aspects of their operations.

South Holland IDB Objectives:

- To maintain the current distribution and abundance of bats within the Board's area.
- Where possible increase the range and population of bats within the Board's area.

Table 14 – South Holland IDB actions/targets for bats

Details of IDB action	Action date	Corresponding Lincolnshire BAP target
Establish policies (good working practice) to ensure management needs and compliance with legislation are incorporated in working practices by 2015.	Ongoing	-

Details of IDB action	Action date	Corresponding Lincolnshire BAP target
Establish the current distribution and abundance of bats within the IDB District. To develop a greater understanding of the habitat needs, in relation to watercourses, and distribution of the different species of bats within the Board's area. Accommodate requests for study opportunities from students and the local bat group.	Ongoing	LIN3_BAT_TO1 and TO2 Establish and publish by 2012 a current baseline using data available to the end of 2010 for the status and distribution of bats in Lincolnshire. Update this baseline using new survey and monitoring data y the ned of 2015 and five yearly thereafter
Establish a survey programme aimed at investigating bat roost opportunities at buildings owned/managed by South Holland IDB.	Ongoing	As above
Increase the awareness of the species and their habitat requirements.	Ongoing	LIN3_BAT_TO3 Continue to implement an annual programme of talks, walks, demonstrations, local press releases and attendance at local shows aimed at widening understanding of bats amongst the general public

5.4 Grass Snake

The grass snake, *Natrix natrix,* is the UK's largest reptile, with some adults growing to well over a metre in length. It is the most common snake found in Britain, and the only native snake that lays eggs. Grass snakes are typically grey-green in colour and have a distinctive yellow or cream collar behind the head on a dark background, with black bars down the side and sometimes black spots on top.

They are most frequently associated with water, feeding on amphibians, fish and small mammals but are also often encountered basking in the sun. The main habitat areas favoured by grass snakes are river valleys, ponds, lakes, streams, marshes, reservoirs and damp meadows but they also travel widely in surrounding drier habitats, including open woodland, rough grassland, heath, derelict urban areas and low intensity farmland. When the temperatures drop, grass snakes will seek hibernation sites, such as rubble or log piles and mammal burrows, which provide frost, flood and predator-free accommodation. They generally emerge from hibernation around April, and after mating, females lay clutches of white leathery eggs in a warm environment such as a compost heap or pile of rotting logs. The young hatch between August and October.

Current Status:

Grass snakes are protected under Schedule 5 of the Wildlife and Countryside Act 1981. It is illegal to kill, injure or trade in this species.

The grass snake has suffered from the loss of suitable habitat because of changes in farming practices and loss of land due to new houses or industrial building. In some areas there has been an increase in disturbance because of increased recreational usage. A general loss of habitat will also lead to the destruction of hibernacula (places where reptiles hibernate) and refuges (places where reptiles can shelter).

Hibernacula and refuges may also be lost through sites being managed in inappropriate ways. Areas may be cleared of overgrown vegetation, fallen logs or piles of stones and other rubbish, and ponds may be filled in. Work on sites around compost heaps may be carried out at the wrong time of year and disturb incubating eggs.

Destruction of linear habitats such as hedgerows and ditches and building or land use change leads to barriers being created between suitable sites. This means that there is much less potential for small populations to expand.

Current Threats in Lincolnshire:

- Habitat destruction.
- Persecution.
- Loss of egg laying sites.

South Holland IDB Objectives:

- To maintain and where possible increase the range of Grass Snake within the Board's area.

Table 15 – South Holland IDB targets/actions for grass snake

Details of actions	Action date
Determine the extent and distribution of the existing populations at the Board's pumping stations and on key drains.	Ongoing
Develop Hibernacula and egg laying sites at pumping stations where appropriate.	Ongoing
Increase the awareness of the species and their habitat requirements.	Ongoing
In partnership with South Holland reptile group, monitor the status of this species in certain key areas.	Ongoing

5.5 Eel

The European eel *Anguilla anguilla* travels to freshwater as a glass eel from its spawning site in the Sargasso Sea in the Atlantic Ocean. On arrival into freshwater in the summer, the tiny unpigmented eel must travel upstream to find appropriate habitat where it will feed and mature through the elver and yellow eel stage, living in some cases up to 15 years, before changing physiologically and returning to the ocean from which it spawned, as a silver eel. Certain abiotic factors such as temperature and the phase of the moon stimulate this movement to the sea, which usually occurs in the autumn months.

Prior to 1930, the fens had undergone hundreds of years of drainage for agriculture and habitation, it was only post 1940 that more intensive drainage programmes were put into operation to optimise the high grade agricultural land of East Anglia to feed the populous both during and after World War II. During this time a widescale loss of aquatic habitat took place. However, it was in response to the saline surge and floods of 1953 that emphasis was placed on defending the East Anglian coast from the North Sea. The "passibility" of these hugely important tidal defence schemes, tidal flaps and pumping stations is likely to have played a role in the successes or non-successes in the life history of the migratory eel in East Anglia.

Eel Management Plan:

The eel became a priority BAP species in 2007. There is currently no Eel BAP for the UK or Lincolnshire. There is however an Eel Management Plan (EMP) for the UK, published in December 2008 which divides the UK into different River Basin Districts (RBD). Lincolnshire falls under the

Anglian River Basin District. This document aims to describe the current status of eel populations in the Anglian RBD, assess compliance with the EU Council Regulation 1100/2007 and detail management measures to increase silver eel escapement.

Current Status:

The eel is thought to be of huge economic and ecological significance to UK waters. It has been estimated that eel recruitment has fallen by 70% in the UK and by 95% in other EU countries since the 1980's. The European Eel Regulation (2007) (EU Council regulation 1100/2007) states that the UK must hope to achieve a 40% silver eel escapement relative to best estimates, with no anthropogenic influences. A failure to achieve this target will result in a 50% reduction in fishery effort for all life stages.

Eel legislation:

The Salmon and Freshwater Fisheries Review (2000) recommended new legislation to improve fish passage in England and Wales to improve fish passage on all rivers, not just those containing salmon and sea trout. The Fish Passage (England and Wales) Regulations 2009 will increase the circumstances in which fish passes will be required to be built or screened and will provide a more robust fish pass authorisation scheme.

Current Threats in Lincolnshire:

- Problems with glass eel recruitment, due to the blockage of glass eel passage into watercourses by means of tidal flaps, sluice gates and pumping stations.
- Problems with silver eel escapement into main rivers and the sea by means of tidal flaps, sluice gates and pumping stations.
- Parasites – *Anguillicolloides crassus* a nematode worm affects the ability of the eel to alter buoyancy during swimming by attaching to the swim bladder of the animal.
- Water quality.
- Illegal commercial fishing.

Lincolnshire BAP Objectives:

- To maintain and where possible enhance fish and eel populations at existing sites
- To conduct further survey and monitoring of fish and eel passage use
- To continue to work with anglers to promote environmentally friendly fishing

South Holland IDB Objectives:

- To contribute toward the Eel Regulation Action and the Eel Management Plan.

Table 16 – South Holland IDB targets/actions for eels

Details of actions	Action date	Corresponding Lincolnshire BAP target
Work in Partnership with the Environment Agency to assess the current status of eel populations within the Board's area.	Ongoing	LIN09_FWF_TO1 Maintain all known populations of these fish species in Lincolnshire
Identify barriers to migration in the Board's Area and assess options for overcoming these.	Ongoing	LIN09_FWF_TO2 Develop projects for adaptation of barriers for migratory fish: remove barriers to migration or install five fish passes and ten eel passes by 2015
Ensure regard to wildlife law, by promoting compliance with the standard pro forma for biodiversity and protected species surveys.	Ongoing	-

5.6 Non-native Invasive Species

A non-native invasive species is a species which has been moved outside its natural range with the aid of humans, is spreading rapidly and is causing problems for the local environment and economy. At a global level, invasive non-native species are now believed to be one of the most significant causes of biodiversity loss. The impacts particularly of freshwater and riparian non-native species are also of concern at a local level to the hydrological engineer, due to the ease and speed at which many plants can spread and grow, causing major problems by blocking watercourses. The low-lying nature of this part of Lincolnshire and its abundance of watercourses means that it is particularly at risk from colonisation by these plants.

The six non-native invasive aquatic or riparian plants of concern are:

- Australian Swamp Stonecrop *Crassula helmsii*

- Floating Pennywort *Hydrocotyl ranunculoides*
- Parrots Feather *Myriophyllum aquaticum*
- Japanese Knotweed *Fallopia japonica*
- Giant Hogweed *Heracleum mantegazzianum*
- Himalayan Balsam *Impatiens glandulifera*

In addition, the presence of American mink *Neovision vision* is also a concern and has therefore been included in this latest version of the Biodiversity Action Plan.

Cost for Control:

There is no doubt that if an infestation, particularly of the aquatic non-native invasive species, is left to grow, the cost to the Board will be considerable. The Board has a duty under the Wildlife and Countryside Act (1981) to prevent the spread of non-native invasives and therefore it would not simply be a matter of removing large areas of invasives during the maintenance period, as often the processes of flailing strimming or mowing of the species will subsequently result in its continual spread. This will occur particularly with Floating Pennywort, Australian Swamp Stonecrop, Parrots Feather and Japanese Knotweed, as they can all reproduce via an asexual, vegetative means. It is likely that the problem will continue on site from small pieces of material left behind from the mechanical operation, but will result in an additional problem of waterborne material causing a further infestation downstream.

The approach to the invasive problem should definitely be one of reaction when the species is manageable and relatively cheap to control. This should hopefully prevent the problem from manifesting into a much larger more expensive control strategy. The key to this is communication and knowing where the invasives are on IDB land or on landowner controlled land, so that an integrated partnership approach may be established.

Lincolnshire BAP Objectives:

- To understand the distribution and impacts of invasive mon-native species in Lincolnshire To carry our horizon scanning for new invasive non-native species entering Lincolnshire and prevent further spread
- To reduce/eliminate the detrimental impacts of invasive non-native natives on native species, habitats and people
- Improve awareness of invasive non-native species: their impacts, spread and management

South Holland IDB Objectives:

- To promote the prevention, control and eradication of non-native invasive species within the Board's area.
- To raise awareness of the presence of mink and encourage recording of sightings and field signs of this species

Table 17 – South Holland IDB targets/actions for invasive species

Details of actions	Action date	Corresponding Lincolnshire BAP target
Collate records for all species of concern and share these with the local records centre.	2020	LIN3_INV_T03 Determine population/distribution trends for non-native species in Lincolnshire
Continue to establish protocols to ensure that the Consortium's activities stop the spread and help towards the eradication of invasive alien species through the Board's area.	2020	-
Train staff in the identification of key non-native species.	Ongoing	-
Develop identification guides for the non-native species of most concern, to be used by officers, staff and contractors.	2020	-
Develop control and eradication projects for American mink and seek external funding where necessary.	Ongoing	LIN3_INV_TO3 Implement nine control projects

6 PROCEDURAL ACTION PLAN

6.1 Introduction

A number of procedural targets and actions have been established within this Procedural Action Plan. These are intended to integrate biodiversity considerations into IDB practices and procedures.

6.2 Duty to Conserving Biodiversity

Project	Outputs and Outcomes	Start and end Dates
Ensure compliance to standard proforma for biodiversity and protected species surveys - particularly with respect to water voles, otters and bats	All works assessed using agreed standards of information to ensure that appropriate mitigation is delivered for capital/maintenance works and projects to ensure no net loss of biodiversity.	Ongoing
Ensure compliance to Board's Standard Maintenance Operations	Assess 5% of maintenance works are being carried out to an agreed minimum standard of operations across the whole Board.	Ongoing
Land Drainage Consent and Bylaws	Through the application of Land Drainage Consents and Bylaws, seek to ensure that natural features of conservation interest and habitat importance are not damaged or destroyed.	Ongoing
Attend Local Biodiversity Forum	Communication and network opportunities with other organisations to facilitate actions for BAP Species and Habitats. PR and lifting profile of Board.	Ongoing
Raising awareness	Biodiversity training days organised for staff and Board members.	Ongoing
Recording	Develop a recording system for BAP species and habitats within the South Holland Board area.	Ongoing

Project	Outputs and Outcomes	Start and end Dates
Communication	A new biodiversity section on the website. Share successes with media and promote public awareness of the Board's actions relating to biodiversity	Ongoing
Monitoring	Continue to develop the Consortium's record base and continue to work internally and in partnership with other organisations to ensure that we have up to date information on species to help inform future works. The results of monitoring to be added to BARS to enhance awareness of IDB successes.	Ongoing Ongoing

7 IMPLEMENTATION AND MONITORING

7.1 Implementation and Monitoring

The procedural action plan shows how the Board is planning to integrate the BAP into its mainstream work planning process. The guiding principle is that in planning for maintenance, capital and non-regular maintenance work, consideration will be given to the implementation of the Board's Biodiversity Action Plan Actions.

The Board, as part of the Water Management Alliance, has adopted the Environmental Management System ISO 14001, which will also help integrate the Biodiversity Action Plan within the organisation.

A simple process will be put into place to record actions and help with the reporting. Any new data on habitats and species will be shared with the Greater Lincolnshire Nature Partnership.

7.2 Reviewing and Reporting Progress

The Board recognises the importance of reviewing the implementation of the Biodiversity Action Plan to assess changes in the status of habitats and species and the overall feasibility of objectives and actions. In addition, they recognise the benefit of recording successful achievements and reporting on those achievements.

The Board's Biodiversity Action Plan was developed with the help of a working group made up of Board members and it is hoped that the working group will continue to meet annually to review progress. A comprehensive review of the plan will take place after five years.

The Board, through the Water Management Alliance, will continue to be a partner in the Greater Lincolnshire Nature Partnership.

8 REFERENCES

Chatwin, C. P. (1961) British Regional Geology: East Anglia and Adjoining Areas (4th Ed.) Her Majesty's Stationary Office.

Collop, C (Ed.). (2011) Lincolnshire Biodiversity Action Plan (3rd edition). GLNP, Lincolnshire.

DEFRA (2008) Eel Management Plan for the United Kingdom: Eel Management Plan for the Anglian River Basin District. Available (Online) from: http://www.defra.gov.uk/foodfarm/fisheries/documents/fisheries/emp/intro.pdf

Shawyer, C. (2009) Biodiversity Action Plan for the Barn Owl – Draft. Wildlife Conservation Partnership.

Shawyer, C. (2009) Biodiversity Action Plan for the Kestrel – Draft. Wildlife Conservation Partnership.

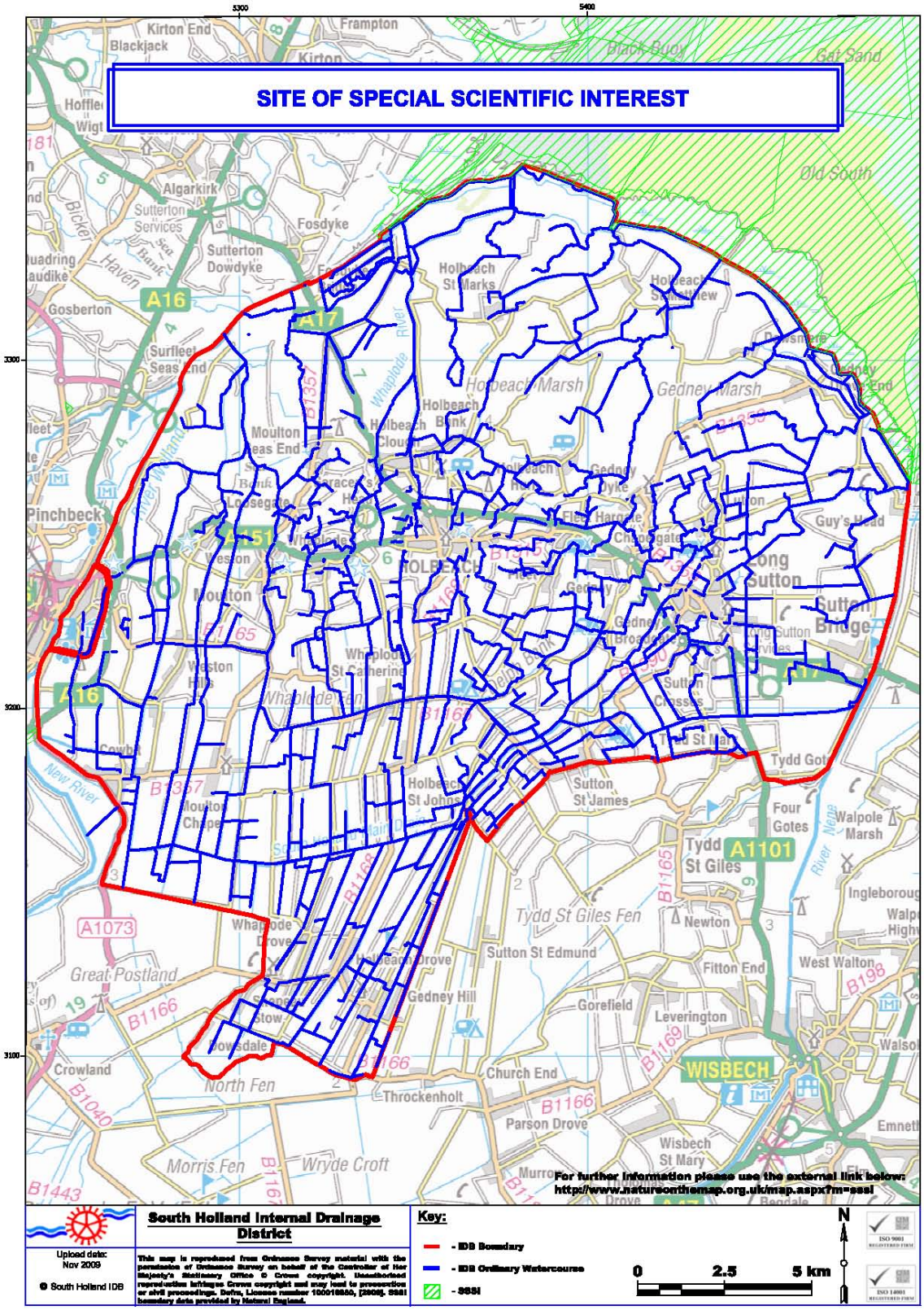
Sutton-Croft, M. (2009) Invasive non-native aquatic plants of Norfolk: Status Report and a plan of action for six priority species. Norfolk Biodiversity Partnership. Norfolk County Council. (Online) Available (Online) from: http://www.norfolkbiodiversity.org/nonnativespecies/publications/Statusreportandactionplan200913.pdf

Watson, J. (2009) Geology of the Wash Basin. Personal Communication

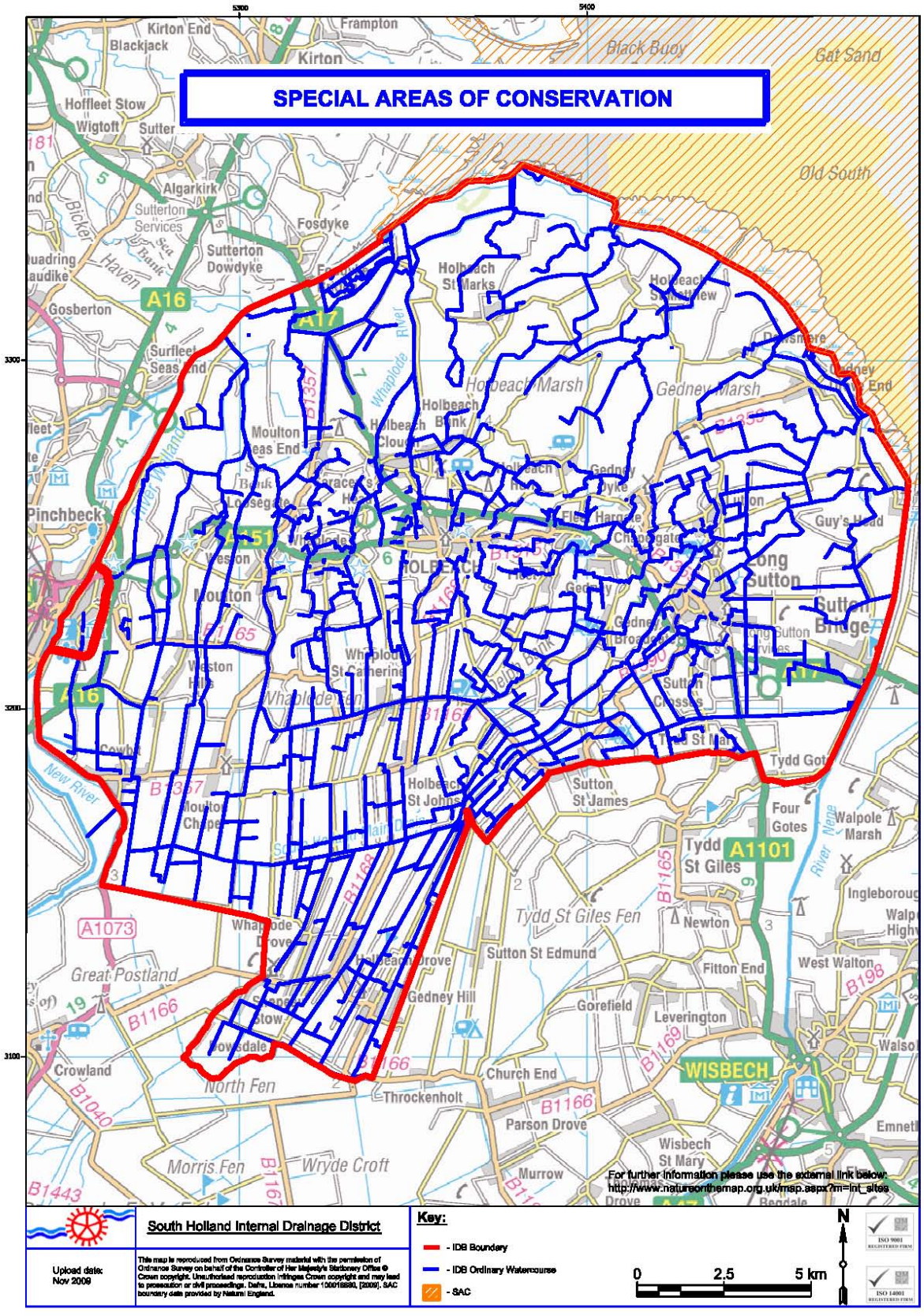
9 APPENDICES

9.1 Appendix I: Nationally, Internationally Designated Nature Conservation Sites

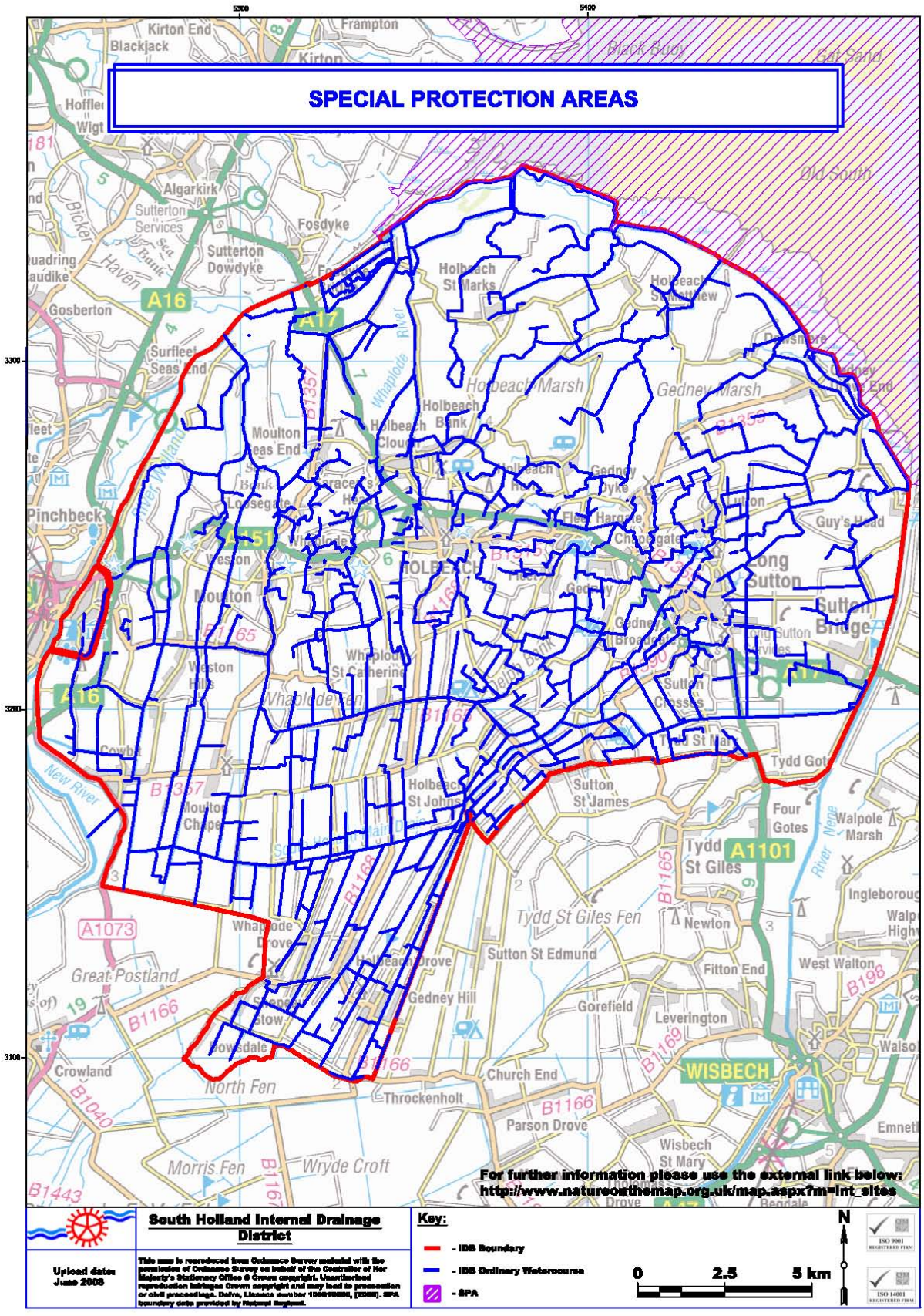
9.1.1 Map of Sites of Special Scientific Interest



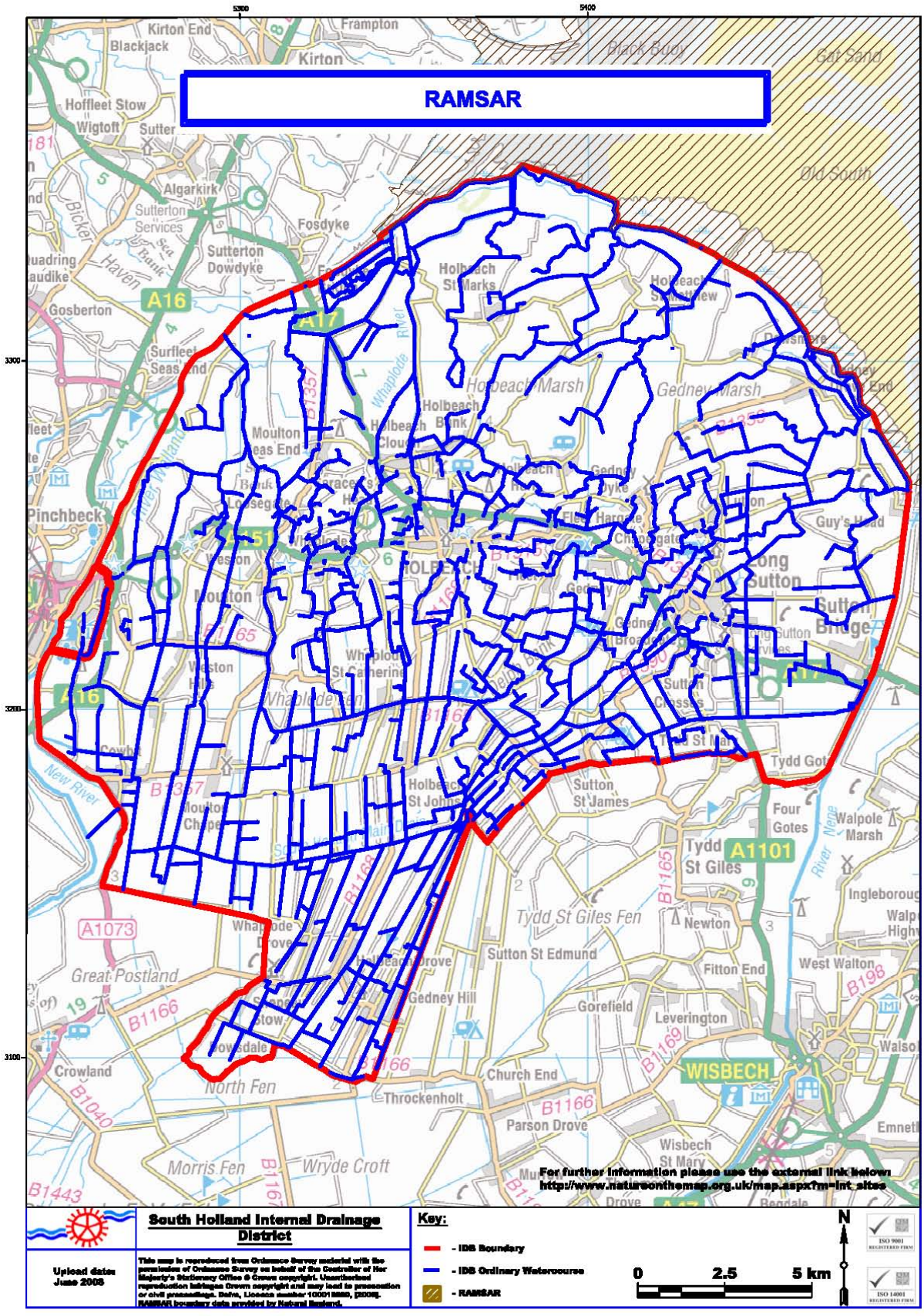
9.1.2 Map of Special Areas of Conservation



9.1.3 Map of Special Protection Areas



9.1.4 Map of RAMSAR sites



9.2 Appendix III: Acronyms Found Within the Document

AONB	Area of Outstanding Natural Beauty
BAP	Biodiversity Action Plan
BARS	Biodiversity Action Reporting System
BTCV	British Trust for Conservation Volunteers
BTO	British Trust for Ornithology
CLA	Country Landowners' and Business Association
EA	Environment Agency
EMP	Eel Management Plan
GIS	Geographic Information System
GLNP	Great Lincolnshire Nature Partnership
Ha	Hectare
HAP	Habitat Action Plan
IDB	Internal Drainage Board
KLIDB	Kings Lynn Internal Drainage Board
LA	Local Authority
LBAP	Local Biodiversity Action Plan
LBG	Lincolnshire Bat Group
LNR	Local Nature Reserve
LNU	Lincolnshire Naturalists' Union
LWCS	Lincolnshire Wolds Countryside Service
LWS	Local Wildlife Site
LWT	Lincolnshire Wildlife Trust
NCA	National Character Areas
NE	Natural England
NERC	Natural Environment and Rural Communities
NFU	National Farmers' Union
NNR	National Nature Reserve
RBD	River Basin District
RSPB	Royal Society for the Protection of Birds

SAC	Special Area for Conservation
SAP	Species Action Plan
SHIDB	South Holland Internal Drainage Board
SHDC	South Holland District Council
SMART	Specific, Measurable, Achievable, Relevant and Time limited
SNCI	Site of Nature Conservation Importance
SPA	Special Protection Area
SSSI	Site of Special Scientific Interest
TPO	Tree Preservation Order
WESG	Wash Estuary Strategy Group
WCP	Wildlife Conservation Partnership
WT	Woodland Trust