



# RAPID

Reducing and Preventing  
Invasive Alien Species Dispersal

## REGIONAL INVASIVE SPECIES MANAGEMENT PLAN (RIMPS): EAST OF ENGLAND REGION



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## Executive Summary

- This document is a part of the RAPID LIFE Project, a three-year EU Life funded project whose objective is to deliver a package of measures to reduce the impact and spread of IAS in freshwater aquatic, riparian and coastal environments across England. RAPID seeks to bridge the gap between high-level strategies (such as the GB IAS strategy) and action on the ground at local level.
- Using a template and guidance developed by national IAS experts, local experts have produced RIMPs for each of five regions in England: North, Midlands, East of England, South West and South East. The RIMPs will deliver consistent (but regionally tailored) recommendations on prevention, early warning, rapid response, eradication and control of IAS (in the above listed target environments) throughout England.
- The purpose of the current document is to guide IAS management activities in the East of England region and to help them to be strategic and coordinated with other regions.
- The size of the East of England region is 26700 km<sup>2</sup>. It covers 13 counties (in whole or in part).
- In the development of this RIMP, local stakeholders were consulted throughout the process through one on one and email conversations, as well as additional feedback from experts. Where appropriate, each RIMP has been modified to incorporate feedback from this consultation. A total of 53 stakeholders were consulted during the development of the East of England RIMP.
- This document categorises IAS in the East of England region by priority. It also details pathways of introduction, the hotspots and areas of high conservation value and also the key stakeholders.
- In this document, IAS are allocated to a priority category for management based on their risk and relative occurrence in the region: Black – prevention; Red – eradicate; Amber & Green – long-term management.
- The RIMPs also contain information and/or links to information on IAS identification, reporting procedures and best practice management guidelines.
- This document will be used to encourage local action groups, county forums and specialists to continue to work together and develop comprehensive plans to tackle invasive non-native species at both local and regional scales.

- All of the RIMPs will need be reviewed periodically and updated as needed to reflect current trends, partnerships and best IAS management practices.

## Introduction

It is widely recognised that invasive alien species (IAS) represent one of the greatest threats to biodiversity across the globe. RAPID (Reducing And Preventing IAS Dispersal) LIFE is a three-year (2017 -2020) EU funded project overseen by the Animal and Plant Health Agency (APHA), working in partnership with Natural England and the British Zoological Society, and coordinated by Alexia Fish. The project works to protect freshwater aquatic, riparian and coastal biodiversity by embedding a coordinated, strategic and evidence-based approach to managing IAS across England. In doing so, this project seeks to bridge the gap between high-level strategies and action on the ground at a local level.

Please note that "IAS" is the European term for invasive species, but as "INNS" (invasive non-native species) is the most commonly used term in the UK (and is synonymous with IAS), this term will be used for the most part throughout the rest of this document.

As part of the RAPID LIFE project, England has been split into five regions (Figure 1) and a Regional IAS Management Plan (RIMP) has been developed for each of these. These plans aim to deliver consistent, regionally relevant information and

advice for prevention, early warning, rapid response, eradication and control of INNS. Each RIMP focuses on three key elements for invasive species management: 1) building partnerships and collaborations; 2) education and awareness raising; and 3) control and management. Each RIMP works to identify regional and local potential pathways and 'hotspots' for INNS introductions, assisting local stakeholder groups to identify priority areas on which to concentrate resources for awareness-raising and education.

Proposed Regions for LIFE Project

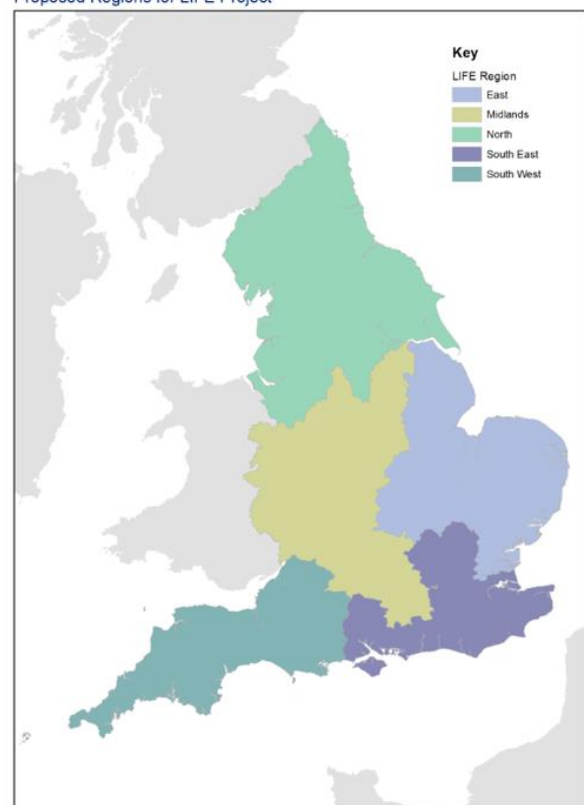


Figure 1. The RAPID LIFE Project covers England and divides the area into five regions

## **East of England RIMP**

To determine management priorities, presence/absence and abundance data have been used to allocate INNS to a management priority category depending on risk to that particular region: Black – prevention; Red – eradicate; Amber and Green – long-term management. This RIMP also contains information and links to INNS identification guides, reporting procedures and good practice management guidelines. In this way, the five RIMP documents will establish a regionally-based framework across England to better support improved strategic delivery of effective INNS management. The aim is that these documents will be continuously updated in response to changes in INNS populations in each catchment and changing management priorities.

This RIMP focuses on the East of England region. This region has been subdivided further into distinct catchments for greater operational relevance as river catchments within the region are distinct in terms of geographical, topographical and demographical information (detailed below). These divisions used were made based upon river catchments in accordance with the Catchment Based Approach (CaBA). This approach incorporates whole systems to allow delivery of strategic improvements to

these environments at a scale relevant to the local community, promoting collaborative working among local stakeholders, and incorporating individual management priorities based upon catchment requirements.

## **Broadland Rivers**

The Broadland Rivers catchment includes the rivers Ant, Bure, Wensum, Yare and Waveney. These catchments drain into a tide dominated area of inland waterway known as the Broads and finally out to sea through the mouth of the River Yare at Great Yarmouth. The catchment covers approximately 3200 km<sup>2</sup> with a population of over 800,000 people. It is predominantly rural and the main urban areas are Norwich, Great Yarmouth and Lowestoft. The Broads is nationally and internationally designated for its unique habitat and is heavily used for tourism, particularly boating with around 280km of navigable waterway.

## **Cam & Ely Ouse**

This catchment covers 904 km<sup>2</sup> in the centre of the Anglian River Basin District. Land use is principally agricultural, with centres of population and industry in the main towns of Swaffham and Watton. The catchment also contains ten surface water bodies and two lake water bodies.

### **Combined Essex**

This catchment includes the rivers and tributaries of the Roach, Crouch, Chelmer, Blackwater, Colne and Stour. It covers Essex as well as small parts of Cambridge and Suffolk.

### **East Suffolk**

This catchment includes the valleys, tributaries and estuaries of the Rivers Gipping, Deben, Alde, Thorpeness Hundred, Yox, Blyth and Lothingland Hundred. Natural England classifies this area as environmentally sensitive under the overarching designation 'Suffolk River Valleys'. This area also contains the Suffolk Coast and Heaths Area of Outstanding Natural Beauty (AONB).

### **Louth, Grimsby, Ancholme**

This is a predominantly rural catchment extending from the Ancholme valley in the west to the coastal resort of Cleethorpes in the east encompassing Louth and Grimsby. The northern fringe of the Lincolnshire Wolds AONB is within the catchment. The River Ancholme forms part of a vital navigable network and connects to the Humber Estuary at South Ferriby. The principal urban areas around the estuary are Grimsby and Immingham with heavy industry dominating the landscape along the south Humber bank. Cadney and Covenham Reservoirs are key water company assets in the drinking water supply

network. The Trent, Witham, Ancholme Transfer Scheme is a critical piece of infrastructure for managing water resources in the catchment.

### **Nene**

The River Nene is the tenth longest river in the country, with a long history of human modification. Significant tributaries include the Ise and Willow Brook. The landscape is agricultural, composed of mixed farming. Within the catchment there are two large urban centres located in Northampton and Peterborough. The Rockingham Forest area covers a large area to the north of the catchment. The valley is rich in wildlife and features large areas of international significance.

### **North Norfolk**

This catchment covers a relatively small area, composed of a narrow strip of land along the North Norfolk coast. This is a rural area, with the largest towns at Mundesley, Cromer, Sheringham, Holt and Wells-next-the-Sea. The main watercourses are the Rivers Hun, Burn, Glaven, Stiffkey and Mun. All are relatively short in length but important due to the biodiversity they support. Land use is mostly agricultural for cereal and root crop production, with some livestock and horticultural use. The landscape value of this catchment is recognised as part of the Norfolk Coast AONB.



### **North West Norfolk**

The NW Norfolk catchment covers an area of approximately 1,000 km<sup>2</sup>, stretching from Denver to Hunstanton. Major urban areas include Kings Lynn, Downham Market and Hunstanton. This region contains the River Great Ouse (north of the Denver Sluice), Rivers Heacham, Ingol, Babingley and Nar which flow into the Wash embayment. The Fenland region to the west is crossed by numerous man-made drainage channels. This catchment is predominantly rural with a population of 109,000. The countryside is mostly agricultural, with a quarter classified as 'high quality' and recognised as an important national and local resource. This area contains sites of exceptional environmental value including the River Nar, Roydon Common and Dersingham Bog. The entire Wash embayment is designated as a European Marine Site.

### **Old Bedford & Middle Level**

This catchment covers an area of approximately 921 km<sup>2</sup>. The local area comprises the Ouse Washes and the Middle Level rivers and drain. Major urban areas include Whittlesey, March, Ramsey and Chatteris. The area contains high quality soil for arable farming and agriculture and is therefore important to the local economy. During the winter, the Washes support significant numbers of water birds, leading to SPA and Ramsar protection.

### **South Essex**

This area represents the catchment for the Rivers Crouch, Roach, and Mard. It covers a total of 727 km<sup>2</sup> with a population of 650,000. More than 20% of the catchment is urbanised, a figure that is likely to increase in the future following initiatives such as the Thames Gateway development. Other land uses are arable crop production and pasture.

### **Upper & Bedford Ouse**

The Great Ouse is the fourth longest river in the UK, with a course of 230 km. It has been important historically for commercial navigation and for draining the low lying area through which it flows. Land use is almost entirely agricultural and the majority is in arable use.

### **Welland**

The River Welland flows through Northamptonshire, Leicestershire and Rutland before slowing down as it becomes one of the four fenland rivers which drain the Fens, before entering The Wash. Major tributaries include Langton Brook, Eye Brook, the River Chater and the River Gwash. The predominantly rural catchment covers an area of approximately 965 km<sup>2</sup>, with a total length of more than 482 km of waterway.

## Witham

This is an extensively rural catchment within the county of Lincolnshire with good agricultural land. The River Witham rises south of Grantham, passes through Lincoln and drains to the Wash embayment. Other significant rivers include the Rivers Brant, Till, Bain, Slea and the extensive network of drainage systems in the East and West Fens north of Boston. Drainage has historically had a significant effect on the catchment; much of the Fen areas are below sea

level. Local Internal Drainage Boards maintain a network of drains, which control water levels. The catchment benefits from the Trent Witham Ancholme River Transfer Scheme. This is a key infrastructure link for managing water resources, maintaining summer water levels and meeting agricultural, public water supply and industrial needs. There are over 150 Sites of Special Scientific Interest (SSSIs) in addition to the southern tip of the Lincolnshire Wolds AONB.

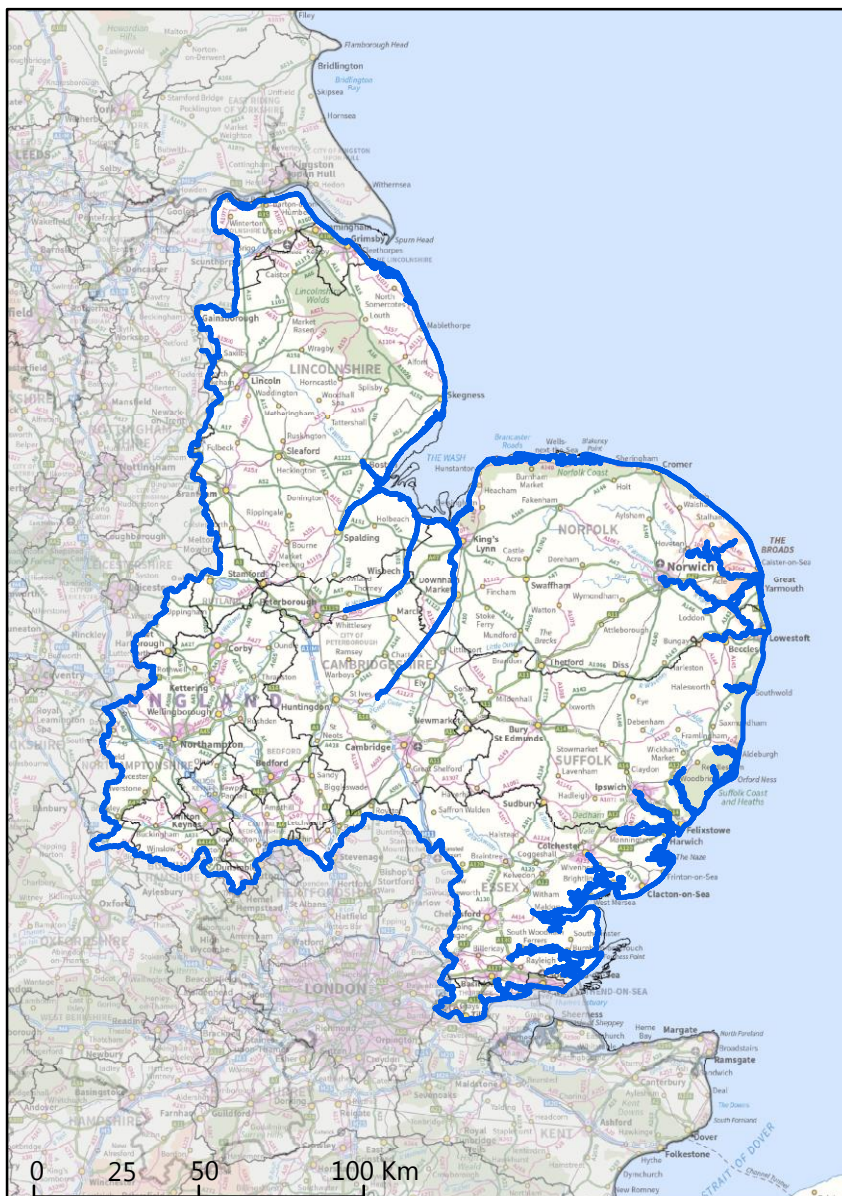


Figure 2. East of England RAPID LIFE region incorporating all or parts of Lincolnshire, Cambridgeshire, Northamptonshire, Leicestershire, Rutland, Bedfordshire, Buckinghamshire, Hertfordshire, Nottinghamshire, Oxfordshire, Norfolk, Suffolk and Essex

## **Section 1: INNS pathways and associated stakeholders**

Invasive species can be introduced into new environments by a variety of different mechanisms, often called pathways of invasion. Understanding the mechanisms through which invasive species arrive in new areas is important in order to understand how to prevent or reduce further introductions. Usually via human activities, INNS can be introduced both intentionally (e.g. ornamental plant species) and accidentally (e.g. through "hitchhiking" or unintentional transfer with aquaculture species).

With respect to the RIMP target species more information can be found on the pathways dispersal and associated biosecurity toolkits can be found on the GB NNS RAPID Life web pages:

<http://www.nonnativespecies.org//index.cfm?pageid=615>

**Table 1 provides a summary of INNS pathways and associated stakeholders for catchments within the East of England region.**

**Table 1. Introduction Pathways and Stakeholders**

| Pathway                           | Description  | Associated stakeholders   |
|-----------------------------------|--|---|
| Transportation – Air              | All modes of air transport e.g. aeroplanes. Stowaways in wheel wells, cargo holds etc.   | <ul style="list-style-type: none"> <li>- Airports (Norwich; Humberside; Cambridge; Southend)</li> <li>- HM customs and Excise</li> <li>- Freight companies</li> <li>- Airlines</li> </ul>   |
| Transportation – land/terrestrial | <p>All modes of transport across ground , INNS can be transported as stowaways or along corridors made via each transporter (e.g. along roads and railways)</p> <ul style="list-style-type: none"> <li>- Cars, buses, trucks, quad bikes, boat trailer, bicycles</li> <li>- Trains</li> <li>- Construction vehicles and equipment</li> <li>- Hikers, hunters, anglers, horses, dogs/dog-walkers</li> <li>- Conservation volunteers/surveyors?</li> </ul> | <ul style="list-style-type: none"> <li>- Freight operators and haulage companies</li> <li>- Transport providers e.g. Eurostar, coach holiday companies</li> <li>- Land management agencies e.g. Councils, Wildlife Trusts, EA, NE, Water Land Management Alliance (WLMA), Internal Drainage Boards (IDBs)</li> <li>- Landowners e.g. Forestry Commission, National Trust, RSPB</li> <li>- Construction companies and building contractors</li> <li>- Ramblers, Walkers are Welcome, National Trails</li> </ul>                                    |
| Transportation – water/aquatic    | <p>All modes of water transport (industrial/commercial/recreation).</p> <ul style="list-style-type: none"> <li>- Ballast water/sediment, seas chests, engine compartments</li> <li>- Hull or other surface fouling on boats, kayaks, platforms, docks etc.</li> <li>- Stowaways in cargo or holds</li> <li>- Structures above the water line (e.g. turbine construction equipment, rigs etc.)</li> <li>- Movement of dredge material</li> </ul>          | <ul style="list-style-type: none"> <li>- Port/boat yard/marina operators</li> <li>- Dredging/piling organisations</li> <li>- Offshore energy companies and maintenance contractors</li> <li>- Marine survey organisations</li> <li>- Cruise operators</li> <li>- Leisure craft members organisations e.g. RYA, sailing clubs,</li> <li>- Water sports schools and clubs e.g. British Canoeing</li> <li>- Water companies</li> <li>- Event/Regatta organisers</li> <li>- Anglers</li> <li>- Coastguards</li> <li>- Cargo ship operators</li> </ul> |
| Transportation – shipping process | <ul style="list-style-type: none"> <li>- Containers (interior and exterior)</li> <li>- Packing materials e.g. wooden pallets</li> <li>- Seaweed</li> <li>- Sand/earth/compost</li> </ul>   | <ul style="list-style-type: none"> <li>- Freight operators and haulage companies</li> <li>- Suppliers and distributors</li> <li>- Trade organisations</li> </ul>  |

| Pathway                                  | Description   | Associated stakeholders   |
|--|---|---|
| Tourism and re-locations                 | <ul style="list-style-type: none"> <li>- Travellers themselves</li> <li>- Baggage</li> <li>- Pets, plants</li> <li>- Plants/animals transported for events e.g. agricultural shows, equestrian events, horticultural shows</li> <li>- Consumables e.g. food in caravans/campervans, carried as gifts</li> </ul>   | <ul style="list-style-type: none"> <li>- Travel operators</li> <li>- Travel websites/bloggers</li> <li>- Members of the public</li> </ul>   |
| “Contamination” or Hitch-hiking          | <p>Seeds, spores and eggs attached to surfaces, other animals or in soil/sediment</p> <ul style="list-style-type: none"> <li>- Aquaculture equipment and stock</li> <li>- Water sports equipment (e.g. canoes)</li> <li>- Clothing/shoes</li> </ul>   | <ul style="list-style-type: none"> <li>- CEFAS / local fishery managers</li> <li>- Leisure craft members organisations e.g. RYA, sailing clubs,</li> <li>- Water sports schools and clubs e.g. British Canoeing</li> <li>- Members of the public (e.g. walkers, ramblers, mountain bikers)</li> </ul> |
| Horticulture i.e. plant and pond escapes | <p>Imports of plants and sites of deliberate introduction, including dumping of horticultural and aquaculture waste sediment / water. Includes whole plants, cuttings, bulbs, roots, fruits and seed. Hitch-hikers on the plant (e.g. pathogens and parasites) or in water, growth medium or packing material.</p> <ul style="list-style-type: none"> <li>- Nurseries/garden centres</li> <li>- Botanical gardens</li> <li>- Landscaping</li> <li>- Plant research facilities</li> <li>- Aquariums</li> </ul> | <ul style="list-style-type: none"> <li>- Garden centres, nurseries</li> <li>- Royal Horticultural Society</li> <li>- Defra / APHA</li> </ul>  |
| Food products                            | <p>Live seafood or other live food animals e.g. crayfish, carp, plants and plant parts e.g. fruit, vegetables, nuts etc.</p> <ul style="list-style-type: none"> <li>- Accidental or intentional release</li> <li>- Hitch-hikers on or in the product (pathogens, parasites)</li> <li>- Hitch-hikers in water, food, packing, bedding, growth medium</li> </ul>  | <ul style="list-style-type: none"> <li>- CEFAS / Local fishery managers</li> <li>- Local councils</li> <li>- EIFCA</li> <li>- MMO</li> </ul>  |
| Non-food products                        | <p>Bait, aquarium/pet trade, aquaculture, work animals</p> <ul style="list-style-type: none"> <li>- Accidental or intentional release</li> <li>- Hitch-hikers on or in the product (pathogens, parasites)</li> <li>- Hitch-hikers in water, food, packing, bedding, growth medium</li> </ul>  | <ul style="list-style-type: none"> <li>- CEFAS / Local fishery managers</li> <li>- Members of the public</li> <li>- Garden centres, nurseries</li> <li>- Pet shops</li> </ul>   |

## Section 2: Priority areas for education and awareness-raising

The identification of INNS priority areas is important in order to better focus resources such as INNS prevention and management, but also education and awareness-raising. These priority areas can be found in the table below to highlight the target audiences and related delivery mechanism.

Further information regarding good biosecurity practices for aquatic species can be found within the biosecurity toolkits found on the GB NNSS RAPID LIFE web pages:

<http://www.nonnativespecies.org/index.cfm?pageid=615>

<http://www.nonnativespecies.org/index.cfm?pageid=622>

The “Check Clean Dry” campaign provides further information for raising

awareness and biosecurity issues for aquatic species:

<http://www.nonnativespecies.org/checkcleandry/index.cfm>

The “Be Plant Wise” campaign also provides further information regarding biosecurity issues relating to plant species:

<http://www.nonnativespecies.org/beplantwise/>

**Table 2 provides a summary of stakeholder groups and priority areas within the East of England region. It provides example stakeholders within each group and presents various delivery mechanisms to tackle each of the priority areas.**

**Table 2: Priority areas education and awareness-raising**

| Stakeholder Group   | Example stakeholders  | Priority Area   | Delivery mechanism   |
|---|---|---|--|
| Air and land transporters                                 | International / national travel hubs, freight/trains  | Promote biosecurity issues to prevent and minimise hitchhikers and stowaways in goods or via tourism (baggage, food, pets)  | Promote awareness of the impact of invasive species.   |
| Freshwater transporters                                   | Port and boat yard operators, berth/mooring owners e.g. Broads Authority, River's Trusts. Water companies   | Use best practice methodologies regarding INNS for disposing of dredge material/spoil<br><br>Promote biosecurity issues to prevent and minimise hitchhikers and stowaways in contaminated cargo   | Promote awareness of the impact of invasive species.<br><br>Promote the implementation of and enable training in codes of best practice regarding biosecurity issues   |
| Marine/coastal transporters                               | Port Operators and associated orgs e.g. Victoria Group, Associated British Ports, Peel Ports Trinity House. Offshore renewables companies e.g. DONG energy, Scottish Power, Iberdrola, Vanguard, East Anglia Arra, dry dock and vessel maintenance companies (e.g. International ports)               | Avoid pumping out of unsterilized ballast water in harbours<br>Enhance knowledge of the role of hull fouling in the transport of INNS<br><br>Use best practice methodologies regarding INNS for disposing of dredge material/spoil                                      | Promote the implementation of and enable training in codes of best practice regarding biosecurity issues , e.g. requiring unsterilized ballast water to be discharged away from harbour, GBNNSS website for Biosecurity<br><br>APHA (Animal Plant and Health Agency) can assist with supply of posters and other awareness material for display and signage (e.g. Check Clean Dry campaign)  |
| Water users (Leisure)                                     | Outdoor aquatic sports centres, canoes/kayaks/leisure craft users, private leisure operators, outfitters/equipment rental agencies, training providers/water sports schools and clubs, Royal Yachting Association, sailing clubs, event organisers e.g regattas etc. British Canoeing. Angling clubs. | Contaminated water sports or angling equipment<br><br>The impact of hull fouling on pleasure craft spreading INNS among marinas<br><br>Promote knowledge of biosecurity issues to clubs, participants and visiting users and awareness of the dangers arising from INNS | APHA (Animal Plant and Health Agency) can assist with supply of posters and other awareness material for display and signage (e.g. Check Clean Dry campaign)<br><br>Raise awareness among community groups by liaising with retailers / sports centres, marinas and local clubs<br><br>Locally based experts to work with associations to promote disinfection of equipment and use of appropriate facilities to eliminate the risk of accidental transfer of INNS<br><br>GBNNSS website, particularly RAPID section and biosecurity |
| Off-road users e.g. quad bikes, mountain bikers, walkers. | E.g. clubs, members of the public   | Promote knowledge of biosecurity issues to clubs, participants and visiting users and awareness of the dangers arising from INNS  | Promote signage of INNS issues among retailers and on community notice boards  |

| Stakeholder Group  | Example stakeholders  | Priority Area   | Delivery mechanism   |
|--|---|---|--|
| Construction / Contractors / Ground Maintenance Workers / Marine Surveyors | Windfarm maintenance and servicing organisations e.g SeaJacks, 4COffshore. Marine survey organisations e.g. Gardline, Fugro, SubSea7. Private environmental consultancies. Piling and dredging organisations. Marine aggregate contractors. Cefas and MMO. Natural England, Environment Agency. Local building contractors. | Promote general awareness of impacts and measures to prevent/control INNS<br><br>Contaminated equipment / construction materials / sediment / soil  | Locally based experts to work with associations to promote disinfection of equipment and use of appropriate facilities to eliminate the risk of accidental transfer of INNS<br><br>GBNNS website, particularly RAPID Life section  |
| Land owners and managers   | EA, NE, Wildlife Trusts. Water Land Management Alliance (WLMA) and Internal Drainage Boards (IDBs). Farmers and other large landowners. County and District Councils.   | Bank management, movement of sand/earth, vegetation clearance and associated equipment. Intentional introduction or planting  | APHA/local stakeholders to work with retailers to encourage distribution of codes and posters (available from APHA/Plantlife) and to advise the general public of INNS issues  |
| Plant traders (terrestrial and aquatic)                                    | Garden centres, online stockists, pet shops, exotics/ornamentals dealers. RHS, local clubs. Horticultural Trade Association   | Sale from garden/aquatics centres and pet shops including hitchhikers in contaminated growth medium, soil, nursery stock etc.<br><br>Promotion of existing codes of best practice covering the security and disposal of INNS<br><br>Target gardeners to dispose plant material and/or soils responsibly<br><br>Promote knowledge of biosecurity issues amongst tenants and resource users | Liaise with local industry and trade associations to advise members regularly of best practice in respect of INNS<br><br>APHA/local stakeholders to work with retailers to encourage distribution of codes and posters (available from APHA/Plantlife) and to advise the general public of INNS issues<br><br>Work with locally based experts to disseminate best practices and appropriate signage to reduce threats from INNS<br><br>GBNNS website, particularly RAPID section |
| Aquaculture and seafood  | Cefas, EIFCA , local harvesting and supplier businesses   | Importation of seed and stock from contaminated areas<br><br>Movement of stock and water<br><br>Biosecurity measures  | Incorporation of INNS codes of good practice into industry codes of practice to enable effective biosecurity<br><br>GBNNS website, particularly RAPID section  |



| Stakeholder Group | Example stakeholders                                 | Priority Area   | Delivery mechanism  |
|-------------------|--|---|---|
| General Public    |  | General awareness of impacts and measures to prevent/control INNS | <p>Local media campaigns</p> <p>Social media as a tool to inform and educate wider audiences</p> <p>GBNNS website, particularly RAPID section</p> <p>RAPID Life project leaflet promoting awareness the dangers arising from INNS and the reporting system</p> <p>Promote the biosecurity guidance to all via locally based experts</p> |
| Schools           | Local colleges, universities, schools, forest school | General awareness of impacts and measures to prevent/control INNS | <p>School visits focusing on ecological clubs and encouraging appropriate field trips</p> <p>Local wildlife charities/council community initiatives/locally based experts</p> <p>Social media as a tool to inform and educate wider youth audiences</p>   |

## Section 3: Key Regional Stakeholders

The following table is a list of regional stakeholders. This list contains the names of groups and agencies listed in sections 1 and 2, and others who are key stakeholders within the region that may either be heavily involved in recording or tackling INNS within the

region, or who have a vested interest in maintaining the quality of the region, its habitats and wildlife. The list includes names of current contacts (where appropriate).

**Table 3: Key regional Stakeholders**

| Stakeholder group   | Website   | Stakeholder location/catchment area within East of England |
|---|---|--|
| <b>Government &amp; Agency</b>                                    |   |  |
| Environment Agency (INNS lead)                                    | <a href="https://www.gov.uk/government/organisations/environment-agency">https://www.gov.uk/government/organisations/environment-agency</a>   | All  |
| Animal and Plant Health Agency (APHA)                             | <a href="https://www.gov.uk/government/organisations/animal-and-plant-health-agency">https://www.gov.uk/government/organisations/animal-and-plant-health-agency</a>                               |  |
| Marine Management Organisation                                    | <a href="https://www.gov.uk/government/organisations/marine-management-organisation">https://www.gov.uk/government/organisations/marine-management-organisation</a>                               | All  |
| Natural England (Lead Marine Adviser)                             | <a href="https://www.gov.uk/government/organisations/natural-england">https://www.gov.uk/government/organisations/natural-england</a>   | All  |
| Forestry Commission   | <a href="https://www.forestry.gov.uk/">https://www.forestry.gov.uk/</a>   | All  |
| Eastern IFCA  | <a href="http://www.eastern-ifca.gov.uk/">http://www.eastern-ifca.gov.uk/</a>   | All  |
| Internal Drainage Boards  | <a href="https://www.ada.org.uk/member_type/idbs/">https://www.ada.org.uk/member_type/idbs/</a>   | All  |
| British Waterways Board   | <a href="http://www.britishwaterways.co.uk/">http://www.britishwaterways.co.uk/</a>   | All  |
| GB non-native species secretariat                                 | <a href="http://www.nonnativespecies.org/home/index.cfm">http://www.nonnativespecies.org/home/index.cfm</a>   | All  |
| Department for Environment, Food and Rural Affairs (DEFRA)        | <a href="https://www.gov.uk/government/organisations/department-for-environment-food-rural-affairs">https://www.gov.uk/government/organisations/department-for-environment-food-rural-affairs</a> | All  |
| Centre for Environment, Fisheries and Aquaculture Science (Cefas) | <a href="https://www.cefasc.co.uk/">https://www.cefasc.co.uk/</a>   | All  |
| <b>Local Authority</b>  |   |  |
| Norfolk Biodiversity Information Service                          | <a href="http://www.nbis.org.uk/">http://www.nbis.org.uk/</a>   | Norfolk  |
| Suffolk Biodiversity Information Service                          | <a href="http://www.suffolkbis.org.uk/">http://www.suffolkbis.org.uk/</a>   | Suffolk  |
| Greater Lincolnshire Nature Partnership                           | <a href="https://glnp.org.uk/">https://glnp.org.uk/</a>   | Lincolnshire   |

|  |   |   |
|--|---|---|
| Wash and North Norfolk Coast Marine Partnership                      | <a href="https://wnnmp.co.uk/">https://wnnmp.co.uk/</a>   | Lincolnshire and Norfolk  |
| Essex Biodiversity Project   | <a href="https://www.essexwt.org.uk/protecting-wildlife/essex-biodiversity">https://www.essexwt.org.uk/protecting-wildlife/essex-biodiversity</a>   | Essex   |
| Cambridgeshire and Peterborough Environmental Records Centre         | <a href="https://www.cperc.org.uk/">https://www.cperc.org.uk/</a>   | Cambridgeshire  |
| Leicestershire and Rutland Environment Records Centre (LRERC)        | <a href="https://www.leicestershire.gov.uk/environment-and-planning/planning/leicestershire-and-rutland-environment-records-centre-lrerc">https://www.leicestershire.gov.uk/environment-and-planning/planning/leicestershire-and-rutland-environment-records-centre-lrerc</a>   | Leicestershire and Rutland  |
| Local Councils   | <a href="https://www.bedford.gov.uk/">https://www.bedford.gov.uk/</a><br><a href="https://www.buckscc.gov.uk/">https://www.buckscc.gov.uk/</a><br><a href="https://www.cambridgeshire.gov.uk/">https://www.cambridgeshire.gov.uk/</a><br><a href="http://www.centralbedfordshire.gov.uk/">http://www.centralbedfordshire.gov.uk/</a><br><a href="https://www.peterborough.gov.uk/">https://www.peterborough.gov.uk/</a><br><a href="https://www.essex.gov.uk/Pages/Default.aspx">https://www.essex.gov.uk/Pages/Default.aspx</a><br><a href="https://www.london.gov.uk/">https://www.london.gov.uk/</a><br><a href="https://www.hertfordshire.gov.uk/home.aspx">https://www.hertfordshire.gov.uk/home.aspx</a><br><a href="https://www.leicestershire.gov.uk/">https://www.leicestershire.gov.uk/</a><br><a href="https://www.lincolnshire.gov.uk/">https://www.lincolnshire.gov.uk/</a><br><a href="https://www.milton-keynes.gov.uk/">https://www.milton-keynes.gov.uk/</a><br><a href="https://www.norfolk.gov.uk/">https://www.norfolk.gov.uk/</a><br><a href="https://www.nelincs.gov.uk/">https://www.nelincs.gov.uk/</a><br><a href="http://www.northlincs.gov.uk/">http://www.northlincs.gov.uk/</a><br><a href="https://www3.northamptonshire.gov.uk/pages/default.aspx">https://www3.northamptonshire.gov.uk/pages/default.aspx</a><br><a href="http://www.nottinghamshire.gov.uk/">http://www.nottinghamshire.gov.uk/</a><br><a href="https://www.oxfordshire.gov.uk/">https://www.oxfordshire.gov.uk/</a><br><a href="https://www.rutland.gov.uk/">https://www.rutland.gov.uk/</a><br><a href="https://www.southend.gov.uk/">https://www.southend.gov.uk/</a><br><a href="https://www.suffolk.gov.uk/">https://www.suffolk.gov.uk/</a><br><a href="https://www.thurrock.gov.uk/">https://www.thurrock.gov.uk/</a> | Bedford (B)<br>Buckinghamshire County<br>Cambridgeshire County<br>Central Bedfordshire<br>City Of Peterborough (B)<br>Essex County<br>Greater London Authority<br>Hertfordshire County<br>Leicestershire County<br>Lincolnshire County<br>Milton Keynes (B)<br>Norfolk County<br>North East Lincolnshire (B)<br>North Lincolnshire (B)<br>Northamptonshire County<br>Nottinghamshire County<br>Oxfordshire County<br>Rutland<br>Southend-On-Sea (B)<br>Suffolk County<br>Thurrock (B) |
| <b>NGO</b>   |   |   |
| CABI   | <a href="https://www.cabi.org/">https://www.cabi.org/</a>   | All   |
| RSPB   | <a href="https://www.rspb.org.uk/about-the-rspb/">https://www.rspb.org.uk/about-the-rspb/</a>   | All   |
| National Trust   | <a href="https://www.nationaltrust.org.uk">https://www.nationaltrust.org.uk</a>   | Norfolk<br>All  |
| Norfolk Wildlife Trust   | <a href="https://www.norfolkwildlifetrust.org.uk/home">https://www.norfolkwildlifetrust.org.uk/home</a>   | Norfolk   |
| Lincolnshire Wildlife Trust  | <a href="https://www.lincstrust.org.uk/">https://www.lincstrust.org.uk/</a>   | Lincolnshire  |
| Suffolk Wildlife Trust   | <a href="https://www.suffolkwildlifetrust.org/">https://www.suffolkwildlifetrust.org/</a>   | Suffolk   |
| Essex Wildlife Trust   | <a href="https://www.essexwt.org.uk/">https://www.essexwt.org.uk/</a>   | Essex   |
| Wildlife Trust for Bedfordshire, Cambridgeshire and Northamptonshire | <a href="https://www.wildlifebcn.org/">https://www.wildlifebcn.org/</a>   | Bedfordshire<br>Cambridgeshire<br>Northamptonshire  |
| Leicestershire and Rutland Wildlife Trust                            | <a href="http://www.lrwt.org.uk/">http://www.lrwt.org.uk/</a>   | Leicestershire and Rutland  |

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|---|---|---|
| Norfolk Rivers Trust  | <a href="https://norfolkrivertrust.org/">https://norfolkrivertrust.org/</a>   | North Norfolk, Broadland  |
| Lincolnshire Rivers Trust   | <a href="http://www.lincsrivers.org.uk/">http://www.lincsrivers.org.uk/</a>   | Lincolnshire  |
| Essex and Suffolk Rivers Trust                                      | <a href="https://essexsuffolkrivertrust.org/">https://essexsuffolkrivertrust.org/</a>   | Essex<br>Suffolk  |
| Canal and Rivers Trust  | <a href="https://canalrivertrust.org.uk/">https://canalrivertrust.org.uk/</a>   | All   |
| Action with Communities in Rural England (ACRE)                     | <a href="http://www.acre.org.uk/">http://www.acre.org.uk/</a>   | Lincolnshire<br>Cambridgeshire<br>Leicestershire and Rutland<br>Northamptonshire<br>Bedfordshire<br>Norfolk<br>Suffolk<br>Essex |
| Welland River Trust   | <a href="http://www.wellandrivertrust.org.uk">www.wellandrivertrust.org.uk</a>  | Welland   |
| Broads Authority  | <a href="http://www.broads-authority.gov.uk/">http://www.broads-authority.gov.uk/</a>   | Broadland Rivers  |
| Wild Trout Trust  | <a href="https://www.wildtrout.org/">https://www.wildtrout.org/</a>   | All   |
| Water Management Alliance   | <a href="https://www.wlma.org.uk/">https://www.wlma.org.uk/</a>   | All   |
| Peterborough Environment City Trust                                 | <a href="https://www.pect.org.uk/">https://www.pect.org.uk/</a>   | Nene  |
| WLMA  | <a href="https://www.wlma.org.uk/">https://www.wlma.org.uk/</a>   | All   |
| Angling Trust   | <a href="https://www.anglingtrust.net/">https://www.anglingtrust.net/</a>   | All   |
| RYA   | <a href="https://www.rya.org.uk/Pages/Home.aspx">https://www.rya.org.uk/Pages/Home.aspx</a>   | All   |
| British Canoeing  | <a href="https://www.britishcanoeing.org.uk/">https://www.britishcanoeing.org.uk/</a>   | All   |
| Essex Rivers Hub  | <a href="http://www.essexrivershub.org.uk/">http://www.essexrivershub.org.uk/</a>   | Combined Essex  |
| Cambridgeshire and Peterborough Biodiversity Partnership            | <a href="http://www.cpbiodiversity.org.uk/">http://www.cpbiodiversity.org.uk/</a>   | Cambridgeshire  |
| Froglife  | <a href="https://www.froglife.org/">https://www.froglife.org/</a>   | All   |
| Bedfordshire and Luton Biodiversity Recording and Monitoring Centre | <a href="https://nbn.org.uk/members/bedfordshire-and-luton-biodiversity-recording-and-monitoring-centre/">https://nbn.org.uk/members/bedfordshire-and-luton-biodiversity-recording-and-monitoring-centre/</a> | Bedfordshire  |
| NatureSpot  | <a href="https://www.naturespot.org.uk/">https://www.naturespot.org.uk/</a>   | Leicestershire and Rutland  |
| <b>Recreational and voluntary</b>                                   |   |   |
| Local Action Groups (LAGS)  | Contact details can be found on GBNSS website:<br><a href="http://www.nonnativespecies.org/index.cfm?sectionid=71">http://www.nonnativespecies.org/index.cfm?sectionid=71</a>                                 | All   |
| Dedham Vale and Stour Valley Project                                | <a href="http://www.dedhamvalestourvalley.org/">http://www.dedhamvalestourvalley.org/</a>   | Combined Essex  |
| Thames Chase Trust  | <a href="http://www.thameschase.org.uk/">http://www.thameschase.org.uk/</a>   | South Essex   |
| Essex River Wardens Project   | <a href="https://www.essexwtrecords.org.uk/survey/river-wardens">https://www.essexwtrecords.org.uk/survey/river-wardens</a>   | Combined Essex  |
| River Glaven Conservation Group                                     | <a href="http://www.riverglaven.co.uk/">http://www.riverglaven.co.uk/</a>   |   |
| Norfolk Mink Project  | <a href="http://www.thenorfolkproject.org.uk/about-us/">www.thenorfolkproject.org.uk/about-us/</a>  |   |
| Lincolnshire Chalk Streams Project                                  | <a href="https://www.lincswolds.org.uk/chalk-streams/lincolnshire-chalk-streams/lincs-chalk-streams">https://www.lincswolds.org.uk/chalk-streams/lincolnshire-chalk-streams/lincs-chalk-streams</a>           | Lincolnshire  |

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|---|---|--|
| River Nene Regional Park community interest group.            | <a href="http://www.riverneneregionalpark.org/">http://www.riverneneregionalpark.org/</a>   | Nene   |
| The Conservation Volunteers                                   | <a href="https://www.tcv.org.uk/">https://www.tcv.org.uk/</a>   | Essex, Norfolk, Bedfordshire, Cambridgeshire |
| RiverCare   | <a href="http://www.rivercare.org.uk/home/2773">http://www.rivercare.org.uk/home/2773</a>   |  |
| Association of River Nene Clubs                               | <a href="https://www.anrc.org.uk/">https://www.anrc.org.uk/</a>   | Nene   |
| Nene Park Trust   | <a href="https://www.nenepark.org.uk/">https://www.nenepark.org.uk/</a>   | Nene   |
| River Nene Regional Park                                      | <a href="http://www.riverneneregionalpark.org/">http://www.riverneneregionalpark.org/</a>   | Nene   |
| Milton Keynes Parks Trust                                     | <a href="https://www.theparkstrust.com/">https://www.theparkstrust.com/</a>   | Upper Ouse                                   |
| The Greensand Trust   | <a href="https://www.greensandtrust.org/">https://www.greensandtrust.org/</a>   | Upper Ouse                                   |
| The Forest of Marston Vale Trust                              | <a href="https://www.marstonvale.org/">https://www.marstonvale.org/</a>   | Upper Ouse                                   |
| Boston and District Angling Association.                      | <a href="https://www.bostonanglingassociation.co.uk/">https://www.bostonanglingassociation.co.uk/</a>   | Witham                                       |
| Grantham Angling Association Fly Fishing Section              | <a href="http://www.granthamaa.org.uk/">http://www.granthamaa.org.uk/</a>   | Witham                                       |
| Sleaford Navigation Trust                                     | <a href="http://www.sleafordnavigation.co.uk/">http://www.sleafordnavigation.co.uk/</a>   | Witham                                       |
| <b>Industry</b>   |   |  |
| Anglian Water   | <a href="https://www.anglianwater.co.uk/">https://www.anglianwater.co.uk/</a>   |  |
| Essex Suffolk Water   | <a href="https://www.eswater.co.uk/">https://www.eswater.co.uk/</a>   |  |
| Farming and Wildlife Advisory Group                           | <a href="http://www.fwag.org.uk/">http://www.fwag.org.uk/</a>   |  |
| CamEO Partnership (Rivers Trust and Anglian Water)            | <a href="http://riverlark.org.uk/index.php/who-is-part-of-rlcp/cameo-partnership/">http://riverlark.org.uk/index.php/who-is-part-of-rlcp/cameo-partnership/</a> | Cam Ely Ouse                                 |
| Cambridge Water   | <a href="https://www.cambridge-water.co.uk/">https://www.cambridge-water.co.uk/</a>   | Cam Ely Ouse                                 |
| British Sugar   | <a href="https://www.britishsugar.co.uk/">https://www.britishsugar.co.uk/</a>   | Cam Ely Ouse                                 |
| CamGrain  | <a href="https://www.camgrain.co.uk/">https://www.camgrain.co.uk/</a>   | Cam Ely Ouse                                 |
| Produce World   | <a href="http://www.produceworld.co.uk/">http://www.produceworld.co.uk/</a>   | Cam Ely Ouse                                 |
| National Farmers Union  | <a href="https://www.nfuonline.com/home/">https://www.nfuonline.com/home/</a>   | All  |
| Association of inshore fisheries and conservation authorities | <a href="http://www.association-ifca.org.uk/">http://www.association-ifca.org.uk/</a>   |  |
| UK Major Ports Group  | <a href="http://www.ukmajorports.org.uk/">http://www.ukmajorports.org.uk/</a>   |  |
| British Marine  | <a href="https://www.britishmarine.co.uk/">https://www.britishmarine.co.uk/</a>   |  |
| Seabed users development group                                | <a href="http://www.sudg.org.uk/">http://www.sudg.org.uk/</a>   |  |
| Shellfish association of great Britain                        | <a href="http://www.shellfish.org.uk/">http://www.shellfish.org.uk/</a>   |  |

## **Section 4: Regional sites of high conservation value**

The following areas have been designated of being of local importance through national and international directives. These are areas of high conservation value as designated by statutory directives. Those listed below form Special Areas of Conservation (SAC), Special Protection Areas (SPA), and Ramsar designated sites. Within the region there are many Sites of Scientific Interest (SSSI) and National Nature Reserves (NNR) however these are often smaller areas that are located within designated SAC's, SPA's and Ramsar sites.

INNS species risks have been highlighted to provide an overview of potential and likely invaders that have been determined to be of concern within the area. Several INNS are already present within each site and would therefore not be included on this list as these would be targeted as part of the INNS management plans (Section 6).

**Table 4: Regional sites of high conservation value**

| Site                        | Location                          | Habitat   | Category          | INNS Species Risks  |
|-----------------------------|-----------------------------------|---|-------------------|---|
| Alde-Ore & Butley Estuaries | Alde-Ore Estuaries – East Suffolk | Estuarine, saltmarsh, intertidal mudflats and sandflats   | SAC               | American mink have been spotted in nearby rivers, New Zealand pygmyweed and signal crayfish are found in nearby waterways and could be transported by birds or contaminated boats   |
| Alde-Ore Estuary            | Alde-Ore Estuaries – East Suffolk | Estuarine, intertidal mud-flats, saltmarsh, vegetated shingle, saline lagoons, grazing marsh    | SPA, SSSI, Ramsar | Zebra mussels coming from nearby Butley River. Pacific oysters are known in from locations within the Combined Essex and East Suffolk catchment, and the American oyster drill in Combined Essex, therefore both species could represent an INNS risk of further spread within and among locations.   |
| Orfordness-Shingle Street   | Alde-Ore Estuaries – East Suffolk | Estuarine, mudflats and sandflats, coastal lagoons, vegetated shingle, grazing marsh, saltmarsh | SAC               | Zebra mussels coming from nearby Butley River, American mink have been spotted in nearby rivers, New Zealand pygmyweed and signal crayfish are found in nearby waterways. Combined Essex and East Suffolk catchment, and the American oyster drill in Combined Essex, therefore both species could represent an INNS risk of further spread within and among locations. |

| Site          | Location                             | Habitat                                      | Category    | INNS Species Risks  |
|---------------|--------------------------------------|--|-------------|---|
| Deben Estuary | Alde-Ore Estuaries<br>– East Suffolk | Estuarine, saltmarsh, intertidal mudflats    | SPA, SSSI   | Zebra mussels coming from nearby Butley River, American mink have been spotted in nearby rivers, New Zealand pygmyweed and signal crayfish are found in nearby waterways. Combined Essex and East Suffolk catchment, and the American oyster drill in Combined Essex, therefore both species could represent an INNS risk of further spread within and among locations. |
| Broadland     | Broadland                            | Freshwater, grazing marsh, fen, wet woodland | SPA, Ramsar | Marsh frogs have been found in locations surrounding The Broads and could migrate naturally or be transported through connecting waterways.<br>Killer shrimp are known from locations in Ants Valley (e.g. Barton Broad) and could be moved elsewhere via contamination.  |
| The Broads    | Broadland                            | Freshwater, grazing marsh, fen, wet woodland | SAC         | Marsh frogs have been found in locations surrounding The Broads and could migrate naturally or be transported through connecting waterways.<br>Killer shrimp are known from locations in Ants Valley (e.g. Barton Broad) and could be moved elsewhere via contamination.  |



| Site   | Location                                    | Habitat   | Category               | INNS Species Risks  |
|--|---|---|------------------------|---|
| Blackwater Estuary (Mid-Essex Coast Phase 4) | Essex Estuaries – Combined Essex            | Estuarine, mudflats, saltmarsh, shingle, shell banks, grazing marshes, grassland, fleet and ditch systems | SPA, SSSI, Ramsar      | Water fern has been found along estuaries north and South of the Blackwater, there is potential for transport via waterfowl movement. Combined Essex and East Suffolk catchment, and the American oyster drill in Combined Essex, therefore both species could represent an INNS risk of further spread within and among locations. |
| Great Yarmouth North Denes                   | Great Yarmouth Winterton Horsey – Broadland | Sand dune   | SPA, SSSI              | Pirri-pirri burr transported from other coastal sites in GB or as an escapee from a garden.   |
| Winterton-Horsey Dunes                       | Great Yarmouth Winterton Horsey – Broadland | Sand dune, estuarine, mudflats and sandflats, heathland, grassland  | SAC, SSSI              | Pirri-pirri burr transported from other coastal sites in GB or as an escapee from a garden.   |
| Humber Estuary                               | Humber Estuary – Louth, Grimsby, Ancholme   | Estuarine, mudflats and sand flats, lagoons, sand dunes   | SAC, SPA, SSSI, Ramsar | Pirri-pirri burr transported from other coastal sites in GB (e.g. established populations in North England) or as an escapee from a garden.   |
| Benfleet and Southend Marshes                | Greater Thames Complex – South Essex        | Estuarine, saltmarsh, cockle shell banks, mudflats, grassland   | SPA, SSSI, Ramsar      | Chinese mitten crabs are found in the Thames and surrounding areas. Wireweed is located closely round the coast in Combined Essex and South England catchments.   |

| Site                                     | Location  | Habitat   | Category    | INNS Species Risks  |
|--|---|---|-------------|---|
| Thames Estuary & Marshes                 | Greater Thames Complex – South Essex                      | Estuarine, grazing marsh, saltmarsh, flooded clay and chalk pits, intertidal mudflats   | SPA, Ramsar | Chinese mitten crabs are found in the Thames and surrounding areas. Wireweed is located closely round the coast in Combined Essex and South England catchments. Combined Essex and East Suffolk catchment, and the American oyster drill in Combined Essex, therefore both species could represent an INNS risk of further spread within and among locations. |
| Minsmere to Walberswick Heaths & Marshes | Minsmere to Walberswick Heaths and Marshes – East Suffolk | Heathland, acid grassland, vegetated shingle, grazing marsh, fen, saltmarsh, fresh water, woodland, sand dunes                    | SAC, SSSI   | Pirri-pirri burr is already present but could be transported to other coastal sites in GB (especially by ramblers/birdwatchers) or as an escapee from a garden.   |
| Minsmere-Walberswick                     | Minsmere to Walberswick Heaths and Marshes – East Suffolk | Heathland, acid grassland, vegetated shingle, grazing marsh, fen, saltmarsh, fresh water, intertidal mudflat, woodland, reed beds | SPA, Ramsar | Zebra mussels are found in the nearby Broadlands and could be transported by anglers, slipper limpets and giant rhubarb have also been reported in nearby Broadlands.   |
| Norfolk Valley Fens                      | Norfolk Valley Fens – Cam Ely Ouse, Broadland             | Fen, heathland, bogs and marshes, grassland, broad-leaved deciduous woodland  | SAC         | Water fern is found in the around Norfolk Broads, giant goldenrod is found in both nearby Broads and Cambridgeshire areas.  |
| Rex Graham Reserve                       | Rex Graham Reserve – Cam Ely Ouse                         | Chalk grassland, broad-leaved deciduous woodland  | SAC, SSSI   | Water fern is found in the around Norfolk Broads. Giant goldenrod is found in both nearby Broads and Cambridgeshire areas.  |

| Site                       | Location  | Habitat   | Category          | INNS Species Risks  |
|----------------------------|---|---|-------------------|---|
| River Wensum               | River Wensum – Broadland                                  | Chalk river, fens, grassland, broad-leaved deciduous woodland               | SAC, SSSI         | Marsh frogs have been found in locations surrounding the broads and could migrate naturally or be transported through connecting waterways.<br>Killer shrimp are known from locations in Ants Valley (e.g. Barton Broad) and could be moved elsewhere via contamination (e.g. on boats or angling equipment).   |
| Rutland Water              | Rutland Water – Welland                                   | Reservoir, wetland and lakeside habitats                                    | SPA, SSSI, Ramsar | Killer shrimp coming from Grafham Water (due to popular angling competitions being held in both places)   |
| Stour and Orwell Estuaries | Stour and Orwell Estuaries – Combined Essex, East Suffolk | Estuarine, mudflats, low cliff, saltmarsh, vegetated shingle, grazing marsh | SPA, Ramsar       | While it has been recorded in the Stour, the Spiny cheek and other crayfish species have been recorded in greater abundances in other locations in the Combined Essex region (e.g. the nearby Colne River) and could be transported by anglers moving between regions. Marine species such as wireweed, brush clawed shore crabs and Asian shore crabs are could spread within these estuaries. |

| Site                           | Location  | Habitat  | Category               | INNS Species Risks  |
|--------------------------------|---|--|------------------------|---|
| Gibraltar Point                | The Wash and North Norfolk Coast – Witham   | Sand dunes, saltmarsh, intertidal mudflat, freshwater marsh, open water  | SPA, SSSI, Ramsar, NNR | Many invasive species (e.g. water fern, New Zealand pygmyweed, slipper limpets, giant goldenrod, the sideswimmer ( <i>Gammarus tigrinus</i> ), curly waterweed) have been recorded at this site, care should be taken to stop further spread or encroachment from adjacent areas. At Risk from pirri-pirri burr found at other locations within the wash. |
| North Norfolk Coast            | The Wash and North Norfolk Coast – North West Norfolk, North Norfolk                        | Estuarine, mudflats and sandflats, coastal lagoon, saltmarsh, sand dune, sand beaches, grazing marsh, shingle                | SPA, SAC, SSSI, Ramsar | Pirri-pirri burr transported from other coastal sites in GB and in North Norfolk and North West Norfolk or as an escapee from a garden.<br>Many invasive species have been recorded around The Wash, care should be taken to stop further spread or encroachment from adjacent areas  |
| The Wash & North Norfolk Coast | The Wash and North Norfolk Coast – Witham, Welland, Nene, North West Norfolk, North Norfolk | Marine and sea inlet, sandbanks, sand dunes, saltmarsh, intertidal mudflat and sandflats, mixed sediment reef, grazing marsh | SAC                    | Many invasive species (e.g. water fern, New Zealand pygmyweed, slipper limpets, giant goldenrod, the sideswimmer ( <i>Gammarus tigrinus</i> ), curly waterweed) have been recorded around The Wash, care should be taken to stop further spread or encroachment from adjacent areas   |

| Site     | Location  | Habitat   | Category               | INNS Species Risks   |
|----------|---|---|------------------------|--|
| The Wash | The Wash and North Norfolk Coast - Witham, Welland, Nene, North West Norfolk, | Sand dunes, saltmarsh, intertidal mudflat and sandflats, shallow waters, deep channels, gravel pits | SPA, SSSI, Ramsar, NNR | <p>Pirri-pirri burr is present in places (North West Norfolk) but could be transported further, either from coastal sites via walkers/bird watchers or as an escapee from a garden.</p> <p>Many invasive species (e.g. water fern, New Zealand pygmyweed, slipper limpets, giant goldenrod, the sideswimmer (<i>Gammarus tigrinus</i>), curly waterweed) have been recorded around The Wash, care should be taken to stop further spread or encroachment from adjacent areas</p> |

## Section 5: Regional hotspots for INNS

### Data and recording

In producing this document it has been essential to consider what is known about the presence of invasive non-native species within the region. In order to establish the presence of species either currently or in the past, and then produce the lists for action, it has been important to access comprehensive and robust data from a wide range of sources. Data has been obtained from a variety of sources including Local Environmental Records centres, local natural history societies and field clubs, online recording systems, mobile apps and ad hoc records provided during the consultation phase of the project. The NBN Atlas was also used as a way of identifying additional data sources and to help place records from the East of England into a national context when developing the action lists.

For the purposes of the project data has been used to build the lists for action and to develop species lists for the management catchments. Maps have been produced showing the number of records collected, and to show the number of species recorded.

These maps have allowed the identification of hotspots for invasive species. This is however not without issues as these maps can provide a picture over-emphasising where recording is happening for reasons unrelated to the identification of invasive species, for instance at well-known birdwatching sites, and consideration needs to be given to how this may skew the overall picture of presence at a catchment level. The level of recording at these sites however does give confirmation that there is a network of people who are able and willing to record invasive species and who could perhaps be utilised for future work to identify and record species as they occur or establish in the management catchments.

All species records collected have been used in the assessment and development of the lists rather than restricting to very recent data. Whilst it is important to restrict data use to recent data to develop the action lists, older data can give vital information on the hotspots and potential of sites for future colonisation. For instance the historic extent of copyu prior to

eradication can help to understand the potential spread of a newly established mammal species.

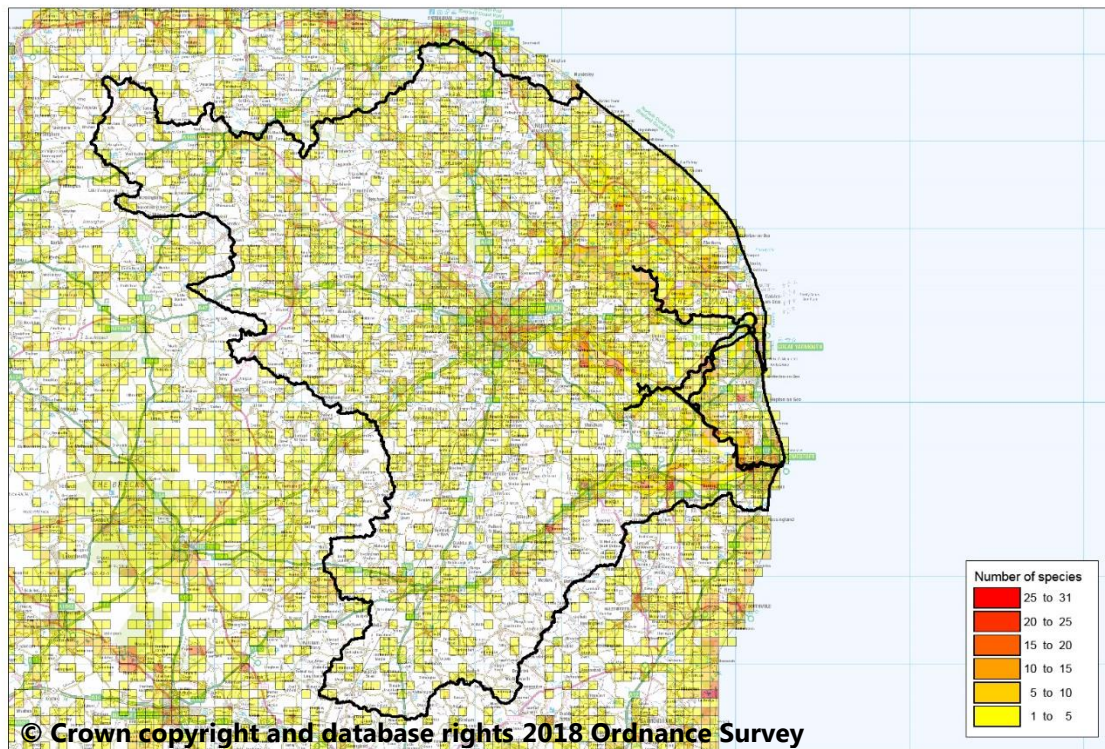
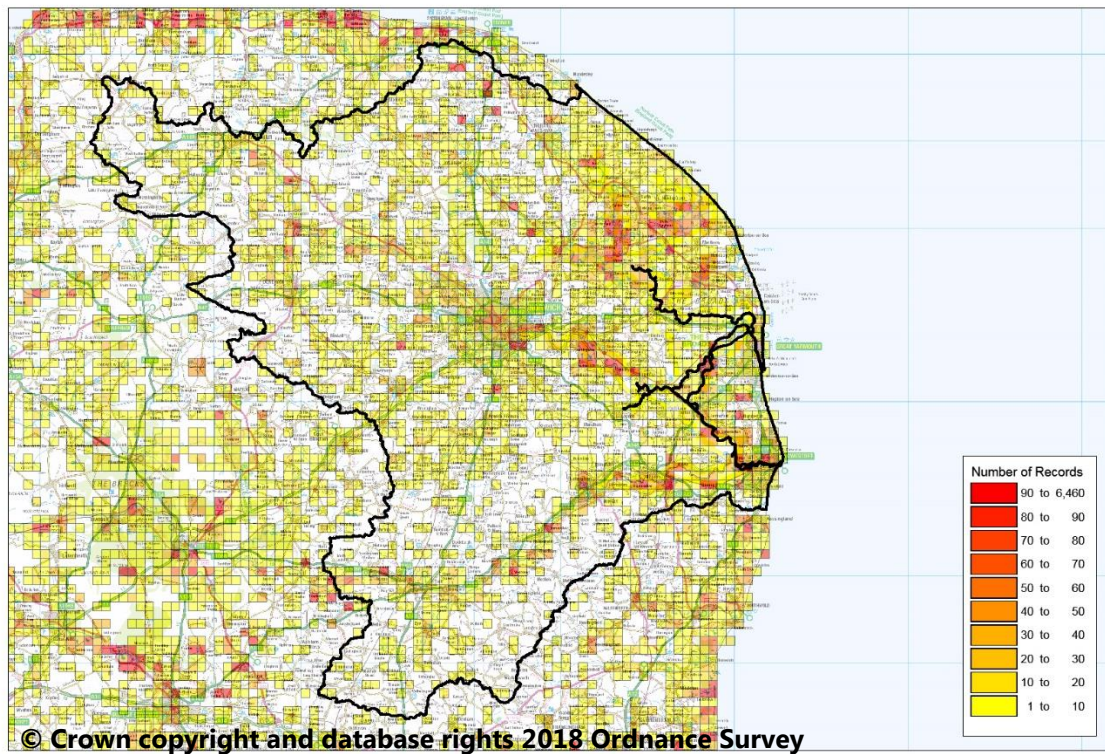
In order to ensure that RIMPs can become living documents and evolve to address future occurrences and establishment of species there will need to be a continued gathering of robust data and a mechanism for accessing it. At present the network of organisations providing biodiversity data allows access within a licensing framework based on a need to support this data collection, often with associated processing charges. Future work needs to recognise this as a component of any funding bids or support for recording networks. It is

possible that a move to more provision of Open Data or equivalent licences may address this but there will still be a need to support and fund the networks and projects providing this.

### **Regional heat maps - hotspots**

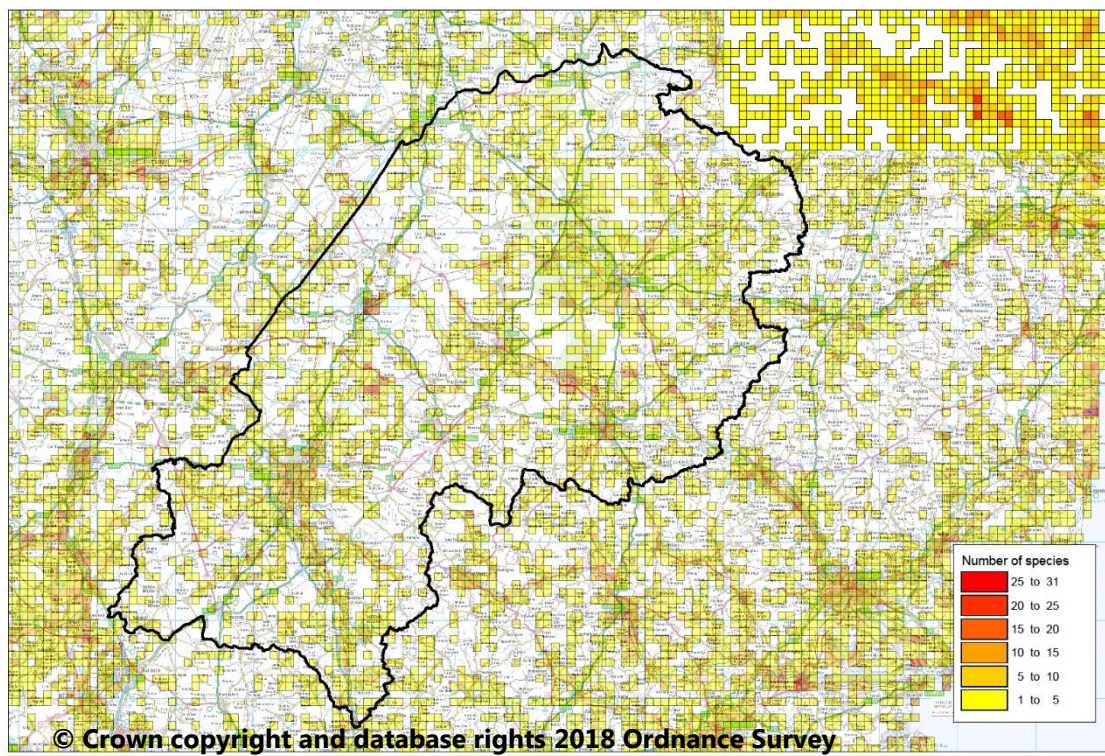
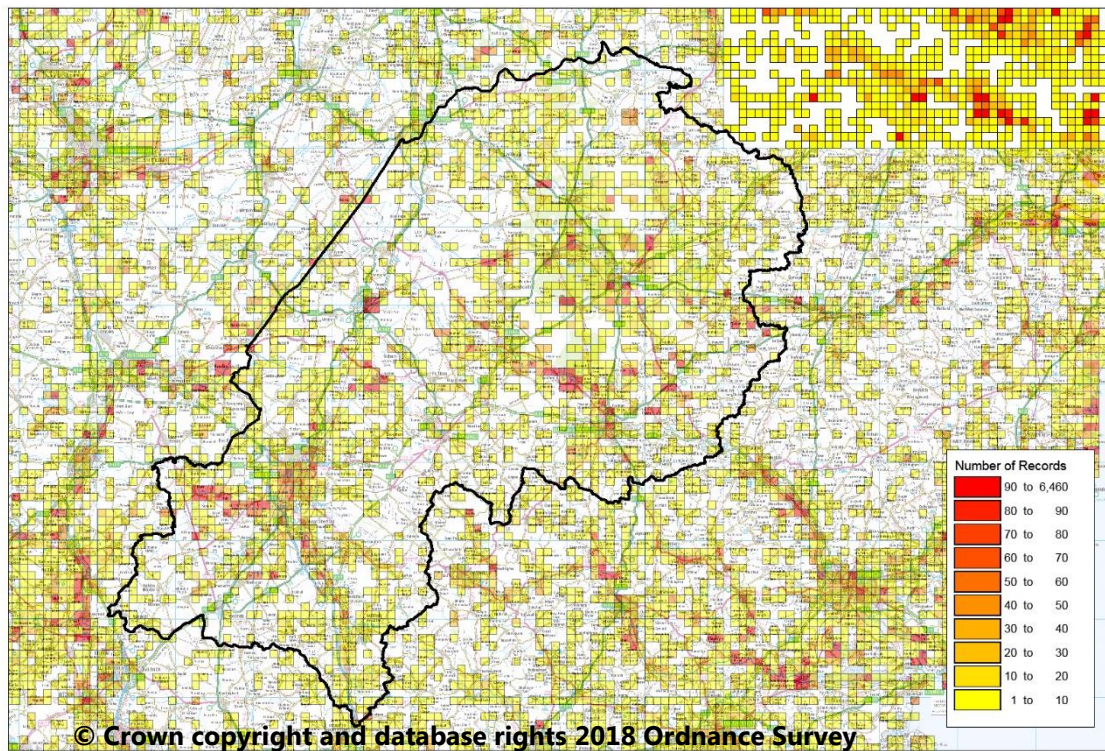
The following heat maps highlight the number of records collected, and the number of species recorded to highlight INNS hotspots within each catchment. These hotspots represent the intensity of occurrence of the number of reported sightings (records) and the number of species reported for all riparian terrestrial and coastal species.

## Broadlands Catchment

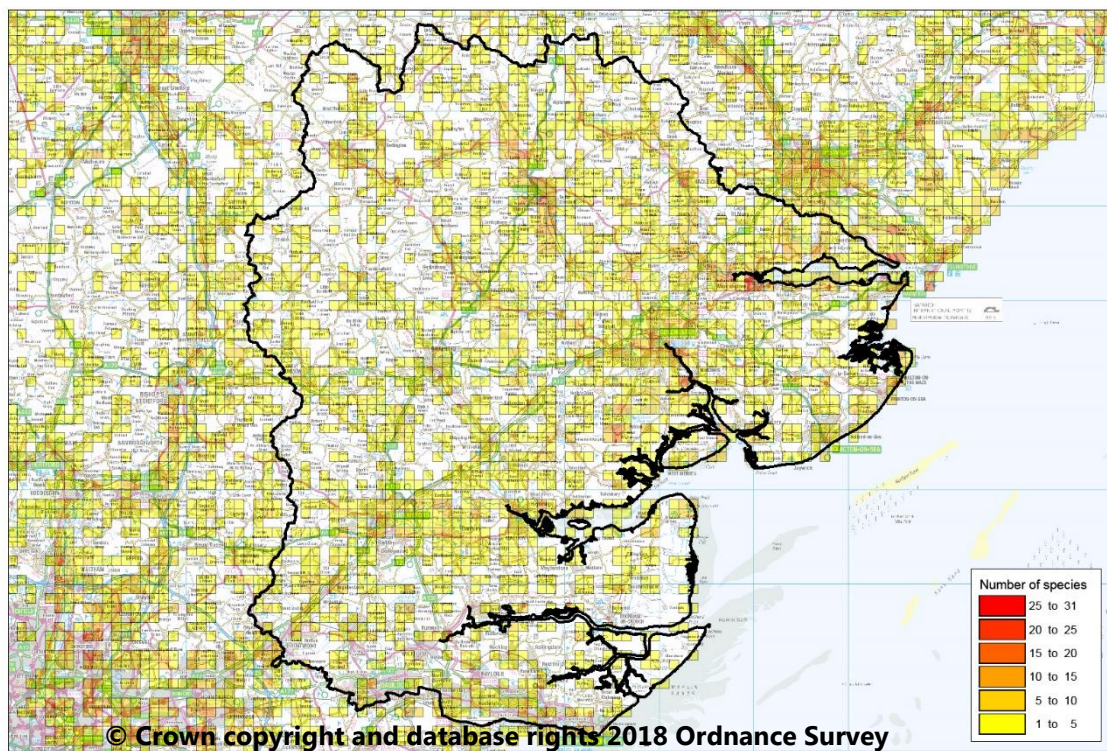
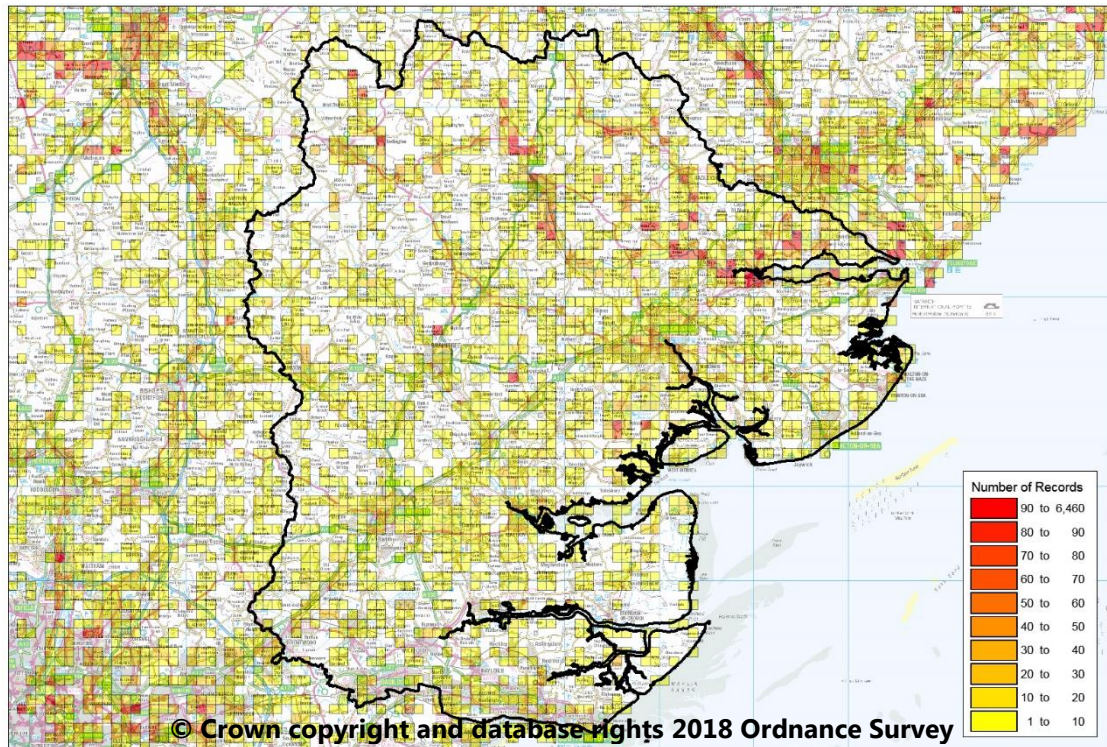




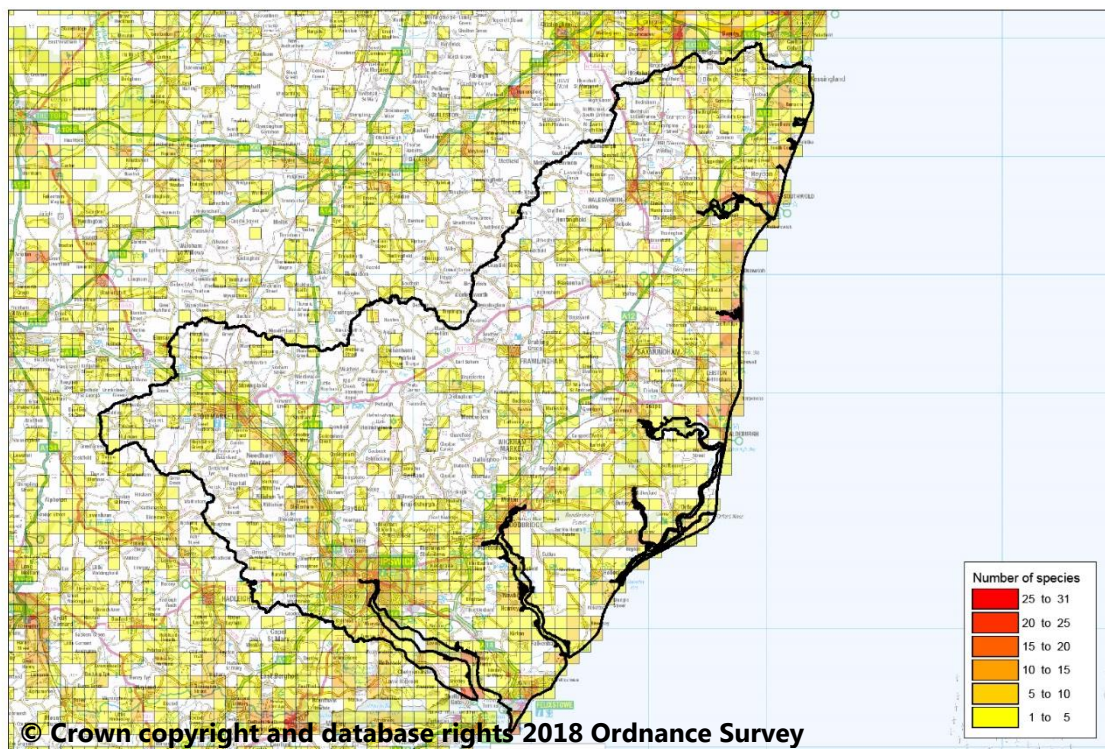
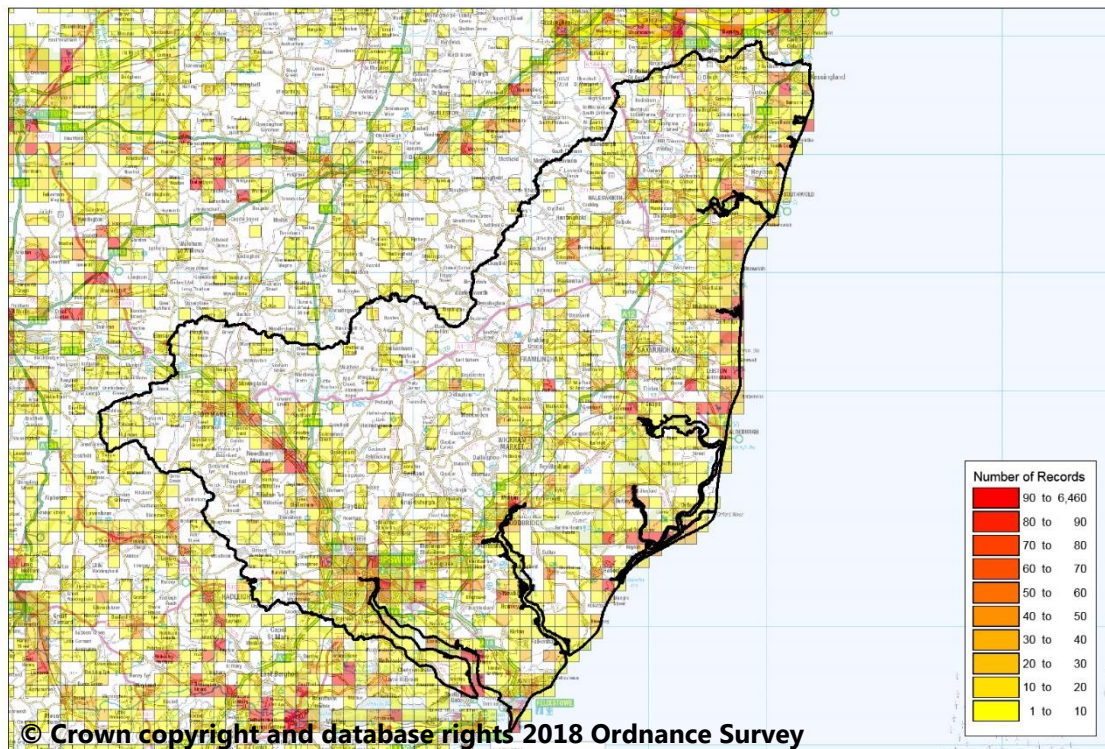
## Cam Ely Ouse



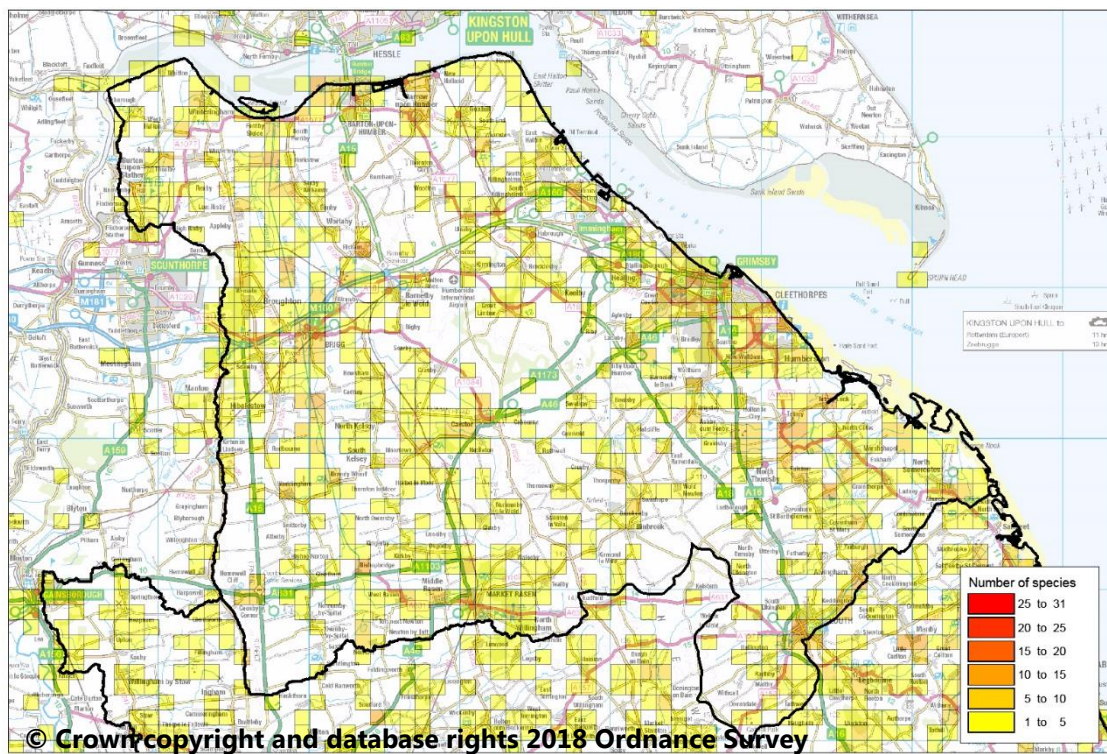
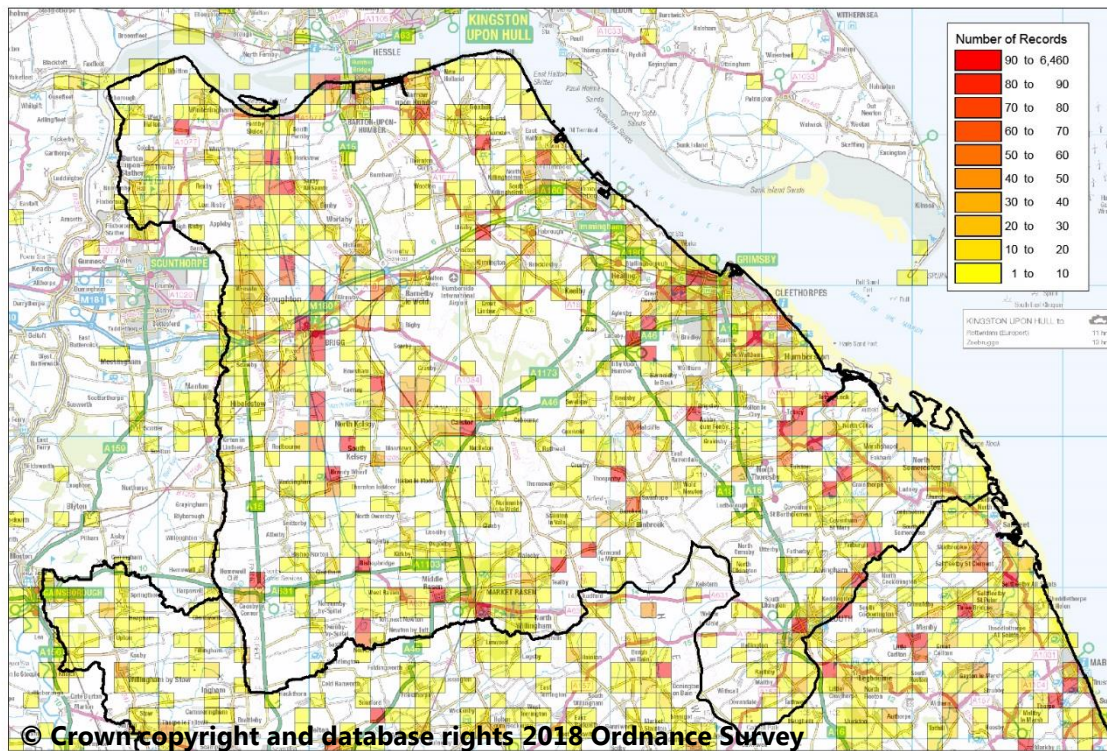
## Combined Essex



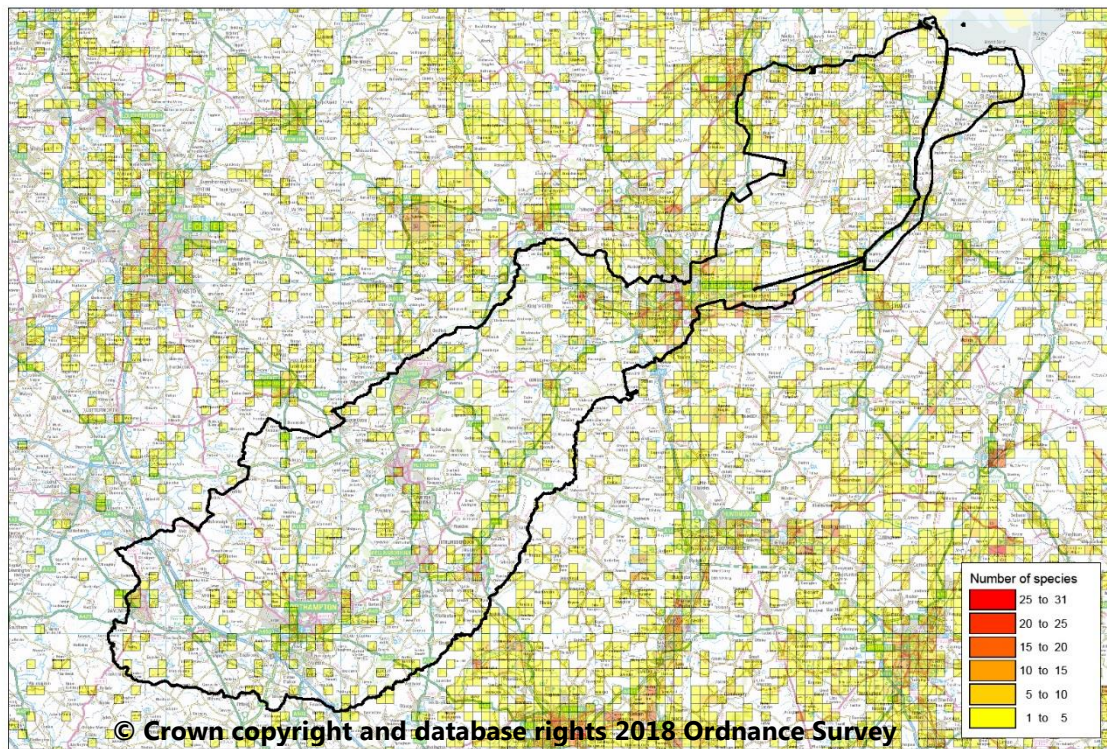
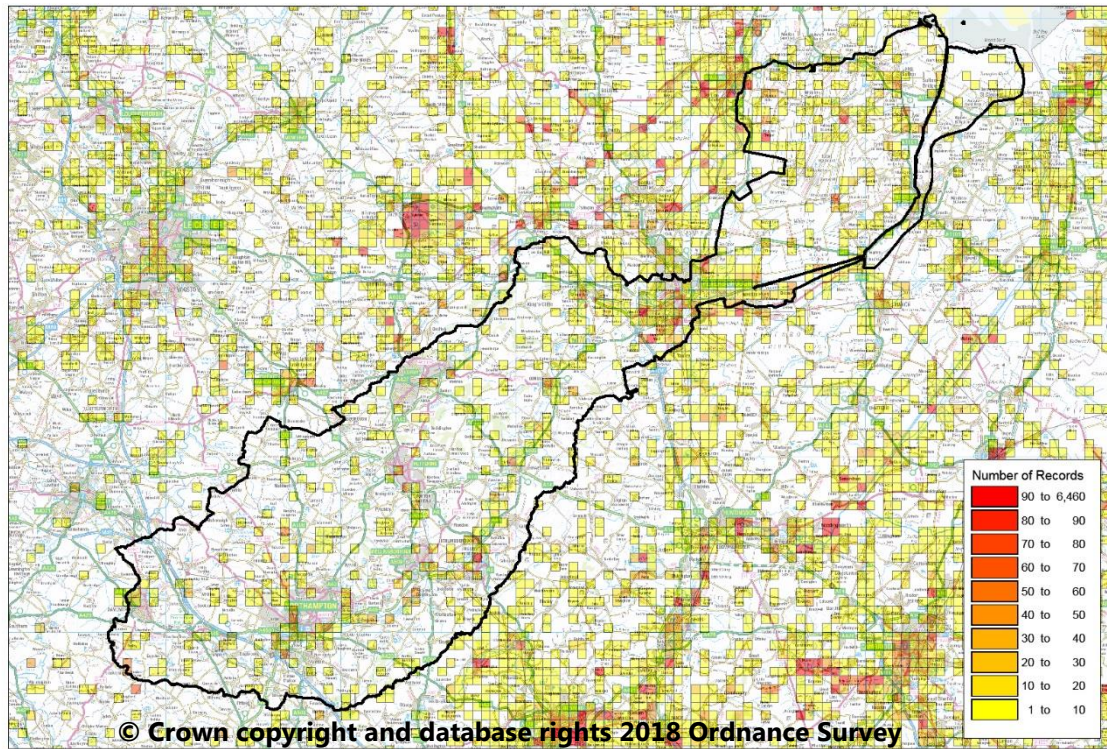
## East Suffolk



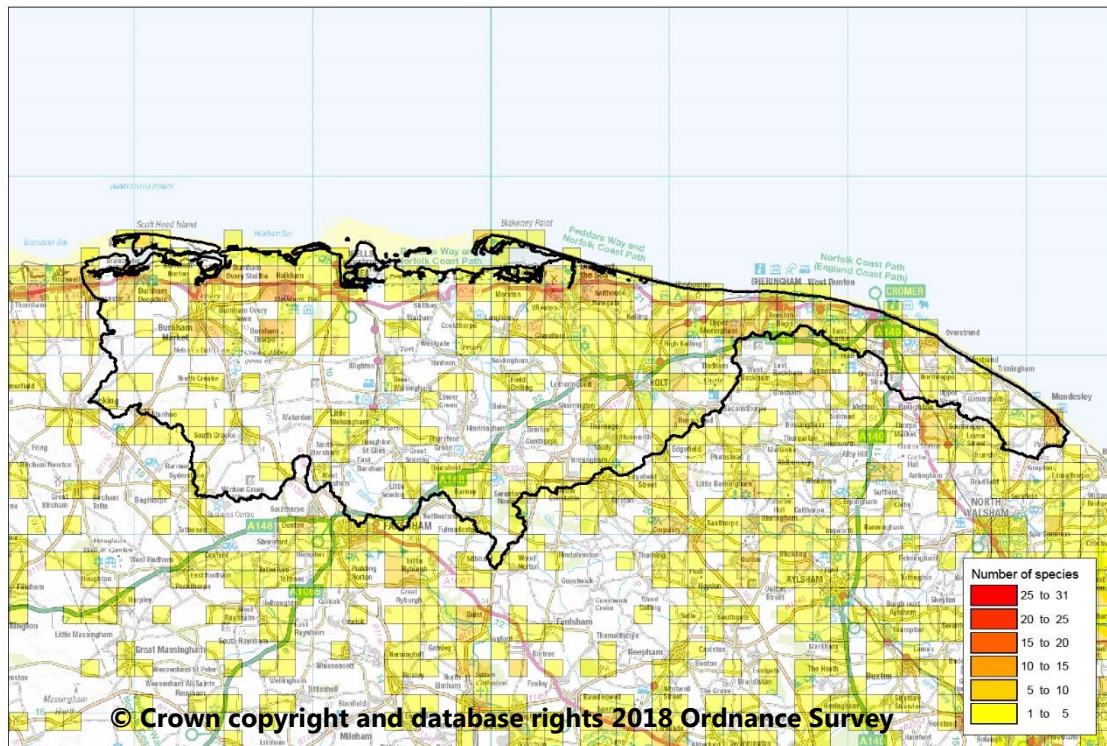
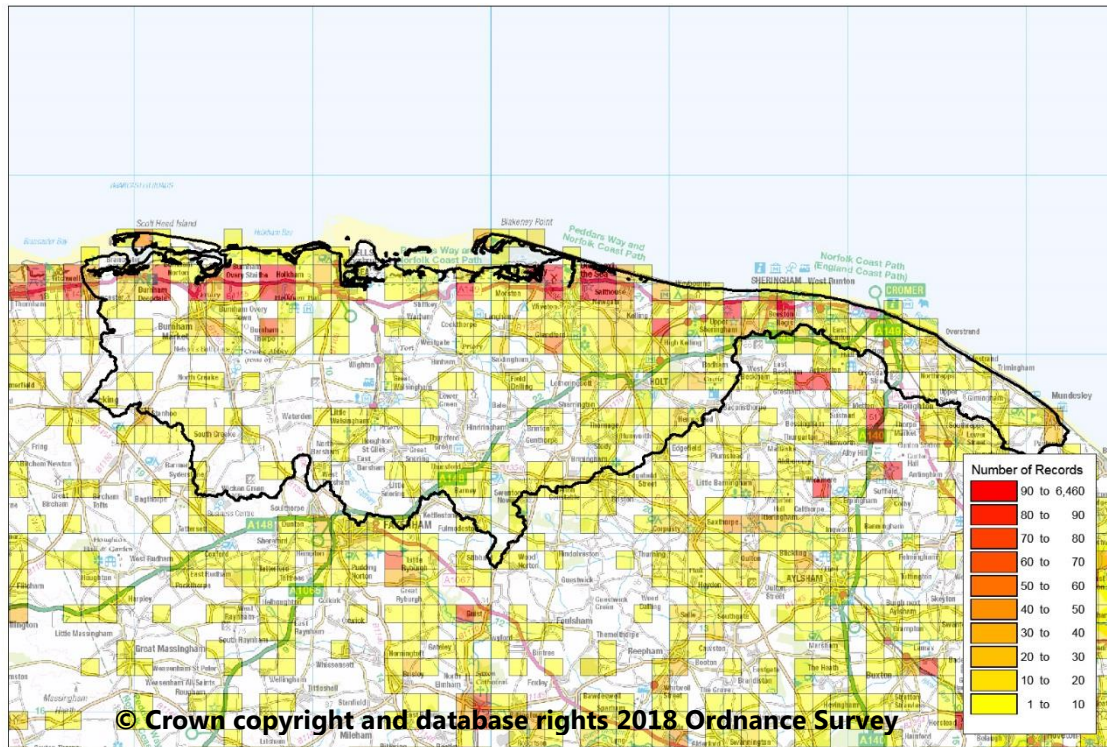
## Louth Grimsby and Ancholme



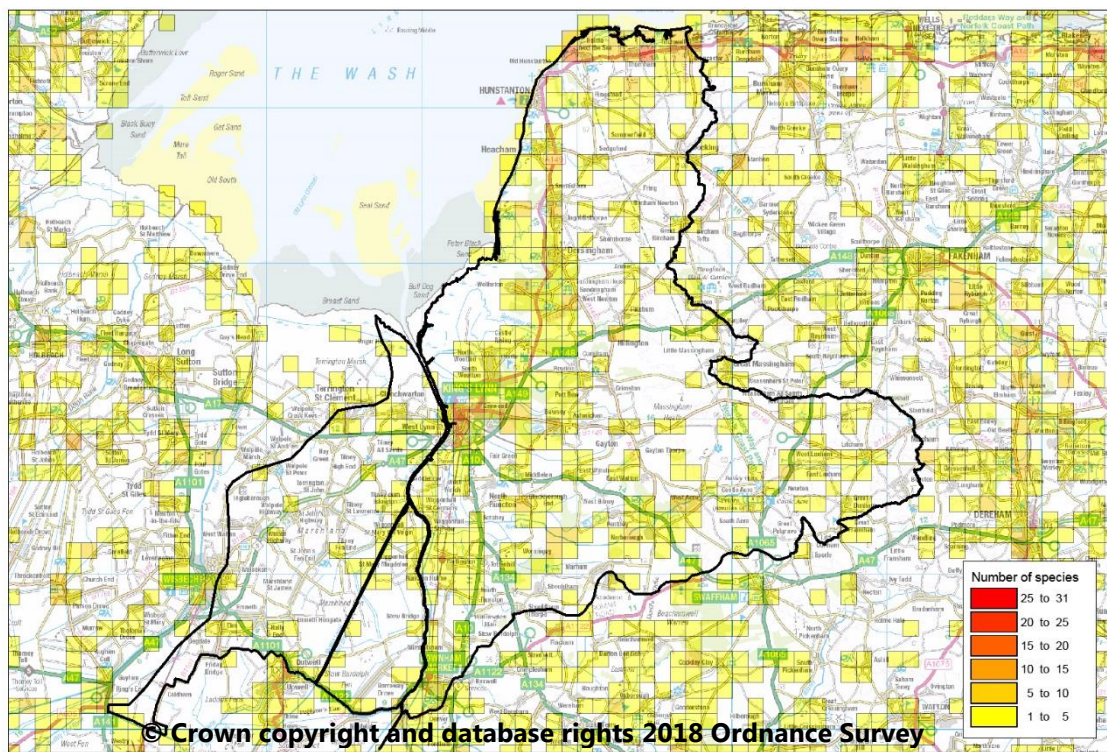
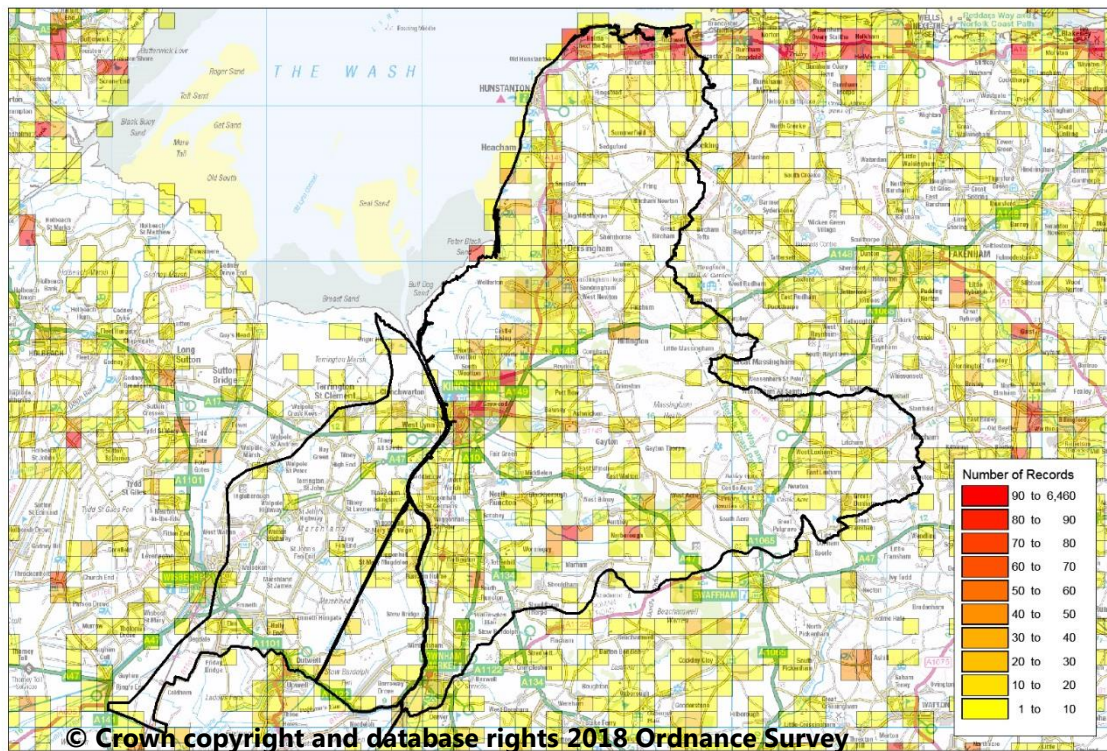
# Nene



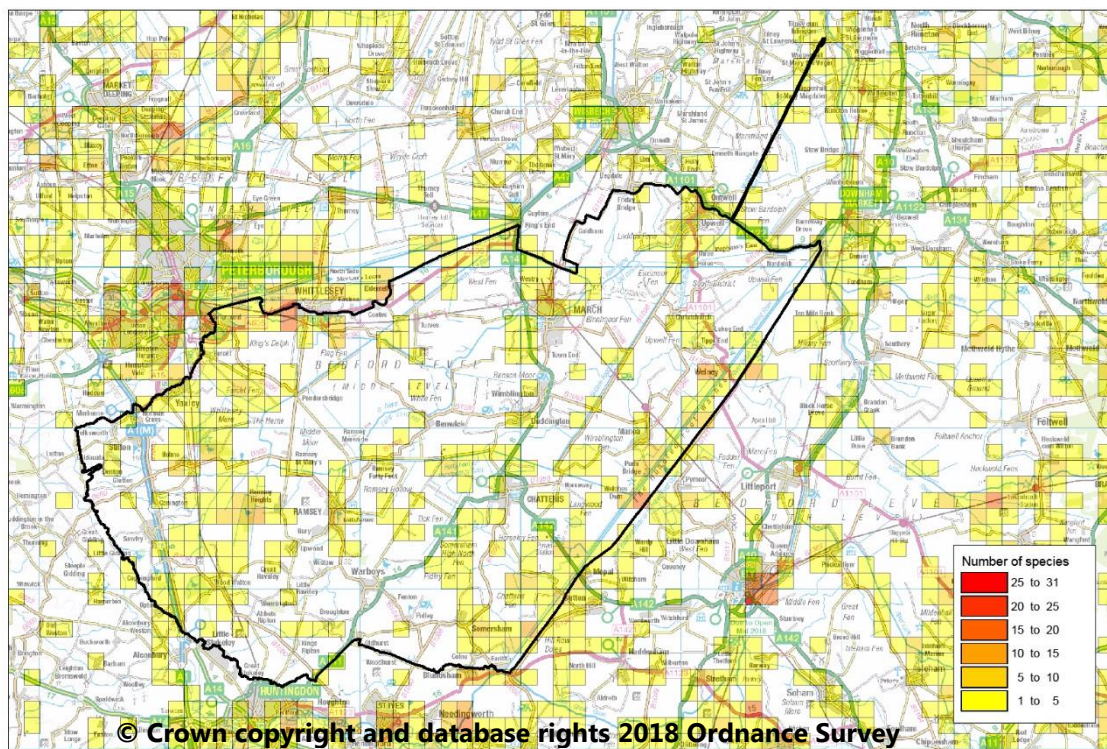
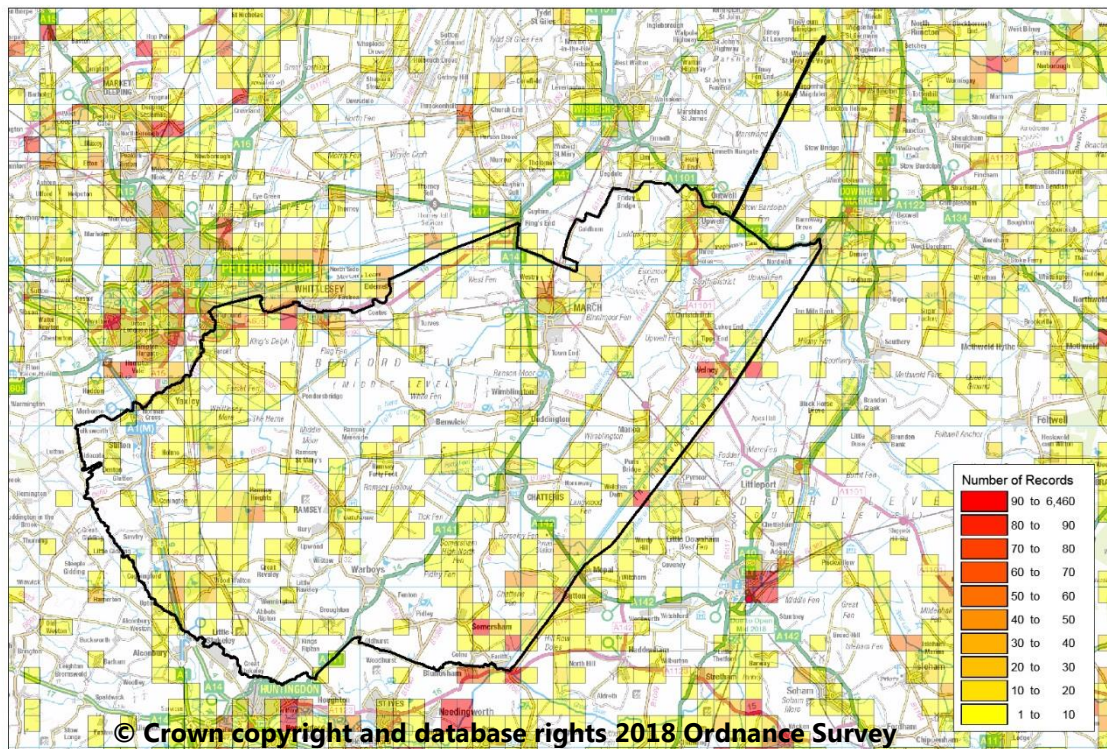
# North Norfolk



# North West Norfolk

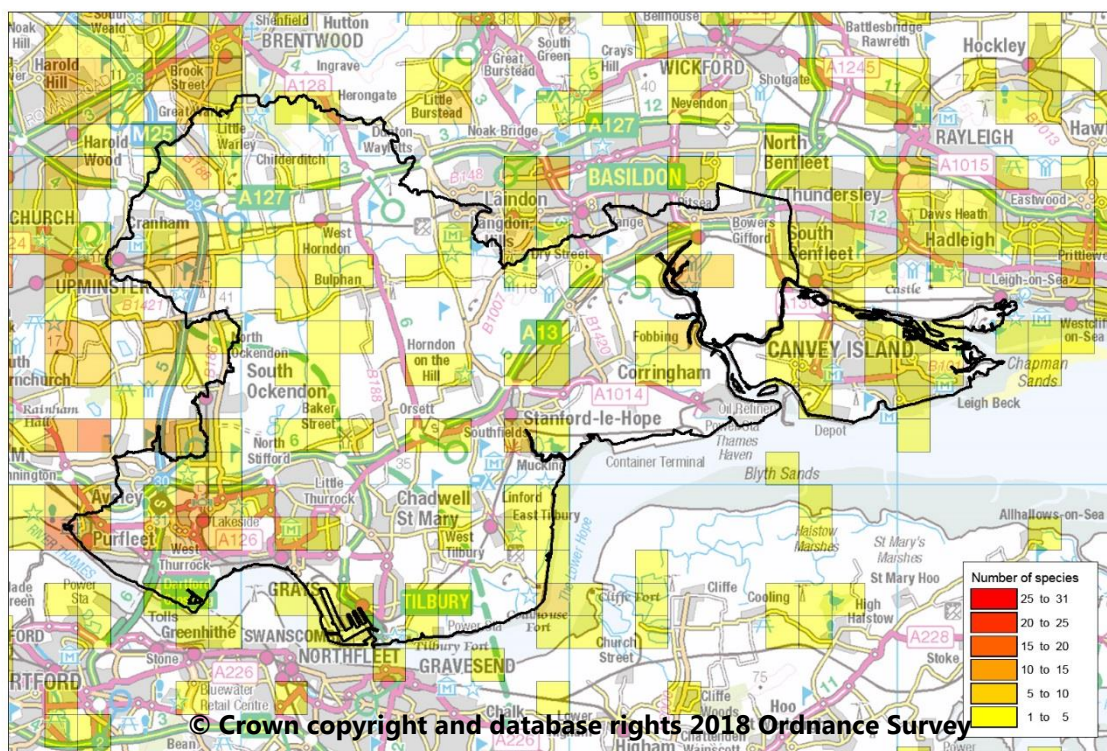
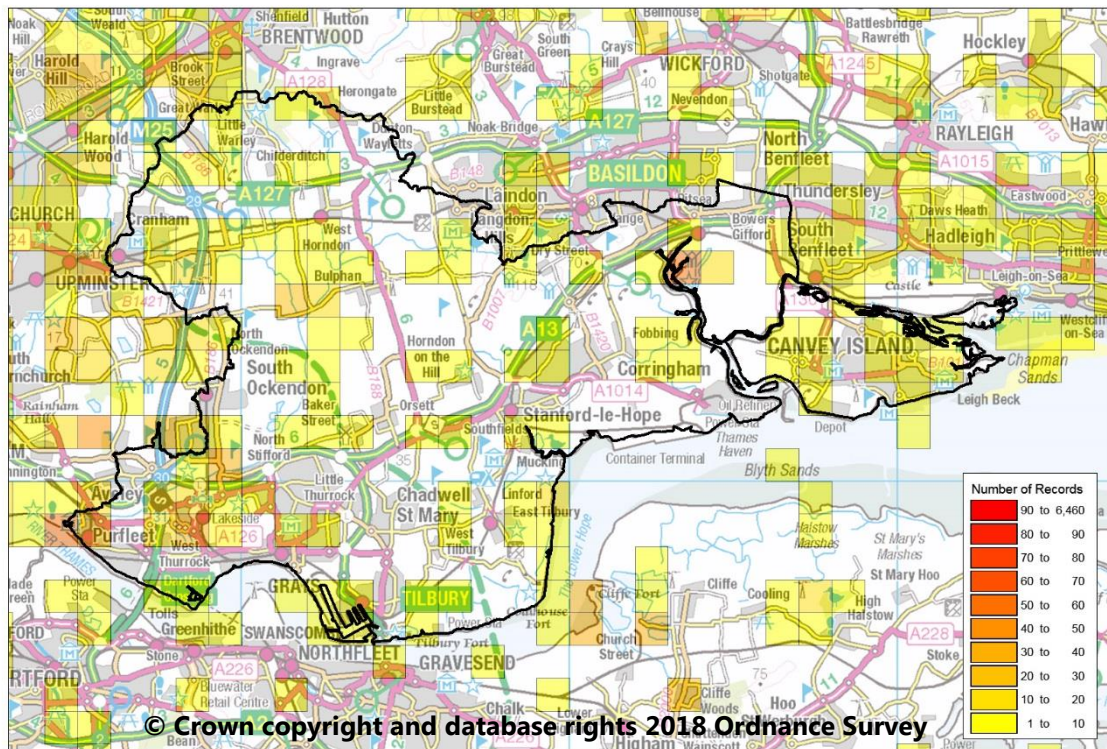


## Old Bedford and Middle Level

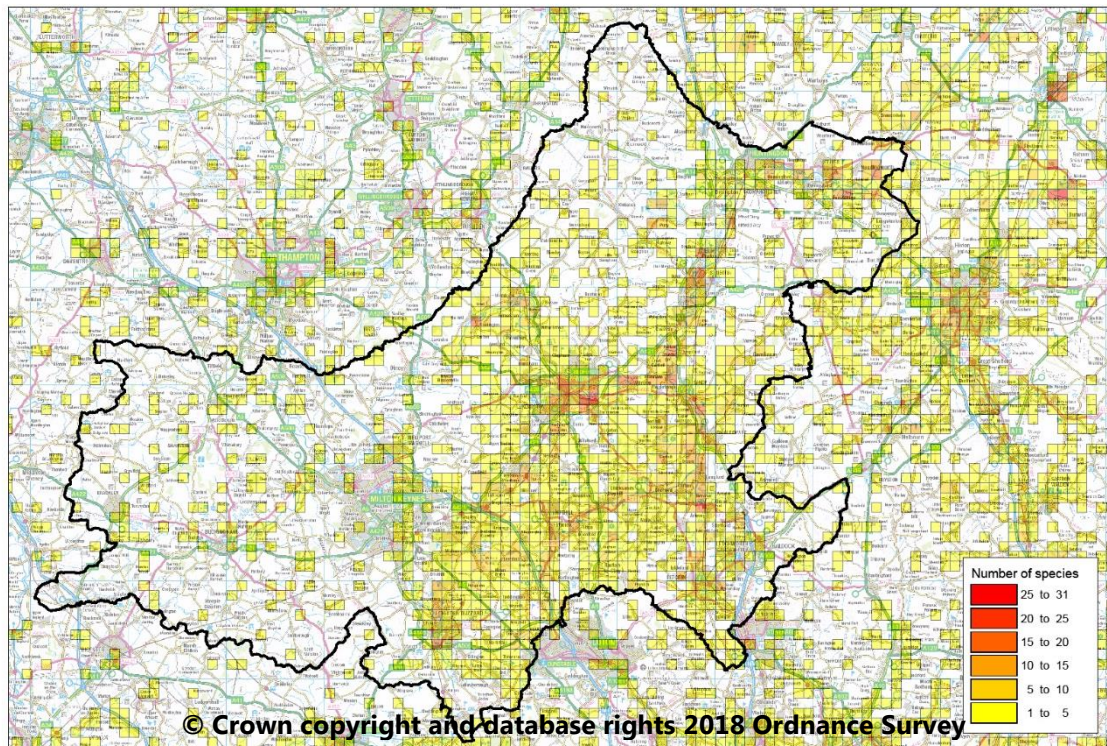
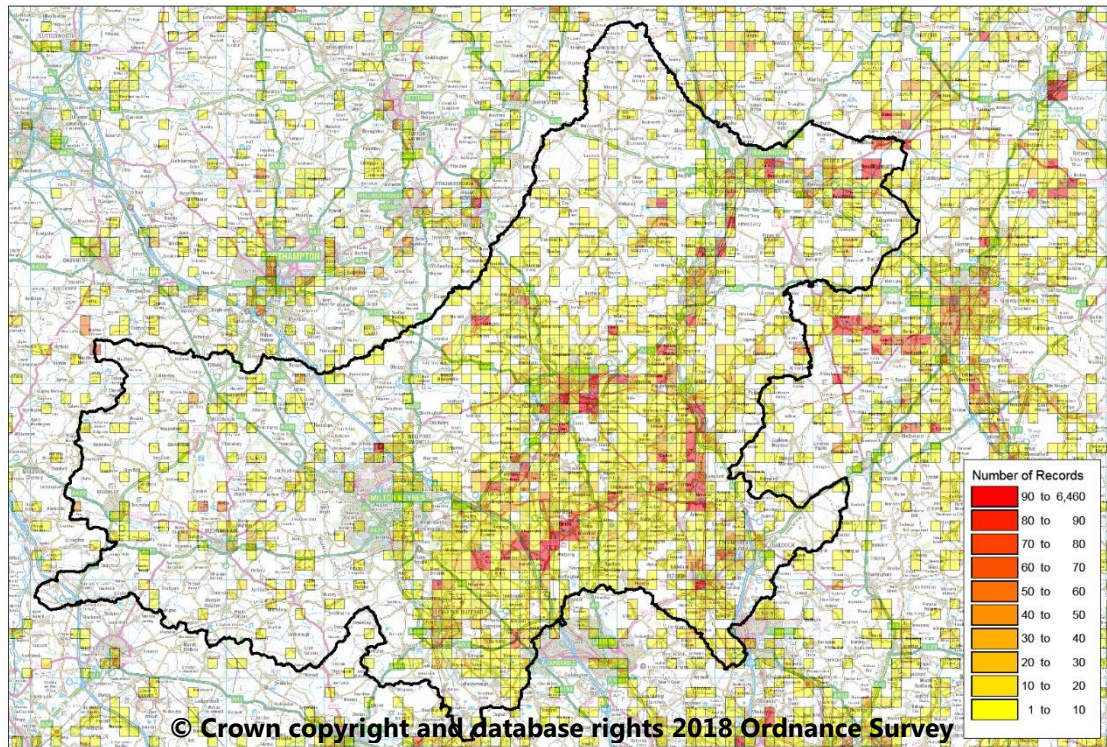




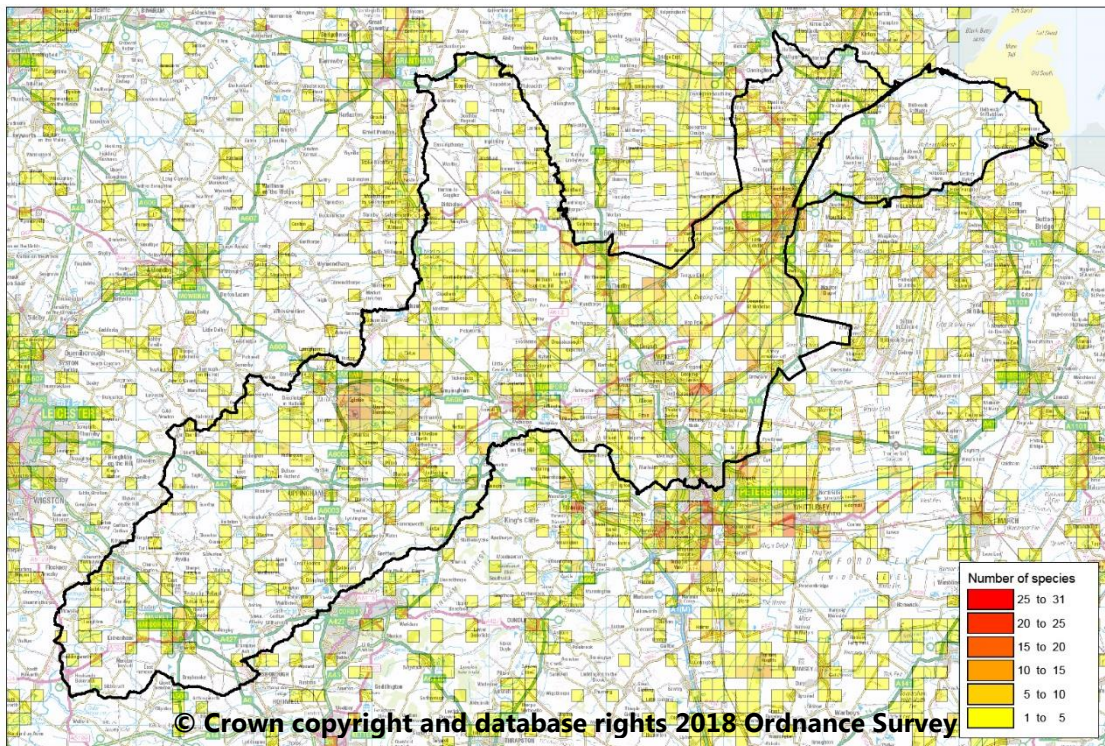
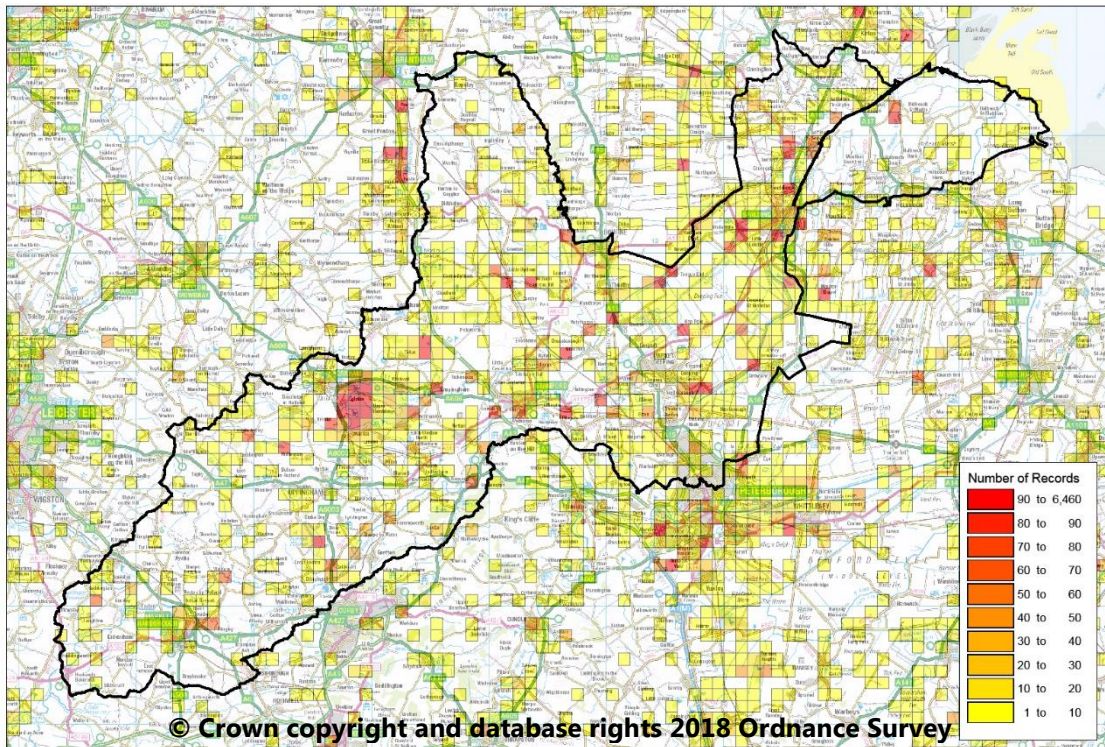
## South Essex



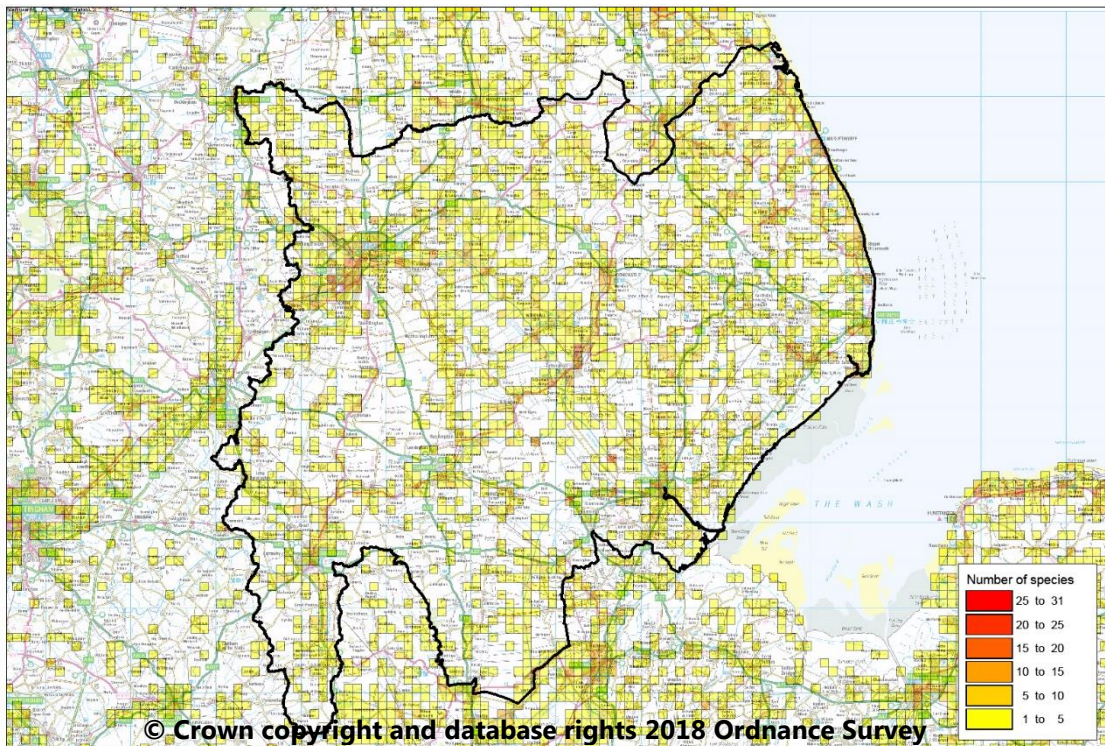
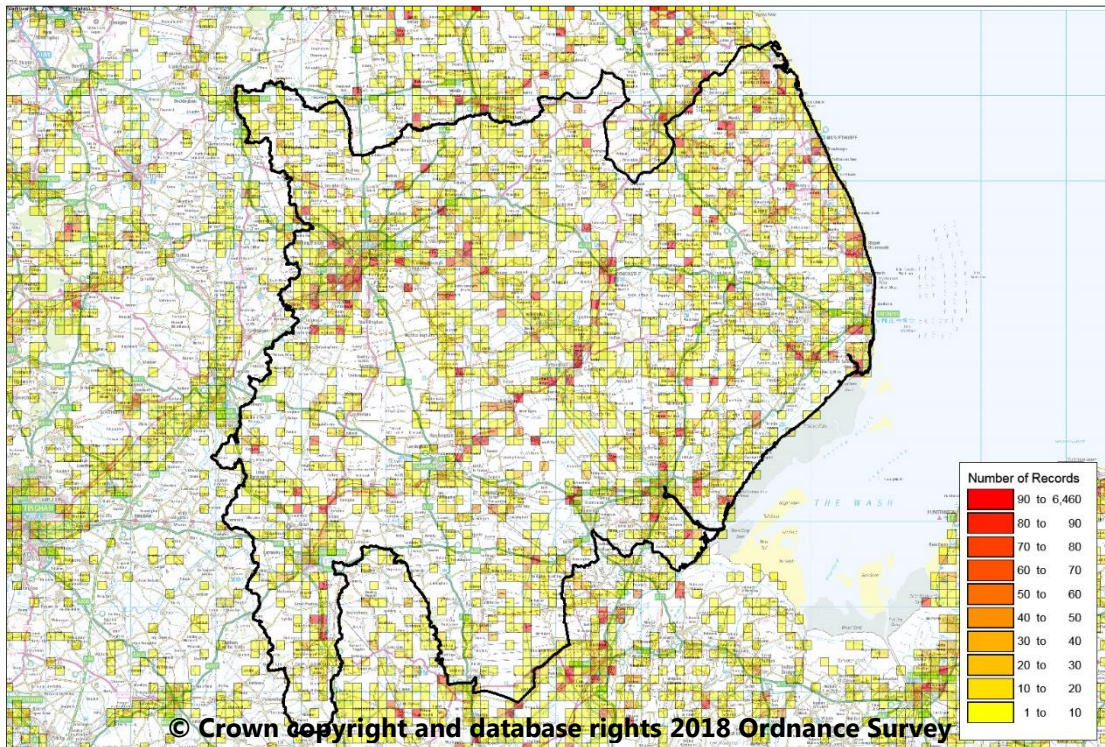
## Upper and Bedford Ouse



# Welland



# Witham



## Regional hotspots

A selection of the major hotspots for INNS introduction in each catchment has been identified and provided below. These hotspots are defined as locations that contain significant numbers of invasive species that are likely to spread due to activities that take place within the location. Areas are also listed where there is significant risk of spread of a particular species

due to the activities that take place within the location. This table outlines high risk areas likely to lead to invasions due to, for example, high numbers of recreational traffic. Often these areas are associated with high numbers of and total sightings of invasive species (see above).

**Table 5: Regional hotspots for INNS**

| Site  | Location   | Habitat  | Risk activities   | INNS species risks   |
|---|------------|--|---|--|
| Norfolk Broads                              | Broadlands | Rivers, streams, freshwater                                      | Dispersal to interconnecting waterways, contamination on peoples clothing, shoes, boats etc. as well as being a popular tourist destination.        | New Zealand pygmyweed, floating pennywort, giant hogweed, Himalayan balsam, Japanese knotweed, parrot's feather  |
| Barton Broad                                | Broadlands | Open water, reedbeds, fens and wet and dry woodland              | Dispersal to interconnecting waterways, yearly regatta, popular fishing area.   | Killer shrimp, zebra mussels, <i>Crangonyx</i>   |
| River Yare (Yare valley)                    | Broadlands | Wet woodlands, shallow lakes, reedfen, meadows and wet grassland | Walking/rambling, river tourism, popular among anglers, host of fishing competitions  | Nuttall's waterweed, American willowherb, giant knotweed, <i>Corbicula fluminea</i> , zebra mussel, American mink  |
| Oulton Broad/Lake Lothing/Lowestoft Harbour | Broadlands | Lake, marsh, harbour   | Tourist and sporting centre, Port of Lowestoft – provides traffic to/from European ports and provides berth for recreational and commercial vessels | Wakame, nuttall's waterweed Japanese knotweed, giant hogweed, Canadian goldenrod, zebra mussel, wakame, marine fouling species (e.g. leathery sea squirt). |

| Site   | Location                        | Habitat  | Risk activities  | INNS species risks   |
|--|---------------------------------|--|--|--|
| Titchwell Marsh and Holme Dunes                    | North West Norfolk              | Marshland  | Popular bird watching location, they could spread to other locations   | Numerous species of invasive birds and fowl, Chinese mitten crab, pirri-pirri burr |
| River Glaven and north Norfolk coastal path        | North Norfolk                   | River, ponds and pools   | General recreation   | Ibis, giant hogweed, Japanese knotweed   |
| Lackford Lakes (Bury St Edmonds), River Lark       | Cam Ely Ouse                    | Lakes, river, grassland  | Contamination from sailing and canoeing, walking and tourism to the area   | Signal crayfish, Nuttall's waterweed, Himalayan balsam                             |
| River Ouse   | Cam Ely Ouse                    | River banks  | Natural dispersal, fouling   | Chinese mitten crabs   |
| Bourne Brook                                       | Cam Ely Ouse                    | Stream   | Walking – close to footpath, natural dispersal along river course  | Himalayan balsam, giant hogweed  |
| Dedham vale – River Stour, Flatford to Manningtree | Combined Essex                  | River, grassland, wet meadows.                                     | River walking, natural dispersal, boating  | Nuttall's waterweed, giant hogweed, Himalayan balsam, zebra mussel, crayfish       |
| River Stour and Orwell estuary                     | Combined Essex and East Suffolk | Estuarine, mudflats, open water                                    | River walking, natural dispersal, boating  | Leathery sea squirt, wireweed, wakame, Pacific oyster, brush clawed shore crab.    |
| Minsmere   | East Suffolk                    | Dunes, coastal lagoons, reedbed, wet grassland, shingle vegetation | Coastal walking, bird watching. Seeds and fragments can easily be transported to new sites on shoes and clothing | Water fern, Canadian and Nuttall's waterweed, giant hogweed, pirri-pirri burr      |
| River Gipping between Stowmarket and Needham       | East Suffolk                    | River, lakes and woodland  | River course follows major roads and train routes, coastal paths, angling hotspots                               | Himalayan balsam, waterweed, signal crayfish                                       |
| Near Orford on the River Alde                      | East Suffolk                    | Estuarine, mudflats and sandflats                                  | Natural dispersal, human activities boating and sailing  | Leathery sea squirt, Asian shore crab, wakame, Pacific oyster                      |
| River Humber                                       | Louth Grimsby and Ancholme      | Intertidal sand and mudflats                                       | Natural dispersal, fouling   | Chinese mitten crabs, leathery sea squirt, wakame                                  |
| River Freshney                                     | Louth Grimsby and Ancholme      | River, lake  | Walking paths, angling   | Waterweed  |
| Snettisham   | North West Norfolk              | Coastal dunes, shingle, sand                                       | Bird watching, coastal walking   | Pirri-pirri burr   |
| River Nene, west of Peterborough                   | Nene                            | River, lakes, meadows  | Rowing and canoeing, Nene park – boating, walking, railway, water sports and recreation                          | Himalayan and orange balsam, waterweed   |

| Site                                     | Location                     | Habitat                                      | Risk activities   | INNS species risks  |
|--|------------------------------|--|---|---|
| Old Bedford River                        | Old Bedford and Middle Level | River, wetlands, fens                        | Recreational tourism – walking, bird watching, fishing            | Nuttall's waterweed   |
| Woodwalton Fen                           | Old Bedford and Middle Level | Fen, meadows, reedbed and woodland           | Recreation – walking trails, wildlife watching                    | Water fern, Nuttall's waterweed, zebra mussel                                   |
| Grafham Water                            | Upper and Bedford Ouse       | Reservoir                                    | Contamination on recreational boats / anglers                     | Killer shrimps  |
| Priory Lake and River Great Ouse         | Upper and Bedford Ouse       | River and lakes                              | Fishing lakes, boating lakes, country park recreation             | Zebra mussel, floating pennywort  |
| Paxten Pits to Buckden Lake              | Upper and Bedford Ouse       | Lakes, meadow, grassland, scrub and woodland | Fishing lakes, marinas, nature reserve                            | Water fern, Nuttall's waterweed, Himalayan balsam                               |
| Rutland water reservoir                  | Welland                      | Reservoir, wetland                           | Angling and water sports activities, aqua park, wildlife watching | Signal crayfish, zebra mussel, Nuttall's waterweed                              |
| Whisby nature park and surrounding lakes | Witham                       | Lakes, river                                 | Foot paths and fishing lakes, sailing                             | New Zealand pygmyweed, Nuttall's waterweed, Jenkin's spire snail, American mink |

## Section 6: INNS management

### Management and reporting INNS

In the preparation of regional INNS management priorities, it is essential to incorporate national policy and species-specific approaches so that high-level GB strategy is implemented at regional and local level. It is also important to consider existing regional and local INNS management so that the RIMPS complement these actions.

In the latter case, one of the key objectives of RAPID is to increase the effectiveness of management through enhanced cooperation and strategic control across the wider landscape.

Management strategies are devised in line with the RAPID INNS management toolkits for freshwater, marine, alert species and incorporate good practice management guidelines. This information can be found on the RAPID webpage on the GBNNSS:

<http://www.nonnativespecies.org/index.cfm?sectionid=139>

Management with respect to the utilisation of good biosecurity practices should be encouraged, especially with regards to species that are difficult to completely eradicate.

For more information and guides visit The Green Blue Project and the RAPID INNS Management Toolkit: Freshwater Biosecurity Resources webpages:

<https://www.thegreenblue.org.uk/>

<http://www.nonnativespecies.org/index.cfm?pageid=622>

The Angling Trust also provides information on key aquatic INNS:

<https://www.anglingtrust.net/page.asp?section=649&sectionTitle=Invasive+Non-Native+Species>

Sightings of invasive species should be recorded with local recording networks and can also be reported online using the INNS Mapper tool.

<http://ywt-data.org/inns-mapper/>

This tool is also connected with [iRecord](#) and the [National Biodiversity Network \(NBN\) atlas](#).

For "Alert" species, records should be submitted directly to GBNNSS or CEH. Further information can be found on the link below, details of which species are classed as alert species and where you can report sightings are included

in the management section of the following tables.

<http://www.nonnativespecies.org/alerts/index.cfm>

### INNS Prioritised management categories

In order to try and keep the document as up to date as possible only records from the past 10 years have been used. The following tables use the species sightings data (see Section 5) and include all species that have been observed in the East of England catchments since the year 2008. These tables are split into 4 categories: prevent (**BLACK**), eradicate (**RED**), long term management for high priority species (**AMBER**), and long term management for low priority species (**GREEN**).

Species on the prevent (**BLACK**) list are INNS that are prioritised for preventing arrival within the east of England and within each catchment. These include GB 'Alert' and other national 'High Risk' species and other species of regional concern. These are species that are not currently present and should be moved to the eradicate (**RED**) list if they are found – leading to



immediate removal. For black listed species report sightings to GB NNSS and/or local authorities as soon as possible for immediate action to prevent these species from gaining a foothold and spreading within the region or catchment.

Species on the eradicate (**RED**) list are of high priority to eradicate from the region or catchment. These species are of EU, GB or regional concern and can effectively be managed and removed. Once eradicated these species will be transferred to the prevent (**BLACK**) list to facilitate a rapid warning early response system to incursions.

For species of high concern that are too widespread and/or eradication is not a viable option (i.e. there is no known method of control), species will be placed upon the high priority species (**AMBER**) list for long term management. These are species for which the management objective is to reduce harmful impacts by containing/controlling the invasion while working to reduce the overall size of the invasion.

Low priority species (**GREEN**) are those that have minimal impacts or where

management is not effective. This is likely because impacts are as yet unknown or because species are well established that management is ineffective. For species that are well established and there is not scope to use control methods, the main action would be preventing further spread through good biosecurity practices.

Within the low priority (**GREEN**) list species that may not be truly invasive (i.e. causing harm and spreading) have been included. This is because there may be effects that are currently not known. For example many species have been in GB for decades but are not spreading but could if conditions change. This list also includes species that may have only been spotted a low number of times (for example the majority of the teal species) and while unlikely to be causing harm at the moment, if released in greater numbers they could cause harm in the future.

**Table 6: INNS management priorities for East of England Region – Animals Prevent List**

| Common Name                | Latin Name                     | Risk of Introduction  | Pathways  | Areas affected  | Impacts   | Identification  | Management   |
|----------------------------|--------------------------------|---|---|---|---|---|--|
| <b>African Clawed Toad</b> | <i>Xenopus laevis</i>          | Medium (Found only in Louth Grimsby Ancholme catchment however there is possibility for accidental release) | Mud and vegetation in ponds   | Used as a pet and laboratory animal, potential to escape and are often deliberately released, breeding in semi natural conditions have been known in GB | Potential carrier of the pathogenic amphibian chytrid fungus  | GB NNSS Alert species: GB NNSS factsheet: <a href="http://www.nonnativespecies.org/factsheet/factsheet.cfm?speciesId=3762">http://www.nonnativespecies.org/factsheet/factsheet.cfm?speciesId=3762</a>     | GB NNSS Alert species, report as soon as possible:   |
| <b>American bullfrog</b>   | <i>Lithobates catesbeianus</i> |   | Deliberate release as unwanted pets, escape from garden ponds, accidental importation from fish stocks and aquatic plant trade. In other countries this species has previously been released as a biological control for insect pests and raised for human consumption. | Areas of still and slow moving water with high levels of aquatic and bank vegetation (e.g. calm water and deep pools in rivers and streams)             | Feeds on native prey (including other amphibians, small mammals and birds, mollusc, crustaceans and insects). Causes predation on and competition with native amphibians. Possible carrier of the chytrid fungus <i>Batrachochytrium dendrobatidis</i> which can be passed to native species. | GB National Alert species: GB NNSS factsheet: <a href="http://www.nonnativespecies.org/factsheet/factsheet.cfm?speciesId=2040">http://www.nonnativespecies.org/factsheet/factsheet.cfm?speciesId=2040</a> | EU blacklisted species, practice good biosecurity, raise public awareness, GB alert species - report sightings as soon as possible, targeted removal |
| <b>Amur sleeper</b>        | <i>Percottus glenii</i>        | Low (although present and established in Eastern Europe)  | In Europe this species has been transported for aquaculture leading to accidental release, it has also been released intentionally from aquaria of by anglers for use as bait. A hardy species it can survive human transportation over long distances                  | Fresh/brackish water, prefers slow moving or static waters (e.g. ponds, lakes) with large amounts of vegetation   | Competition with native species for food, predation on native species, transmission of diseases to native species   | GB NNSS factsheet: <a href="http://www.nonnativespecies.org/factsheet/factsheet.cfm?speciesId=4365">http://www.nonnativespecies.org/factsheet/factsheet.cfm?speciesId=4365</a>                            | EU blacklisted species. Raise public awareness   |

| Common Name              | Latin Name                   | Risk of Introduction   | Pathways  | Areas affected   | Impacts  | Identification  | Management  |
|--------------------------|------------------------------|--|---|--|--|---|---|
| <b>Carpet Sea-squirt</b> | <i>Didemnum vexillum</i>     | Very likely (present in GB)  | Strongly associated with marinas and is likely transferred by attachment to hulls of leisure crafts, it can also be transferred in ballast water and through movement of contaminated stock in the aquaculture trade.                                 | Hard surfaces in coastal habitats, particularly on artificial structures in marinas and harbours (e.g. pilings, piers, boats, pontoons). It can also grow on cobble and gravel to 80m depth and on bivalves. | Can form large mats (colonies) smothering surfaces and species already present, this can significantly alter species natural species composition. It can smother aquaculture species (e.g. scallops, mussels) resulting in death, and/or significant cleaning costs. | GB National Alert species: <a href="http://www.nonnativespecies.org/alerts/index.cfm">http://www.nonnativespecies.org/alerts/index.cfm</a>                                    | GB non-native species secretariat management and guidance: <a href="http://www.nonnativespecies.org/index.cfm?pageid=227">http://www.nonnativespecies.org/index.cfm?pageid=227</a> , <a href="http://www.nonnativespecies.org/index.cfm?pageid=624">http://www.nonnativespecies.org/index.cfm?pageid=624</a><br>If found in small patches, surfaces should be removed from the water, and if intertidal scraping to remove it could be considered. See <a href="#">Green Blue project</a> and <a href="#">RAPID biosecurity</a> webpages. |
| <b>Coati</b>             | <i>Nasua nasua</i>           | High (previous escapees from zoos have been recorded in GB)  | Introduced into Europe for the pet trade, Escape from zoos  | Forests and wetlands   | This species could potentially compete with or predate on native wildlife  | GB NNS factsheet: <a href="http://www.nonnativespecies.org/factsheet/factsheet.cfm?speciesId=2324">http://www.nonnativespecies.org/factsheet/factsheet.cfm?speciesId=2324</a> | EU Blacklisted species, CABI invasive species compendium: <a href="https://www.cabi.org/ISC/datasheet/74001">https://www.cabi.org/ISC/datasheet/74001</a>   |
| <b>Coypu</b>             | <i>Myocastor coypus</i>      | Low (eradicated in GB, previously abundant in East of England)   | Accidental escape e.g. from private keepers/collections   | Wetlands   | Destruction and damage of vegetation and habitats through grazing, burrowing can impact river banks resulting in flooding, coypus are a carrier of a nematode parasite that can cause dermatitis in humans ("nutria itch")   | GB NNS factsheet: <a href="http://www.nonnativespecies.org/factsheet/factsheet.cfm?speciesId=2282">http://www.nonnativespecies.org/factsheet/factsheet.cfm?speciesId=2282</a> | EU Blacklisted species, CABI invasive species compendium: <a href="https://www.cabi.org/ISC/datasheet/73537">https://www.cabi.org/ISC/datasheet/73537</a>   |
| <b>Edible Frog</b>       | <i>Pelophylax esculentus</i> | Possible (a hybrid of the native pool frog <i>Pelophylax lessonae</i> and the invasive marsh frog <i>P. ridibundus</i> , it is previously known in EE and reported in SE GB) | hybridisation between hybrid of the native pool frog <i>Pelophylax lessonae</i> and the invasive marsh frog <i>P. ridibundus</i> , generally needs either species to be present to reproduce, deliberate introductions, Spreading along water courses | Large unshaded ponds, gravel pits, canals and other slow flowing water bodies.   | Impact through hybridisation, can affect native amphibians (competition or vector of disease).   | GB NNS factsheet: <a href="http://www.nonnativespecies.org/factsheet/factsheet.cfm?speciesId=2575">http://www.nonnativespecies.org/factsheet/factsheet.cfm?speciesId=2575</a> | Raise public awareness  |

| Common Name      | Latin Name                               | Risk of Introduction   | Pathways  | Areas affected  | Impacts   | Identification   | Management  |
|------------------|--|--|---|---|---|--|---|
| Fox squirrel     | <i>Sciurus niger</i>                     | Low (not recorded in the wild Europe)  | Spreads along riparian corridors, Imported for the pet trade - potential escape mechanism   | Riparian woodland   | potential to outcompete the native red squirrel and pass on diseases to native fauna  | GB NNSF factsheet: <a href="http://www.nonnativespecies.org/factsheet/factsheet.cfm?speciesId=4362">http://www.nonnativespecies.org/factsheet/factsheet.cfm?speciesId=4362</a> | EU Blacklisted species: CABI invasive species compendium: <a href="https://www.cabi.org/ISC/datasheet/64742">https://www.cabi.org/ISC/datasheet/64742</a>   |
| Marbled crayfish | <i>Procambarus fallax f. virginialis</i> | Low (prefers warm waters (18-25 °C) for reproduction although able to survive in lower temperatures) | Species can clone itself, popular in the aquarium trade which often leads to potential for escape.                                      | Freshwater channels, lakes, ponds, rivers and streams   | Limited evidence of major impacts so far however could become a threat to native crayfish through competition and plague, burrowing could disrupt wetlands as with other invasive crayfish species.   | CABI invasive species compendium: <a href="https://www.cabi.org/ISC/datasheet/110477">https://www.cabi.org/ISC/datasheet/110477</a>  | EU blacklisted species, practice good biosecurity, raise public awareness, rapid eradication of newly emerging populations. GBNNSF non-native crayfish management plan: <a href="http://www.nonnativespecies.org/index.cfm?pageid=472">http://www.nonnativespecies.org/index.cfm?pageid=472</a>   |
| Musk Rat         | <i>Ondatra zibethicus</i>                | Low (previously present in the EE and GB before eradication)   | Originally introduced for fur farming and has escaped into the wild, natural expansion once established                                 | Freshwater, along riverbanks dykes, lakes, ponds and wetlands.  | Damage of marshland can destroy vegetation, burrowing in banks can undermine the flood defence capability and irrigation systems, burrowing can cause flooding, this animal is a vector of leptospirosis, which can be transferred to humans as Weil's disease. | GB NNSF factsheet: <a href="http://www.nonnativespecies.org/factsheet/factsheet.cfm?speciesId=2422">http://www.nonnativespecies.org/factsheet/factsheet.cfm?speciesId=2422</a> | EU Blacklisted species, CABI invasive species compendium: <a href="https://www.cabi.org/ISC/datasheet/71816">https://www.cabi.org/ISC/datasheet/71816</a>   |
| Quagga Mussel    | <i>Dreissena rostriformis bugensis</i>   | High (newly recorded in UK)  | In ballast water, contamination of boats and fishing gear, downstream expansion   | Freshwater rivers canals and lakes, can survive marine waters and lives in brackish and estuarine waters in its natural range | Filter nutrients from the water to the detriment of other species, biofouling - blocks pipes and smothers ship hulls and other structures   | GB National Alert species: <a href="http://www.nonnativespecies.org/alerts/index.cfm">http://www.nonnativespecies.org/alerts/index.cfm</a>                                     | No effective eradication method once established, Practice good biosecurity (check, clean and dry approach), See <a href="#">Green Blue project</a> and <a href="#">RAPID biosecurity</a> webpages, CABI invasive species compendium: <a href="https://www.cabi.org/ISC/datasheet/107770">https://www.cabi.org/ISC/datasheet/107770</a> |
| Raccoon          | <i>Procyon lotor</i>                     | Low  | Kept in zoos and as pets, potential for escape or deliberate release - they are released for hunting purposes in other parts of Eurasia | Woodland near water, urban areas  | Threaten birds and displace native carnivores, pest species in urban areas, vectors of parasites and diseases which can be passed to humans and animals.  | GB NNSF factsheet: <a href="http://www.nonnativespecies.org/factsheet/factsheet.cfm?speciesId=2839">http://www.nonnativespecies.org/factsheet/factsheet.cfm?speciesId=2839</a> | EU Blacklist species, CABI invasive species compendium: <a href="https://www.cabi.org/ISC/datasheet/67856">https://www.cabi.org/ISC/datasheet/67856</a>   |

| Common Name                            | Latin Name                      | Risk of Introduction  | Pathways   | Areas affected   | Impacts  | Identification  | Management  |
|--|---------------------------------|---|--|--|--|---|---|
| <b>Raccoon dog</b>                     | <i>Nyctereutes procyonoides</i> | Very likely, already present in mainland Europe, escapees have occurred in GB | Deliberate introduction and escape from fur farms (in Eastern Europe). Natural range expansion.  | Damp forests, typically found near water   | Competition for food and dens with native badger and foxes, potential to impact bird and amphibian populations, carriers of disease that can affect other animals, main vector of rabies within Europe.  | GB NNSS factsheet: <a href="http://www.nonnativespecies.org/factsheet/factsheet.cfm?speciesId=2377">http://www.nonnativespecies.org/factsheet/factsheet.cfm?speciesId=2377</a>                        | EU blacklist species, CABI invasive species compendium: <a href="https://www.cabi.org/ISC/datasheet/72656">https://www.cabi.org/ISC/datasheet/72656</a>   |
| <b>Red swamp crayfish</b>              | <i>Procambarus clarkii</i>      | Medium (already established in parts of EE and isolated locations in GB)      | Deliberate introduction to supplement stocks of native crayfish for consumption, it is likely escaped from aquaria or introduced intentionally from aquaculture facilities, natural expansion downstream is likely.  | Ponds, ditches, canals and rivers, but potentially able to survive in inundated wetland, reed bed, drainage channels and coastal marshes | It is an aggressive predator and can cause a decline of native species due to predation, burrowing causes increase turbidity/decreased light penetration resulting in decreased recreational value for the water body, increased water processing and filtration costs and damage to banks resulting in flooding, this species is a carrier for crayfish plague. | GB NNSS factsheet: <a href="http://www.nonnativespecies.org/factsheet/factsheet.cfm?speciesId=2836">http://www.nonnativespecies.org/factsheet/factsheet.cfm?speciesId=2836</a>                        | EU blacklisted species, practice good biosecurity, raise public awareness, rapid eradication of newly emerging populations. GBNNSS non-native crayfish management plan: <a href="http://www.nonnativespecies.org/index.cfm?pageid=472">http://www.nonnativespecies.org/index.cfm?pageid=472</a> |
| <b>Sacred ibis</b>                     | <i>Threskiornis aethiopicus</i> | High (already present in GB although no breeding populations currently known) | Escape from captivity, vagrants from mainland Europe.  | Wet grasslands and wetlands  | Localised impacts through feeding on earthworms, insects, fish, small rodents, molluscs, crustaceans and amphibians as well as eggs of other birds, competition with native species for nest sights, due to this species feeding on rubbish dumps and slurry pits there is concern about the implications towards human health                                   | GB NNSS alert species, GB NNSS factsheet: <a href="http://www.nonnativespecies.org/factsheet/factsheet.cfm?speciesId=3537">http://www.nonnativespecies.org/factsheet/factsheet.cfm?speciesId=3537</a> | EU Blacklist species, public awareness on impacts, GB NNSS alert - report sightings as soon as possible, <a href="https://secure.fera.defra.gov.uk/nonnativespecies/downloadDocument.cfm?id=942">https://secure.fera.defra.gov.uk/nonnativespecies/downloadDocument.cfm?id=942</a>              |
| <b>Stone moroko / Topmouth Gudgeon</b> | <i>Pseudorasbora parva</i>      | High  | Originally introduced as an ornamental species with subsequent escapes, due to small size it can escape from enclosed still-waters and rapidly colonise connected waterbodies, potentially introduced as a contaminant with other ornamental fish or through use as a baitfish | Vegetated small channels, ponds and small lakes and connected water bodies.  | Can significantly decrease and stunt growth of native or farmed fish numbers through competition for food and space (including spawning habitat), a vector for parasites and infectious diseases (e.g. <i>Sphaerotecum destruens</i> ) which can impact fisheries  | GB NNSS factsheet: <a href="http://www.nonnativespecies.org/factsheet/factsheet.cfm?speciesId=2876">http://www.nonnativespecies.org/factsheet/factsheet.cfm?speciesId=2876</a>                        | EU Blacklist species, GB NNSS alert species, report sightings as soon as possible: <a href="http://www.nonnativespecies.org/index.cfm?pageid=552">http://www.nonnativespecies.org/index.cfm?pageid=552</a>  |

| Common Name            | Latin Name                | Risk of Introduction  | Pathways   | Areas affected                      | Impacts   | Identification   | Management  |
|------------------------|---------------------------|---|--|-------------------------------------|---|--|---|
| <b>Virile crayfish</b> | <i>Orconectes virilis</i> | High (It is well established in the Lea catchment (north London) and thought to be spreading) | Imported to Europe in the aquarium trade, accidental or deliberate release into the wild through disposal, natural expansion downstream is likely, transfer by birds or other predators. | Freshwater lakes, ponds and rivers. | Decrease native populations of crayfish through competition and as carriers for crayfish plague, potential to disrupt natural food webs through feeding, burrowing can destabilise river banks resulting in flooding. | CABI invasive species compendium:<br><a href="https://www.cabi.org/ISC/data-sheet/72034">https://www.cabi.org/ISC/data-sheet/72034</a> | EU blacklisted species, practice good biosecurity, raise public awareness, rapid eradication of newly emerging populations. GBNNS non-native crayfish management plan:<br><a href="http://www.nonnativepecies.org/index.cfm?pageid=472">http://www.nonnativepecies.org/index.cfm?pageid=472</a> |

**Table 7: INNS management priorities for East of England Region – Plants and Algae Prevent List**

| Common Name                     | Latin Name                         | Risk of Introduction  | Pathways  | Areas affected                    | Impacts   | Identification   | Management  |
|---------------------------------|------------------------------------|---|---|-----------------------------------|---|--|---|
| <b>Alligator weed</b>           | <i>Alternanthera philoxeroides</i> | Low, currently present in mainland Europe   | Possibly mistaken for or contaminating ornamental species   | Warm waterways (freshwater)       | Forms dense mats, choking waterways   | CABI invasive species compendium:<br><a href="https://www.cabi.org/ISC/datasheet/4403">https://www.cabi.org/ISC/datasheet/4403</a>   | EU blacklisted species, practice good biosecurity, CABI invasive species compendium:<br><a href="https://www.cabi.org/ISC/datasheet/4403">https://www.cabi.org/ISC/datasheet/4403</a> |
| <b>Asiatic tearthumb</b>        | <i>Persicaria perfoliata</i>       | Low (expected to spread to warmer subtropical regions)  | Accidental introduction from ballast water and with ornamental shrubs, natural spread to neighbouring sites by water birds and animals              | River and stream banks, wetlands  | Rapidly smothers native vegetation and reducing available light (including ornamental and horticultural trees), this is a prickly shrub therefore restricts movement of animals and humans. | GB NNS factsheet:<br><a href="http://www.nonnativespecies.org/factsheet/factsheet.cfm?speciesId=4378">http://www.nonnativespecies.org/factsheet/factsheet.cfm?speciesId=4378</a> | EU blacklisted species, CABI invasive species compendium:<br><a href="https://www.cabi.org/ISC/datasheet/109155">https://www.cabi.org/ISC/datasheet/109155</a>                        |
| <b>Broadleaf watermilfoil</b>   | <i>Myriophyllum heterophyllum</i>  | Low (found at a series of ponds in Horsham, West Sussex in 2016 and present in mainland Europe) | Used in the aquacultural and horticultural trade, may attach to boats and spread, fragments can regrow and be transferred along water or by humans. | Freshwater habitats and wetlands. | Rapid growth and dense mat formation impede water flow, block sunlight and reduce oxygen, in turn reduces native diversity.   | CABI invasive species compendium:<br><a href="https://www.cabi.org/ISC/datasheet/34940">https://www.cabi.org/ISC/datasheet/34940</a>   | EU blacklisted species, CABI invasive species compendium:<br><a href="https://www.cabi.org/ISC/datasheet/34940">https://www.cabi.org/ISC/datasheet/34940</a>                          |
| <b>Carolina fanwort</b>         | <i>Cabomba caroliniana</i>         | High, already present in some parts of GB   | Brought in as aquatic ornamental plant, release by public with unwanted pond water  | Lakes, ponds, small watercourses  | Forms dense mats - eutrophic conditions   | GB NNS factsheet:<br><a href="http://www.nonnativespecies.org/factsheet/factsheet.cfm?speciesId=596">http://www.nonnativespecies.org/factsheet/factsheet.cfm?speciesId=596</a>   | EU blacklisted species, practice good biosecurity, raise public awareness   |
| <b>Common milkweed</b>          | <i>Asclepias syriaca</i>           | Low, currently present in mainland Europe   | Brought in as ornamental plant, accidental escape   | Grasslands, dunes, river valleys  | Crowd out native plant spp. Toxic if ingested.  | CABI invasive species compendium:<br><a href="https://www.cabi.org/ISC/datasheet/7249">https://www.cabi.org/ISC/datasheet/7249</a>   | EU blacklisted species, practice good biosecurity, CABI invasive species compendium:<br><a href="https://www.cabi.org/ISC/datasheet/7249">https://www.cabi.org/ISC/datasheet/7249</a> |
| <b>Floating primrose-willow</b> | <i>Ludwigia peploides</i>          | High  | Originally introduced as an ornamental plant, it can double its extent in 4 weeks   | Still or slow moving water        | Outcompeting native species and clogging waterways  | GB NNS factsheet:<br><a href="http://www.nonnativespecies.org/factsheet/factsheet.cfm?speciesId=3799">http://www.nonnativespecies.org/factsheet/factsheet.cfm?speciesId=3799</a> | EU blacklisted species, CABI invasive species compendium:<br><a href="https://www.cabi.org/ISC/datasheet/31673">https://www.cabi.org/ISC/datasheet/31673</a>                          |
| <b>Himalayan Knotweed</b>       | <i>Persicaria wallichii</i>        | High (previously recorded in North West Norfolk)  | Horticultural trade has led to escaped plants from gardens or waste disposal. Seeds and fragments can be water and wind dispersed.                  | Marsh banks and riverbanks        | Grows into dense stands that can displace native species and prevent them from growing / germinating from seeds   | CABI invasive species compendium:<br><a href="https://www.cabi.org/ISC/datasheet/120210">https://www.cabi.org/ISC/datasheet/120210</a>   | CABI invasive species compendium:<br><a href="https://www.cabi.org/ISC/datasheet/120210">https://www.cabi.org/ISC/datasheet/120210</a>  |

| Common Name         | Latin Name                      | Risk of Introduction  | Pathways   | Areas affected   | Impacts  | Identification  | Management   |
|---------------------|---------------------------------|---|--|--|--|---|--|
| Japanese stiltgrass | <i>Microstegium vimineum</i>    | Very likely   | Potential to be introduced from bird seed, contamination causing seed present within imported soils for use within the horticultural trade and road construction, dispersal from established population via waterway and animal vectors (i.e. attached to fur) | River corridors, forested wetlands, moist woodlands  | Rapidly replaces natural communities, can overgrow vegetation, alters ecosystem processes such as nitrogen and carbon cycling, decomposition and fire regimes, it can impact the abundances and diversity of native fauna. | GB NNS factsheet: <a href="http://www.nonnativespecies.org/factsheet/factsheet.cfm?speciesId=4327">http://www.nonnativespecies.org/factsheet/factsheet.cfm?speciesId=4327</a> | EU blacklisted species, CABI invasive species compendium: <a href="https://www.cabi.org/ISC/datasheet/115603">https://www.cabi.org/ISC/datasheet/115603</a>  |
| Persian hogweed     | <i>Heracleum persicum</i>       | High (present in GB, previously recorded in East of England)  | Originally grown as an ornamental, seed dispersed by waterways   | Coastal habitats, wetlands and pastures  | Forms dense stands that reduce biodiversity through shading and competition, can alter soil composition and cause erosion, Phototoxic sap when combined with UV radiation causes skin burns.                               | GB NNS factsheet: <a href="http://www.nonnativespecies.org/factsheet/factsheet.cfm?speciesId=4366">http://www.nonnativespecies.org/factsheet/factsheet.cfm?speciesId=4366</a> | EU blacklisted species, CABI invasive species compendium: <a href="https://www.cabi.org/ISC/datasheet/120209">https://www.cabi.org/ISC/datasheet/120209</a>  |
| Sosnowsky's hogweed | <i>Heracleum sosnowskyi</i>     | Likely (present in mainland Europe, similarity to other species of hogweed could lead to this species being overlooked) | Planted for ornamental, culinary and medicinal purposes as well as use as a potential livestock fodder reasons, seeds spread by wind and water.  | Disturbed, semi-natural habitats such as road and rail verges, waste ground, river and stream banks, disused agricultural land and meadows | Can invade and rapidly transform landscape, highly toxic to humans (causes skin burns)   | GB NNS factsheet: <a href="http://www.nonnativespecies.org/factsheet/factsheet.cfm?speciesId=4376">http://www.nonnativespecies.org/factsheet/factsheet.cfm?speciesId=4376</a> | EU blacklisted species: rapid eradication to prevent establishment: CABI invasive species compendium: <a href="https://www.cabi.org/ISC/datasheet/108958">https://www.cabi.org/ISC/datasheet/108958</a>  |
| Tree Groundsel      | <i>Baccharis halimifolia</i>    | Medium already present in some parts of GB but not spreading  | Brought in as ornamental plant, accidental escape  | Coastal areas: dunes, saltmarsh, woodland etc.   | Alters ecosystem structure, impacts dune dynamics  | GB NNS factsheet: <a href="http://www.nonnativespecies.org/factsheet/factsheet.cfm?speciesId=452">http://www.nonnativespecies.org/factsheet/factsheet.cfm?speciesId=452</a>   | EU blacklisted species, practice good biosecurity  |
| Water hyacinth      | <i>Eichhornia crassipes</i>     | Low, has been found in some parts of GB but rarely survives frosts  | Brought in as ornamental plant, accidental escape  | Water bodies   | Forms dense mats - eutrophic conditions, loss of recreation/navigation   | GB NNS factsheet: <a href="http://www.nonnativespecies.org/factsheet/factsheet.cfm?speciesId=1292">http://www.nonnativespecies.org/factsheet/factsheet.cfm?speciesId=1292</a> | EU blacklisted species, rapid control: CABI invasive species compendium: <a href="https://www.cabi.org/isc/datasheet/20544">https://www.cabi.org/isc/datasheet/20544</a><br>Rarely survives winters in the UK but should be reported and managed accordingly if it were to spread. |
| Whitetop weed       | <i>Parthenium hysterophorus</i> | Low (subtropical species, not yet considered established in the EU)   | accidental contamination from agricultural produce and farm machinery, once grown seeds can spread by humans animals and wind  | Riverbanks and floodplains   | Rapidly outgrows native species, produces a substance that inhibits growth of native species, contact with plant or pollen can produce serious reactions in humans and livestock (especially horses)                       | GB NNS factsheet: <a href="http://www.nonnativespecies.org/factsheet/factsheet.cfm?speciesId=4377">http://www.nonnativespecies.org/factsheet/factsheet.cfm?speciesId=4377</a> | EU blacklisted species, CABI invasive species compendium: <a href="https://www.cabi.org/ISC/datasheet/45573">https://www.cabi.org/ISC/datasheet/45573</a>  |



**Table 8: INNS management priorities for East of England Region – Animals Eradicate List**

| Common Name       | Latin Name                   | Risk of Introduction  | Pathways   | Areas affected   | Impacts   | Identification  | Management  |
|-------------------|------------------------------|---|--|--|---|---|---|
| <b>Goldfish</b>   | <i>Carassius auratus</i>     | Likely introduced by people   | Pet trade, accidental and deliberate release   | Still and stagnant waters (ponds, lakes)   | Competes with and hybridises with native fish populations   | GB NNS factsheet: <a href="http://www.nonnative-species.org/factsheet/factsheet.cfm?speciesId=655">http://www.nonnative-species.org/factsheet/factsheet.cfm?speciesId=655</a>   | Raise awareness, eradication programmes   |
| <b>Marsh Frog</b> | <i>Pelophylax ridibundus</i> | High (already present and spreading from SE to EE)  | Imported from Hungary and deliberate introductions into the wild have been recorded. Descendants either deliberately translated or their range naturally expanded. | Large unshaded ponds, gravel pits, canals and other slow flowing water bodies, present around marshland dykes and fisheries in GB. | Impact through hybridisation, can affect native amphibians (competition or vector of disease), loud calling can cause noise complaints in suburban areas. | GB NNS factsheet: <a href="http://www.nonnative-species.org/factsheet/factsheet.cfm?speciesId=2577">http://www.nonnative-species.org/factsheet/factsheet.cfm?speciesId=2577</a> | Raise public awareness  |
| <b>Ruddy duck</b> | <i>Oxyura jamaicensis</i>    | Possible (however successful eradication programmes have significantly reduced numbers in GB) | Introduced as part of wildfowl collections and escaped   | Freshwater water bodies with emergent reeds, winters on lakes and reservoirs   | Competition with native duck populations when population peaks, in GB the ruddy duck appears to occupy a vacant niche limiting negative impacts           | GB NNS factsheet: <a href="http://www.nonnative-species.org/factsheet/factsheet.cfm?speciesId=2486">http://www.nonnative-species.org/factsheet/factsheet.cfm?speciesId=2486</a> | EU blacklisted species, CABI invasive species compendium: <a href="https://www.cabi.org/ISC/datasheet/71368">https://www.cabi.org/ISC/datasheet/71368</a> |

**Table 9: INNS management priorities for East of England Region – Plants and Algae Eradicate List**

| Common Name            | Latin Name                       | Risk of Introduction  | Pathways   | Areas affected   | Impacts   | Identification  | Management   |
|------------------------|----------------------------------|---|--|--|---|---|--|
| American skunk cabbage | <i>Lysichiton americanus</i>     | High (present in most catchments)   | Introduced as an ornamental plant and escaped into the wild, seeds spread along waterways and through bird and mammal dispersal.   | Swamp forests and associated wetlands, fens, meadows, bogs, alluvial woodlands, streams, riverbanks, lakes and ponds | Large leaves build dense layers and block light, outcompeting native species and having a knock on effect to biodiversity.                                      | GB NNS factsheet: <a href="http://www.nonnative-species.org/factsheet/factsheet.cfm?speciesid=2110">http://www.nonnative-species.org/factsheet/factsheet.cfm?speciesid=2110</a> | EU blacklisted species, <a href="http://www.nonnativespecies.org/index.cfm?pageid=413">http://www.nonnativespecies.org/index.cfm?pageid=413</a> , <a href="http://www.nonnativespecies.org/index.cfm?pageid=624">http://www.nonnativespecies.org/index.cfm?pageid=624</a>  |
| Floating pennywort     | <i>Hydrocotyle ranunculoides</i> | Very likely (widespread throughout EE)                                      | Water plant trade; disposal of excess plant growth; natural means  | Ponds, canals, drainage channels, ditches, streams and slow-flowing rivers.  | Smother water bodies reducing the numbers of native species and potentially increasing the risk of flooding. Can damage waterworks by blocking pipes and pumps. | <a href="http://www.nonnative-species.org/index.cfm?pageid=143">http://www.nonnative-species.org/index.cfm?pageid=143</a>   | EU blacklisted species, <a href="http://www.nonnativespecies.org/index.cfm?pageid=538">http://www.nonnativespecies.org/index.cfm?pageid=538</a> , <a href="http://www.nonnativespecies.org/index.cfm?pageid=624">http://www.nonnativespecies.org/index.cfm?pageid=624</a>  |
| Hottentot-fig          | <i>Carpobrotus edulis</i>        | Medium – has been previously recorded in one location in East Suffolk       | Ornamental plant, introduced through dumping garden waste  | Sea cliffs, sand dunes, coastal banks, rocks and walls   | Rapidly produces a monoculture that prevents growth of native species, alters the soils nutrient dynamics   | GB NNS factsheet: <a href="http://www.nonnative-species.org/factsheet/factsheet.cfm?speciesid=669">http://www.nonnative-species.org/factsheet/factsheet.cfm?speciesid=669</a>   | CABI invasive species compendium: <a href="https://www.cabi.org/ISC/data-sheet/10648">https://www.cabi.org/ISC/data-sheet/10648</a>  |
| Uruguay Water-primrose | <i>Ludwigia grandiflora</i>      | High (only known in a few locations around east Anglia but highly invasive) | Introduced as an ornamental species. Stem fragments be spread by animals, waterways and humans. Fruits can remain buoyant for weeks facilitating widespread dispersal along waterways. | Ponds, farm reservoirs and slow-flowing rivers and ditches   | This species can outcompete native plants for light nutrients and pollinators by forming dense stands on mud or in water, it can facilitate oxygen depletion.   | GB National Alert species: <a href="http://www.nonnative-species.org/alerts/index.cfm">http://www.nonnative-species.org/alerts/index.cfm</a>                                    | EU Blacklisted species, GB non native species secretariat management and guidance: <a href="http://www.nonnativespecies.org/index.cfm?pageid=275">http://www.nonnativespecies.org/index.cfm?pageid=275</a> , <a href="http://www.nonnativespecies.org/index.cfm?pageid=624">http://www.nonnativespecies.org/index.cfm?pageid=624</a> |
| Water Fern             | <i>Azolla filiculoides</i>       | High - Already present throughout GB  | Origin in botanic gardens, potentially spread by machinery or contaminated clothing  | Coastal areas, ponds, lakes, canals, ditches and slow flowing rivers   | Forms dense coverage that blocks light, compromises oxygen diffusion and restricting animals, limits recreation   | GB NNS factsheet: <a href="http://www.nonnative-species.org/factsheet/factsheet.cfm?speciesid=451">http://www.nonnative-species.org/factsheet/factsheet.cfm?speciesid=451</a>   | CABI invasive species compendium: <a href="https://www.cabi.org/ISC/data-sheet/8119">https://www.cabi.org/ISC/data-sheet/8119</a>  |

**Table 10: INNS management priorities for East of England Region – Animals Amber Management Species List**

| Common Name                    | Latin Name                 | Risk of Introduction  | Pathways  | Areas affected  | Impacts  | Identification   | Management   |
|--------------------------------|----------------------------|---|---|---|--|--|--|
| <b>American Mink</b>           | <i>Neovison vison</i>      | High  | Escape from fur farms, deliberate releases, establishment of populations  | Vegetated areas of lakes and rivers, streams, coasts and marshlands as well as brackish areas | Preys on fish, farmed animals (including lambs and chickens) and game birds impacting aquaculture, farmer's hunters and anglers. It is a voracious predator killing more than it needs and has helped facilitate the near extinction of the water vole in GB | <a href="http://www.nonnative-species.org/index.cfm?pageid=539">http://www.nonnative-species.org/index.cfm?pageid=539</a> ,<br><a href="http://www.nonnative-species.org/index.cfm?pageid=624">http://www.nonnative-species.org/index.cfm?pageid=624</a> | <a href="http://www.nonnativespecies.org/index.cfm?pageid=539">http://www.nonnativespecies.org/index.cfm?pageid=539</a> ,<br><a href="http://www.nonnativespecies.org/index.cfm?pageid=624">http://www.nonnativespecies.org/index.cfm?pageid=624</a> |
| <b>American Oyster Drill</b>   | <i>Urosalpinx cinerea</i>  | Low (low abundance in GB, has been previously identified in Combined Essex catchment) | Unintentional introduction on oysters   | Coasts and estuaries  | Predates on oysters, may compete with native dogwhelk, considered a pest to the oyster industry  | GB NNESS factsheet: <a href="http://www.nonnative-species.org/factsheet/factsheet.cfm?speciesid=3664">http://www.nonnative-species.org/factsheet/factsheet.cfm?speciesid=3664</a>  | Prevention of settlement is recommended, good biosecurity practices to prevent movement, CABI invasive species compendium: <a href="https://www.cabi.org/ISC/datasheet/60187">https://www.cabi.org/ISC/datasheet/60187</a>                           |
| <b>American Slipper Limpet</b> | <i>Crepidula fornicata</i> | High (already present and widespread in the region)                                   | Transported in the aquaculture industry on contaminated oysters, can contaminate floating debris, be found in ballast water, ship's hull fouling and through contaminated soil. | Estuaries, coastal, intertidal, mudflats, predominantly found on sandy and gravelly bottoms   | Alters sediment distribution, biodiversity and suspended matter when found in high abundances  | <a href="http://www.nonnative-species.org/index.cfm?pageid=624">http://www.nonnative-species.org/index.cfm?pageid=624</a>  | <a href="http://www.nonnativespecies.org/index.cfm?pageid=624">http://www.nonnativespecies.org/index.cfm?pageid=624</a><br><br>See <a href="#">Green Blue project</a> and <a href="#">RAPID biosecurity</a> webpages.                                |

| Common Name                    | Latin Name                     | Risk of Introduction                          | Pathways   | Areas affected  | Impacts   | Identification   | Management  |
|--------------------------------|--------------------------------|---|--|---|---|--|---|
| <b>Amphibalanus improvisus</b> | <i>Amphibalanus improvisus</i> |   | Attached to ships hulls and in ballast water, also found attached to aquaculture species such as oyster shells, spreads along interconnected waterways | Marine hard surfaces (manmade or natural)   | Fouls artificial substrates (e.g. boat hulls), can form dense layers and compete for space with other species   | CABI invasive species compendium:<br><a href="https://www.cabi.org/ISC/datasheet/91903">https://www.cabi.org/ISC/datasheet/91903</a>   | Check Clean Dry campaign:<br><a href="http://www.nonnativespecies.org/checkcleandry/">http://www.nonnativespecies.org/checkcleandry/</a> , CABI invasive species compendium:<br><a href="https://www.cabi.org/ISC/datasheet/91903">https://www.cabi.org/ISC/datasheet/91903</a><br><br>See <a href="#">Green Blue project</a> and <a href="#">RAPID biosecurity</a> webpages. |
| <b>Asian Shore Crab</b>        | <i>Hemigrapsus sanguineus</i>  | Highly likely to be spread by human transport | Transport through ballast water and hull fouling, transport along with aquaculture species is also possible, natural larval dispersal                  | Intertidal areas of estuarine and marine shores, usually on exposed rocky shores however can also live under rocks and shells, on artificial structures, mussel beds and oyster reefs | It can reduce numbers of native shore crabs and reduce mussel densities which could conflict with multiple bivalve aquaculture species  | GB NNS factsheet:<br><a href="http://www.nonnativespecies.org/factsheet/factsheet.cfm?speciesId=3818">http://www.nonnativespecies.org/factsheet/factsheet.cfm?speciesId=3818</a> | Raise awareness of the problem of fouling species, e.g. Check Clean Dry campaign:<br><a href="http://www.nonnativespecies.org/checkcleandry/">http://www.nonnativespecies.org/checkcleandry/</a> . See <a href="#">Green Blue project</a> and <a href="#">RAPID biosecurity</a> webpages.   |
| <b>Asiatic Clam</b>            | <i>Corbicula fluminea</i>      |   | Can be spread via ballast water, expansion of range is occurring in GB   | Freshwater habitats, still waters and flowing rivers, prefers sand and gravel habitats  | Forms dense populations, has a high filtration rate and produces large amounts of pseudofaeces, this could alter ecosystem dynamics, large densities can block intake pipes and irrigation channels | GB NNS factsheet:<br><a href="http://www.nonnativespecies.org/factsheet/factsheet.cfm?speciesId=897">http://www.nonnativespecies.org/factsheet/factsheet.cfm?speciesId=897</a>   | CABI invasive species compendium:<br><a href="https://www.cabi.org/ISC/datasheet/88200">https://www.cabi.org/ISC/datasheet/88200</a>  |

| Common Name                    | Latin Name                 | Risk of Introduction                          | Pathways   | Areas affected  | Impacts  | Identification   | Management   |
|--------------------------------|----------------------------|---|--|---|--|--|--|
| <b>Bloody-red Mysid</b>        | <i>Hemimysis anomala</i>   |   | Intentional introduction as a food source for fished species, spread naturally, in ballast water and potentially contaminated equipment and boats used across different areas for recreation | Freshwater and brackish water in areas with loose stones  | Form large colonies and can alter ecosystem through feeding (omnivorous). They can reduce food stocks (zooplankton) of fished species causing economic concerns. | GB NNSF factsheet: <a href="http://www.nonnative-species.org/factsheet/factsheet.cfm?speciesid=1698">http://www.nonnative-species.org/factsheet/factsheet.cfm?speciesid=1698</a> | CABI invasive species compendium: <a href="https://www.cabi.org/ISC/datasheet/108015">https://www.cabi.org/ISC/datasheet/108015</a>  |
| <b>Brush clawed shore crab</b> | <i>Hemigrapsus takanoi</i> | Highly likely to be spread by human transport | Transport through ballast water and hull fouling, transport along with aquaculture species is also possible, natural larval dispersal  | Intertidal areas of estuarine harbours lagoons and bays, usually on sheltered muddy sediment in low energy areas, within sites it can be found under boulders and hard substrates | This species can displace native shore crabs.  | GB NNSF factsheet: <a href="http://www.nonnative-species.org/factsheet/factsheet.cfm?speciesid=3815">http://www.nonnative-species.org/factsheet/factsheet.cfm?speciesid=3815</a> | Raise awareness of the problem of fouling species, e.g. Check Clean Dry campaign: <a href="http://www.nonnativespecies.org/checkcleandry/">http://www.nonnativespecies.org/checkcleandry/</a> . See <a href="#">Green Blue project</a> and <a href="#">RAPID biosecurity</a> webpages. |
| <b>Bugula simplex</b>          | <i>Bugula simplex</i>      | High  | Ballast water, attached to ships hulls   | Harbours and marinas, artificial and natural surfaces in marine waters  | Grows into dense concentrations overgrowing native species, they can foul hulls , underwater machinery and aquaculture facilities                                | Erect bryozoan   | Check Clean Dry campaign: <a href="http://www.nonnativespecies.org/checkcleandry/">http://www.nonnativespecies.org/checkcleandry/</a><br><br>See <a href="#">Green Blue project</a> and <a href="#">RAPID biosecurity</a> webpages.  |
| <b>Bugula stolonifera</b>      | <i>Bugula stolonifera</i>  | High  | Ballast water, attached to ships hulls   | Harbours and marinas, artificial and natural surfaces in marine waters  | Grows into dense concentrations overgrowing native species, they can foul hulls , underwater machinery and aquaculture facilities                                | Erect bryozoan   | Check Clean Dry campaign: <a href="http://www.nonnativespecies.org/checkcleandry/">http://www.nonnativespecies.org/checkcleandry/</a><br><br>See <a href="#">Green Blue project</a> and <a href="#">RAPID biosecurity</a> webpages.  |

| Common Name               | Latin Name                        | Risk of Introduction | Pathways  | Areas affected  | Impacts  | Identification  | Management  |
|---------------------------|-----------------------------------|----------------------|---|---|--|---|---|
| <b>Chinese mittercrab</b> | <i>Eriocheir sinensis</i>         | High                 | Shipping (in ballast water), clinging to ships hulls, mariculture / aquaculture contamination, interconnected waterways                                     | Estuaries (saline waters) and rivers with muddy banks, salt marshes, open water bays                        | Impact native populations through predation and competition, causes siltation in gravel runs used for fish spawning (salmon, trout), potential disease carrier, degrades river banks resulting in reparation costs | GB NNS factsheet: <a href="http://www.nonnative-species.org/factsheet/factsheet.cfm?speciesid=1379">http://www.nonnative-species.org/factsheet/factsheet.cfm?speciesid=1379</a> | EU blacklisted species, practice good biosecurity, raise public awareness<br><br>See <a href="#">Green Blue project</a> and <a href="#">RAPID biosecurity</a> webpages.   |
| <b>Compass Sea Squirt</b> | <i>Asterocarpa humilis</i>        | High                 | Attached to ships hulls and ballast water   | Marinas harbours and aquaculture facilities, hard structures  | Smothering hard surfaces, can form large clumps that could block pipes   | GB NNS factsheet: <a href="http://www.nonnative-species.org/factsheet/factsheet.cfm?speciesid=4133">http://www.nonnative-species.org/factsheet/factsheet.cfm?speciesid=4133</a> | Check Clean Dry campaign: <a href="http://www.nonnativespecies.org/checkcleandry/">http://www.nonnativespecies.org/checkcleandry/</a><br><br>See <a href="#">Green Blue project</a> and <a href="#">RAPID biosecurity</a> webpages.           |
| <b>Demon Shrimp</b>       | <i>Dikerogammarus haemobaphes</i> | High                 | Unintentional introduction by anglers (fouling), in ballast water, transferred through movement of fish stocks and foraging birds, natural range expansion. | Rivers lakes and canals   | Kill native species including young fish and significantly alter ecosystems  | GB National Alert species: <a href="http://www.nonnative-species.org/alerts/index.cfm">http://www.nonnative-species.org/alerts/index.cfm</a>                                    | Practice good biosecurity (check, clean and dry approach), GB non-native species secretariat management and guidance: <a href="http://www.nonnativespecies.org/index.cfm?pageid=559">http://www.nonnativespecies.org/index.cfm?pageid=559</a> |
| <b>Egyptian Goose</b>     | <i>Alopochen aegyptiacus</i>      | High                 | Brought in as an ornamental species, possible escapes from captivity, expansion from present population   | Wetland habitats (lakes, ponds, reservoirs, estuaries, sewage works, swampy woodland and meadows), farmland | Competition with native species for food and nest sites. Can cause physical damage through grazing and eutrophication in still waters from droppings.  | GB NNS factsheet: <a href="http://www.nonnative-species.org/factsheet/factsheet.cfm?speciesid=140">http://www.nonnative-species.org/factsheet/factsheet.cfm?speciesid=140</a>   | EU blacklisted species, Raise public awareness, manage populations  |

| Common Name                     | Latin Name                     | Risk of Introduction | Pathways   | Areas affected  | Impacts  | Identification   | Management   |
|---------------------------------|--------------------------------|----------------------|--|---|--|--|--|
| <b>False Dark Mussel</b>        | <i>Mytilopsis leucophaeata</i> | High                 | Boat fouling   | Estuaries attached to hard substrates (natural and artificial)                          | Rapid reproduction can lead to fouling, especially problematic for coolant water systems, clogging water intakes and pipes, can have similar ecological effects as the Zebra mussel, ( <i>Dreissena polymorpha</i> ) | <a href="http://www.iucngisd.org/gisd/speciesname/Mytilopsis+leucophaeata">http://www.iucngisd.org/gisd/speciesname/Mytilopsis+leucophaeata</a>                                | <a href="http://www.iucngisd.org/gisd/speciesname/Mytilopsis+leucophaeata">http://www.iucngisd.org/gisd/speciesname/Mytilopsis+leucophaeata</a>  |
| <b>Freshwater hydroid</b>       | <i>Cordylophora caspia</i>     | High                 | Possibly introduced on timber and spread via shipping, transported via hull fouling and in ballast tanks | Estuaries, lagoons and coastal lakes  | Possible displacement of other species, causes fouling and is known to be a nuisance in water cooling systems, blocking pipes and filters  | GB NNSF factsheet: <a href="http://www.nonnative-species.org/factsheet/factsheet.cfm?speciesid=900">http://www.nonnative-species.org/factsheet/factsheet.cfm?speciesid=900</a> | Raise awareness of the problem of fouling species, e.g. Check Clean Dry campaign: <a href="http://www.nonnativespecies.org/checkcleandry/">http://www.nonnativespecies.org/checkcleandry/</a> . See <a href="#">Green Blue project</a> and <a href="#">RAPID biosecurity</a> webpages. Manual cleaning, eradication using heat or chlorine and use of biocides could help control and curtail spread |
| <b>Japanese Skeleton Shrimp</b> | <i>Caprella mutica</i>         | High                 | Shipping and aquacultures, attached to algae, on ships hulls and in ships sea chests (ballast water)     | Marine reef habitats and artificial substrates, not currently found in natural habitats | Potentially aggressive, in high densities this species can block water intakes on pumps or settle on mussel lines, causing significant economic impacts  | GB NNSF factsheet: <a href="http://www.nonnative-species.org/factsheet/factsheet.cfm?speciesid=647">http://www.nonnative-species.org/factsheet/factsheet.cfm?speciesid=647</a> | Raise public awareness, Check Clean Dry campaign: <a href="http://www.nonnativespecies.org/checkcleandry/">http://www.nonnativespecies.org/checkcleandry/</a> . See <a href="#">Green Blue project</a> and <a href="#">RAPID biosecurity</a> webpages.   |

| Common Name                    | Latin Name                        | Risk of Introduction  | Pathways  | Areas affected  | Impacts  | Identification   | Management   |
|--------------------------------|-----------------------------------|---|---|---|--|--|--|
| <b>Killer Shrimp</b>           | <i>Dikerogammarus haemobaphes</i> | Very likely (currently found in multiple catchments)                | Unintentional introduction by anglers (fouling), in ballast water, transferred through movement of fish stocks and foraging birds, natural range expansion. | Rivers lakes and canals   | Kill native species including young fish and significantly alter ecosystems  | GB National Alert species:<br><a href="http://www.nonnative-species.org/alerts/index.cfm">http://www.nonnative-species.org/alerts/index.cfm</a>                                    | Practice good biosecurity (check, clean and dry approach), GB non-native species secretariat management and guidance:<br><a href="http://www.nonnativespecies.org/index.cfm?pageid=559">http://www.nonnativespecies.org/index.cfm?pageid=559</a>   |
| <b>Leathery Sea Squirt</b>     | <i>Styela clava</i>               | Likely - fouling species present around GB and some locations in EE | Transport on ships hulls through fouling and in ballast water   | Coastal hard surfaces, particularly in artificial structures such as marinas and harbours | GB NNS factsheet:<br><a href="http://www.nonnativespecies.org/factsheet/factsheet.cfm?speciesId=3430">http://www.nonnativespecies.org/factsheet/factsheet.cfm?speciesId=3430</a> | GB NNS factsheet:<br><a href="http://www.nonnative-species.org/factsheet/factsheet.cfm?speciesId=3430">http://www.nonnative-species.org/factsheet/factsheet.cfm?speciesId=3430</a> | Promote awareness of fouling species and transport, Check Clean Dry campaign:<br><a href="http://www.nonnativespecies.org/checkcleandry/">http://www.nonnativespecies.org/checkcleandry/</a> , See <a href="#">Green Blue project</a> and <a href="#">RAPID biosecurity</a> webpages. CABI invasive species compendium:<br><a href="https://www.cabi.org/ISC/datasheet/62274">https://www.cabi.org/ISC/datasheet/62274</a> |
| <b>Orange Cloak sea squirt</b> | <i>Botrylloides violaceus</i>     |   | Hull fouling and ballast water, attached to aquaculture species   | Artificial substrates and hard coastal shores   | Forms large colonies able to smother aquaculture facilities animals and hard substrates, able to block intake pipes and compete with other sessile invertebrates                 | GB NNS factsheet:<br><a href="http://www.nonnative-species.org/factsheet/factsheet.cfm?speciesId=514">http://www.nonnative-species.org/factsheet/factsheet.cfm?speciesId=514</a>   | Check Clean Dry campaign:<br><a href="http://www.nonnativespecies.org/checkcleandry/">http://www.nonnativespecies.org/checkcleandry/</a><br><br>See <a href="#">Green Blue project</a> and <a href="#">RAPID biosecurity</a> webpages.   |



| Common Name                       | Latin Name               | Risk of Introduction   | Pathways   | Areas affected   | Impacts   | Identification   | Management  |
|-----------------------------------|--------------------------|--|--|--|---|--|---|
| <b>Orange-tipped sea squirt</b>   | <i>Corella eumyota</i>   |  | Attached to ships hulls and ballast water  | Marinas harbours and aquaculture facilities, hard structures           | Smothering hard surfaces, can form large clumps that could block pipes  | GB NNSS factsheet: <a href="http://www.nonnative-species.org/factsheet/factsheet.cfm?speciesId=902">http://www.nonnative-species.org/factsheet/factsheet.cfm?speciesId=902</a>   | Check Clean Dry campaign: <a href="http://www.nonnativespecies.org/checkcleandry/">http://www.nonnativespecies.org/checkcleandry/</a><br><br>See <a href="#">Green Blue project</a> and <a href="#">RAPID biosecurity</a> webpages. |
| <b>Pacific/ Portuguese oyster</b> | <i>Magellana gigas</i>   | High (likely to escape from farming, expand from present ranges) | A farmed species around GB, escape likely  | Hard substrates in shallow and intertidal coastal areas                | Forms dense aggregations to the exclusion of other species, forms reefs changing habitats and ecosystem processes, shells are sharp and pose hazard to humans | GB NNSS factsheet: <a href="http://www.nonnative-species.org/factsheet/factsheet.cfm?speciesId=1013">http://www.nonnative-species.org/factsheet/factsheet.cfm?speciesId=1013</a> | <a href="http://www.nonnativespecies.org/index.cfm?pageid=624">http://www.nonnativespecies.org/index.cfm?pageid=624</a>   |
| <b>Ruby bryozoan</b>              | <i>Bugula neritina</i>   | High   | Ballast water, attached to ships hulls   | Harbours and marinas, artificial and natural surfaces in marine waters | Grows into dense concentrations overgrowing native species, they can foul hulls , underwater machinery and aquaculture facilities                             | GB NNSS factsheet: <a href="http://www.nonnative-species.org/factsheet/factsheet.cfm?speciesId=585">http://www.nonnative-species.org/factsheet/factsheet.cfm?speciesId=585</a>   | Check Clean Dry campaign: <a href="http://www.nonnativespecies.org/checkcleandry/">http://www.nonnativespecies.org/checkcleandry/</a><br><br>See <a href="#">Green Blue project</a> and <a href="#">RAPID biosecurity</a> webpages. |
| <b>Sideswimmer</b>                | <i>Gammarus tigrinus</i> |  | Transported in ballast water originally, since introduction has spread naturally and via attachment/transport via recreational boats | Brackish water rivers, lakes and canals                                | Replaces native invertebrates, predation on some native species, sometimes linked to destruction of fishing gears and injuring fish caught in nets            | GB NNSS factsheet: <a href="http://www.nonnative-species.org/factsheet/factsheet.cfm?speciesId=1572">http://www.nonnative-species.org/factsheet/factsheet.cfm?speciesId=1572</a> | Promote awareness of fouling species and transport, Check Clean Dry campaign: <a href="http://www.nonnativespecies.org/checkcleandry/">http://www.nonnativespecies.org/checkcleandry/</a>   |

| Common Name                 | Latin Name                      | Risk of Introduction                 | Pathways   | Areas affected   | Impacts   | Identification  | Management   |
|-----------------------------|---------------------------------|--------------------------------------|--|--|---|---|--|
| <b>Signal crayfish</b>      | <i>Pacifastacus leniusculus</i> | High                                 | Imported to be farmed for food but escaped or released into the wild through water courses and across land, natural expansion up and downstream and across land is likely.   | Freshwater lakes, ponds, canals, streams and rivers, can also survive brackish waters. | Decrease native populations of crayfish through competition and as carriers for crayfish plague, potential to disrupt natural food webs through feeding, burrowing can destabilise river banks resulting in flooding. | GB NNS factsheet: <a href="http://www.nonnative-species.org/factsheet/factsheet.cfm?speciesId=2498">http://www.nonnative-species.org/factsheet/factsheet.cfm?speciesId=2498</a> | EU blacklisted species, practice good biosecurity, raise public awareness, rapid eradication of newly emerging populations. GBNNS non-native crayfish management plan: <a href="http://www.nonnativespecies.org/index.cfm?pageid=472">http://www.nonnativespecies.org/index.cfm?pageid=472</a> |
| <b>Spiny cheek crayfish</b> | <i>Orconectes limosus</i>       | High (present in many EE catchments) | Deliberate introduction to supplement stocks of native crayfish in mainland Europe, Also used in pet trade, in GB it is likely escaped from aquaria or introduced intentionally into ponds as fish food, likely contamination from fish farms and as food bait, natural expansion downstream is likely, dispersal across land to nearby waterways, transfer by birds or other predators. | Freshwater lakes, ponds and rivers.  | Decrease native populations of crayfish through competition and as carriers for crayfish plague, potential to disrupt natural food webs through feeding, burrowing can destabilise river banks resulting in flooding. | GB NNS factsheet: <a href="http://www.nonnative-species.org/factsheet/factsheet.cfm?speciesId=2441">http://www.nonnative-species.org/factsheet/factsheet.cfm?speciesId=2441</a> | EU blacklisted species, practice good biosecurity, raise public awareness, rapid eradication of newly emerging populations. GBNNS non-native crayfish management plan: <a href="http://www.nonnativespecies.org/index.cfm?pageid=472">http://www.nonnativespecies.org/index.cfm?pageid=472</a> |

| Common Name                  | Latin Name                   | Risk of Introduction  | Pathways   | Areas affected   | Impacts   | Identification  | Management   |
|------------------------------|------------------------------|---|--|--|---|---|--|
| <b>Terrapins</b>             | Multiple species             | Medium, natural dispersal is low, likely to be introduced by people. Not known to breed successfully in GB. | Native to mainland Europe, Species are generally released or escaped via the pet trade | Freshwater ponds and streams, wetlands                                 | Possible effects on insect larvae, earthworm and aquatic vegetation species   | GB NNS factsheet: <a href="http://www.nonnative-species.org/factsheet/factsheet.cfm?speciesId=1318">http://www.nonnative-species.org/factsheet/factsheet.cfm?speciesId=1318</a> , <a href="http://www.nonnative-species.org/factsheet/factsheet.cfm?speciesId=3566">http://www.nonnative-species.org/factsheet/factsheet.cfm?speciesId=3566</a> | Raise public awareness, EU Blacklist species red eared terrapin, <a href="http://www.nonnativespecies.org/index.cfm?pageid=624">http://www.nonnativespecies.org/index.cfm?pageid=624</a>   |
| <b>Tricellaria inopinata</b> | <i>Tricellaria inopinata</i> | High  | Ballast water, attached to ships hulls   | Harbours and marinas, artificial and natural surfaces in marine waters | Grows into dense concentrations overgrowing native species, they can foul hulls , underwater machinery and aquaculture facilities | CABI invasive species compendium: <a href="https://www.cabi.org/ISC/datasheet/62274">https://www.cabi.org/ISC/datasheet/62274</a>   | Promote awareness of fouling species and transport, Check Clean Dry campaign: <a href="http://www.nonnativespecies.org/checkcleandry/">http://www.nonnativespecies.org/checkcleandry/</a> , See <a href="#">Green Blue project</a> and <a href="#">RAPID biosecurity</a> webpages. CABI invasive species compendium: <a href="https://www.cabi.org/ISC/datasheet/62274">https://www.cabi.org/ISC/datasheet/62274</a> |

| Common Name             | Latin Name                   | Risk of Introduction | Pathways   | Areas affected  | Impacts  | Identification  | Management   |
|-------------------------|------------------------------|----------------------|--|---|--|---|--|
| <b>Turkish Crayfish</b> | <i>Astacus leptodactylus</i> |                      | Deliberate or accidental release into the wild after being brought in to GB for sale in fish markets | Lakes, ponds, rivers and reservoirs, also brackish water      | Potential to alter food chain through feeding and competition, minimal impact on native crayfish   | GB NNSS factsheet: <a href="http://www.nonnative-species.org/factsheet/factsheet.cfm?speciesid=381">http://www.nonnative-species.org/factsheet/factsheet.cfm?speciesid=381</a>  | Practice good biosecurity, raise public awareness, rapid eradication of newly emerging populations. GBNNSS non-native crayfish management plan: <a href="http://www.nonnativespecies.org/index.cfm?pageid=472">http://www.nonnativespecies.org/index.cfm?pageid=472</a>                                      |
| <b>Zebra Mussel</b>     | <i>Dreissena polymorpha</i>  | High                 | Transported by shipping, spreads along waterways   | Estuaries, rivers and lakes with firm surfaces for attachment | This species can foul pumps, forbays, and holding tanks, trashracks, and condenser units and can form dense aggregations that can restrict water flow on piping, increase corrosion of piping and riveting. It can also impact biodiversity by attaching to other animals or removing viable substrate, through rapid feeding it decrease phytoplankton and can increase dissolved nutrients in the water through increased amounts of faeces production | GB non-native species secretariat factsheet: GB NNSS factsheet: <a href="http://www.nonnative-species.org/factsheet/factsheet.cfm?speciesid=1250">http://www.nonnative-species.org/factsheet/factsheet.cfm?speciesid=1250</a> | GB non-native species secretariat management and guidance: <a href="http://www.nonnativespecies.org/index.cfm?pageid=305">http://www.nonnativespecies.org/index.cfm?pageid=305</a> , <a href="http://www.nonnativespecies.org/index.cfm?pageid=624">http://www.nonnativespecies.org/index.cfm?pageid=624</a> |

**Table 11: INNS management priorities for East of England Region – Plants and Algae Amber Management Species List**

| Common Name                    | Latin Name                 | Risk of Introduction  | Pathways  | Areas affected   | Impacts   | Identification  | Management  |
|--------------------------------|----------------------------|---|---|--|---|---|---|
| <b>American Willowherb</b>     | <i>Epilobium ciliatum</i>  | High (widespread in EE)   | Possibly introduced on imported timber and spread from naturally from timber yards, often moved in soil, attached to animals and vehicles | Damp marshland rivers and ponds  | Outcompetes smaller shrubs  | CABI invasive species compendium:<br><a href="https://www.cabi.org/ISC/datasheet/114114">https://www.cabi.org/ISC/datasheet/114114</a>  | CABI invasive species compendium:<br><a href="https://www.cabi.org/ISC/datasheet/114114">https://www.cabi.org/ISC/datasheet/114114</a>  |
| <b>Brazilian Giant-rhubarb</b> | <i>Gunnera manicata</i>    | Medium (only present in Louth Grimsby Ancholme, East Suffolk, upper Bedford and Witham catchments in low abundances), not as invasive as the other species of Giant Rhubarb | Ornamental species and used as an architectural herb, slow spread and seed is often not viable in the UK                                  | Lake margins and streamsides, moist ground                               | Large leaves prevent growth of other species, potential to suppress biodiversity and alter ecosystems, it can block drains and streams and increases the risk of flooding | GB NNSS factsheet:<br><a href="http://www.nonnative-species.org/factsheet/factsheet.cfm?speciesid=1646">http://www.nonnative-species.org/factsheet/factsheet.cfm?speciesid=1646</a> | See information regarding Giant Rhubarb: CABI invasive species compendium:<br><a href="https://www.cabi.org/ISC/datasheet/107826">https://www.cabi.org/ISC/datasheet/107826</a> |
| <b>Canadian Goldenrod</b>      | <i>Solidago canadensis</i> | High - Widespread throughout EE catchments  | A horticultural species spread via waste disposal and natural dispersal   | Waysides, waste ground, river banks, unmanaged grasslands and open scrub | Can grow in dense aggregations  | GB NNSS factsheet:<br><a href="http://www.nonnative-species.org/factsheet/factsheet.cfm?speciesid=3323">http://www.nonnative-species.org/factsheet/factsheet.cfm?speciesid=3323</a> | CABI invasive species compendium:<br><a href="https://www.cabi.org/ISC/datasheet/50599">https://www.cabi.org/ISC/datasheet/50599</a>  |

| Common Name            | Latin Name                      | Risk of Introduction                       | Pathways  | Areas affected  | Impacts  | Identification   | Management   |
|------------------------|---------------------------------|--|---|---|--|--|--|
| <b>Curly waterweed</b> | <i>Lagarosiphon major</i>       | High                                       | Introduced as an oxygenating plant in the aquarium trade, transference of fragments on machinery recreational equipment and clothing.     | Streams and ponds, still water, eutrophic calcareous canals ponds gravel pits and lakes | Dense growth can deplete oxygen, disrupt erosion-deposition processes, block light, outcompete native plants, disrupt movement of animals and predator-prey relationships, absorb sunlight increasing overall water temperature, die back can result in eutrophic conditions, can facilitate mosquito breeding areas. Socially, this species can restrict recreational water activities, sailing and watersports. Rotting material can be deposited on beaches after storms. | GB NNSF factsheet: <a href="http://www.nonnative-species.org/factsheet/factsheet.cfm?speciesid=1888">http://www.nonnative-species.org/factsheet/factsheet.cfm?speciesid=1888</a> | EU blacklisted species, <a href="http://www.nonnativespecies.org/index.cfm?pageid=624">http://www.nonnativespecies.org/index.cfm?pageid=624</a>  |
| <b>Early Goldenrod</b> | <i>Solidago gigantea</i>        | High - Widespread throughout EE catchments | A horticultural species spread via waste disposal and natural dispersal   | Uncut grasslands, wetland edges, riparian habitats, forest edges                        | Once established it can outcompete native species  | CABI invasive species compendium: <a href="https://www.cabi.org/ISC/datasheet/50575">https://www.cabi.org/ISC/datasheet/50575</a>  | CABI invasive species compendium: <a href="https://www.cabi.org/ISC/datasheet/50575">https://www.cabi.org/ISC/datasheet/50575</a>  |
| <b>Giant hogweed</b>   | <i>Heracleum mantegazzianum</i> | High                                       | Originally introduced as an ornamental plant and deliberately planted around rivers and ponds, seeds dispersed by wind, water and humans. | Lowland streams and rivers, waste ground, rough pastures                                | Forms dense stands that reduce biodiversity through shading and competition, Phototoxic sap when combined with UV radiation causes skin burns.   | GB NNSF factsheet: <a href="http://www.nonnative-species.org/factsheet/factsheet.cfm?speciesid=1705">http://www.nonnative-species.org/factsheet/factsheet.cfm?speciesid=1705</a> | <a href="http://www.nonnativespecies.org/index.cfm?pageid=154">EU blacklisted species,</a> <a href="http://www.nonnativespecies.org/index.cfm?pageid=154">http://www.nonnativespecies.org/index.cfm?pageid=154</a> |

| Common Name             | Latin Name                    | Risk of Introduction   | Pathways  | Areas affected   | Impacts  | Identification  | Management   |
|-------------------------|-------------------------------|--|---|--|--|---|--|
| <b>Giant Knotweed</b>   | <i>Fallopia sachalinensis</i> | High (present throughout EE although not as common as Japanese knotweed) | Ornamental species that has escaped through river flooding and disposal, rhizome material can be spread via waterways                                     | Riverbanks, lake shores, lowland disturbed areas                             | Forms tall and dense thickets that compete with native vegetation for space, light, nutrients and water, can cause significant changes to native community composition, weaken flood defences (however in dense aggregations may help to protect them), infestations can deter development due to cost of eradication (similar to Japanese Knotweed) | GB NNS factsheet: <a href="http://www.nonnative-species.org/factsheet/factsheet.cfm?speciesId=1498">http://www.nonnative-species.org/factsheet/factsheet.cfm?speciesId=1498</a> | Raise public awareness, establish a rapid response protocol, see information regarding Japanese knotweed   |
| <b>Giant-rhubarb</b>    | <i>Gunnera tinctoria</i>      | High - present in numerous catchments and highly invasive                | Introduced as an ornamental plant and has escaped into the wild. Plant can regenerate from rhizome fragments, seeds dispersed by birds, water and humans. | Margins and banks of ponds, rivers, streams and interconnected waterways.    | Large leaves cause shading and prevent growth of native species, blockage of drains and streams, degradation of agricultural and recreational land, soil erosion.  | GB NNS factsheet: <a href="http://www.nonnative-species.org/factsheet/factsheet.cfm?speciesId=1647">http://www.nonnative-species.org/factsheet/factsheet.cfm?speciesId=1647</a> | EU blacklisted species, control: CABI invasive species compendium: <a href="https://www.cabi.org/ISC/datasheet/107826">https://www.cabi.org/ISC/datasheet/107826</a> |
| <b>Himalayan balsam</b> | <i>Impatiens glandulifera</i> | High   | Introduced as a garden plant and sown by beekeepers, explosive seed heads facilitate spread over distances, seeds spread by waterways.                    | Widespread particularly along riverbanks, floodplain forests and wet meadows | Shallow root system does not bind sediment leading to erosion following die back, can shade and crowd out native species, attracts pollinators possibly to the detriment of native species, dense stands can impede water flow and increase likelihood of flooding.  | GB NNS factsheet: <a href="http://www.nonnative-species.org/factsheet/factsheet.cfm?speciesId=1810">http://www.nonnative-species.org/factsheet/factsheet.cfm?speciesId=1810</a> | EU blacklisted species, <a href="http://www.nonnativespecies.org/index.cfm?pageid=147">http://www.nonnativespecies.org/index.cfm?pageid=147</a>                      |

| Common Name                  | Latin Name                | Risk of Introduction                         | Pathways   | Areas affected   | Impacts   | Identification   | Management   |
|------------------------------|---------------------------|--|--|--|---|--|--|
| <b>Japanese Knotweed</b>     | <i>Fallopia japonica</i>  | Very likely                                  | 1) Inappropriate disposal of garden and building site waste material.<br>2) Inappropriate removal methods used where it is already a problem.<br>3) Downstream spread of rhizome material from river banks.<br>4) Transport of contaminated topsoil.<br>5) Intentional introduction as ornamental garden plant spread to unaffected areas. | Occurs throughout most of Great Britain                | Can have major impacts on biodiversity, integrity of river morphology etc. in localised area, with a lesser impact elsewhere. Impact can be high in urban areas/developments where buildings are undermined. It can hybridise with giant knotweed which can often be more vigorous. | GB NNS factsheet:<br><a href="http://www.nonnative-species.org/factsheet/factsheet.cfm?speciesid=1495">http://www.nonnative-species.org/factsheet/factsheet.cfm?speciesid=1495</a> | <a href="http://www.nonnativespecies.org/index.cfm?pageid=226">http://www.nonnativespecies.org/index.cfm?pageid=226</a>  |
| <b>New Zealand Pygmyweed</b> | <i>Crassula helmsii</i>   | High (already present)                       | Originally used as an oxygenating plant in ponds, escape via discarding contents of ponds, can spread by fragmentation attached to boats, machinery, clothing and waterfowl  | Ponds, lakes, reservoirs, canals and ditches, damp mud | Dense mats cause shading, deplete oxygen and cause a decline of diversity, mats can be mistaken for solid ground and lead to death of animals when they cannot get out of the water. Mats can obstruct water-borne transport, navigation and flood defences                         | GB NNS factsheet:<br><a href="http://www.nonnative-species.org/factsheet/factsheet.cfm?speciesid=1017">http://www.nonnative-species.org/factsheet/factsheet.cfm?speciesid=1017</a> | <a href="http://www.nonnativespecies.org/index.cfm?pageid=624">http://www.nonnativespecies.org/index.cfm?pageid=624</a>  |
| <b>Nuttall's waterweed</b>   | <i>Elodea nuttallii</i>   | High   | Brought in as an ornamental plant has resulted in accidental and deliberate release, spreads through fragmentation   | Nutrient-rich lakes and ponds, slow flowing water      | Rapid growth causes tangled mats that block light, chokes recreational water channels and hydroelectric plants  | GB NNS factsheet:<br><a href="http://www.nonnative-species.org/factsheet/factsheet.cfm?speciesid=1304">http://www.nonnative-species.org/factsheet/factsheet.cfm?speciesid=1304</a> | EU blacklisted species, control: CABI invasive species compendium: <a href="https://www.cabi.org/ISC/datasheet/20761">https://www.cabi.org/ISC/datasheet/20761</a> |
| <b>Orange Balsam</b>         | <i>Impatiens capensis</i> | High - already present throughout the region | Projectile seeds, dispersed along waterways, similar to Himalayan Balsam   | Riverbanks   | Similar to Himalayan Balsam   | Similar to Himalayan balsam although smaller with orange flowers   | See methods for Himalayan Balsam   |



| Common Name             | Latin Name                    | Risk of Introduction  | Pathways  | Areas affected  | Impacts  | Identification  | Management  |
|-------------------------|-------------------------------|---|---|---|--|---|---|
| <b>Parrot's feather</b> | <i>Myriophyllum aquaticum</i> | Very likely (already present)   | This is an aquaculture / horticulture species, spreads through dumping of contaminated garden plants, potential escape / expansion from gardens, transfer along interconnected waterways through natural expansion or via stem fragments. | In GB it often occurs in eutrophic conditions in freshwater lakes and ponds, ditches, reservoirs, canals and flooded mineral workings, in its native range it also occurs in floodplain lagoons, river backwaters, marshes, fens and ditches. | Dense growth can disrupt natural erosion-deposition process, disrupt animal movement, block light disrupt predator-prey dynamics, lead to oxygen depletion, absorb sunlight to increase water temperature, facilitate mosquito breeding grounds. Dense growth can also cause flooding, interfere with irrigation, transport, hydroelectric power production, fisheries, recreation and interfere with fisheries. In large amounts it can prevent recreation in water bodies. Most of these impacts are unlikely in GB unless populations increase. | GB NNS factsheet: <a href="http://www.nonnative-species.org/factsheet/factsheet.cfm?speciesid=2285">http://www.nonnative-species.org/factsheet/factsheet.cfm?speciesid=2285</a> | EU blacklisted species, <a href="http://www.nonnativespecies.org/index.cfm?pageid=541">http://www.nonnativespecies.org/index.cfm?pageid=541</a>                             |
| <b>Pickereel weed</b>   | <i>Monochoria vaginalis</i>   | Medium - currently uncommon in UK but occurrences are increasing. Present in Broadland Rivers and Combined Essex catchments | Used in garden ponds and boggy areas, can buy for horticultural purposes, potential for this species to escape.   | Swamps, marshes, open wet places, along ditches, freshwater pools and mudflats  | Rapidly growing species, noxious   | CABI invasive species compendium: <a href="https://www.cabi.org/isc/datasheet/34807">https://www.cabi.org/isc/datasheet/34807</a>   | Known control and eradication is limited. CABI invasive species compendium: <a href="https://www.cabi.org/isc/datasheet/34807">https://www.cabi.org/isc/datasheet/34807</a> |

| Common Name             | Latin Name                    | Risk of Introduction   | Pathways   | Areas affected   | Impacts  | Identification   | Management  |
|-------------------------|-------------------------------|--|--|--|--|--|---|
| <b>Pirri-Pirri Burr</b> | <i>Acaena novae-zelandiae</i> | High - found in numerous coastal sites in EE   | Ornamental species, colonises through burs that attach to fur and clothing | Coastal and sandy soils and sand dunes   | Dense growth can suppress other plants   | <a href="http://www.nonnative-species.org/index.cfm?pageid=624">http://www.nonnative-species.org/index.cfm?pageid=624</a> ,<br><a href="http://www.nonnative-species.org/download/Document.cfm?id=1404">http://www.nonnative-species.org/download/Document.cfm?id=1404</a> | RAPID good practice management toolkit:<br><a href="http://www.nonnativespecies.org/index.cfm?pageid=624">http://www.nonnativespecies.org/index.cfm?pageid=624</a><br><a href="https://secure.fera.defra.gov.uk/nonnativespecies/downloadDocument.cfm?id=17704">https://secure.fera.defra.gov.uk/nonnativespecies/downloadDocument.cfm?id=17704</a> |
| <b>Wakame</b>           | <i>Undaria pinnatifida</i>    | High (spread throughout SE and some EE catchments)   | Unintentional with Pacific oysters and attached to ships hulls             | Subtidal marine areas, artificial structures especially in marinas, attached to pontoons, pylons, buoys etc. | Competition for space with native kelp species, fouling commercial shellfish   | GB NNSS factsheet:<br><a href="http://www.nonnative-species.org/factsheet/factsheet.cfm?speciesid=3643">http://www.nonnative-species.org/factsheet/factsheet.cfm?speciesid=3643</a>  | No effective management procedures. Promote awareness of fouling species and transport Check Clean Dry campaign:<br><a href="http://www.nonnativespecies.org/checkcleandry/">http://www.nonnativespecies.org/checkcleandry/</a><br><br>See <a href="#">Green Blue project</a> and <a href="#">RAPID biosecurity</a> webpages.                       |
| <b>Wireweed</b>         | <i>Sargassum muticum</i>      | High - already widespread around the South and West coasts of GB, currently only found within Combined Essex | Fouling on boats, shellfish and commercial oyster fisheries                | Coastal sites, intertidally and subtidally on hard surfaces, such as in rock pools                           | Fouling aquaculture species, it can impair recreational activities in harbours, fast growing and can outgrow native species, blocking light, increases sedimentation in rock pools | GB NNSS factsheet:<br><a href="http://www.nonnative-species.org/factsheet/factsheet.cfm?speciesid=3141">http://www.nonnative-species.org/factsheet/factsheet.cfm?speciesid=3141</a>  | Most methods of management are limited to control. CABI invasive species compendium:<br><a href="https://www.cabi.org/ISC/datasheet/108973">https://www.cabi.org/ISC/datasheet/108973</a>   |

**Table 12: INNS management priorities for East of England Region – Animals Green Management Species List**

| Common Name                     | Latin Name                        | Risk of Introduction                                    | Pathways  | Areas affected   | Impacts   | Identification  | Management   |
|---------------------------------|-----------------------------------|---|---|--|---|---|--|
| <b>A sea spider</b>             | <i>Ammothea hilgendorfi</i>       |   | Transport on ships hulls  | Shallow subtidal waters  | Limited impact  | GB NNSS factsheet:<br><a href="http://www.nonnativespecies.org/factsheet/factsheet.cfm?speciesId=186">http://www.nonnativespecies.org/factsheet/factsheet.cfm?speciesId=186</a>   | See <a href="#">Green Blue project</a> and <a href="#">RAPID biosecurity</a> webpages.   |
| <b>A tube worm</b>              | <i>Hydroides ezoensis</i>         | Low - rarely spotted, only known in Broadland catchment | Originally introduced on cars and in ballast water, low rate of natural spread                            | Marine reef habitats and artificial substrates, not currently found in natural habitats  | Unknown   | <a href="http://jncc.defra.gov.uk/page-1699">http://jncc.defra.gov.uk/page-1699</a>   | Raise public awareness, Check Clean Dry campaign:<br><a href="http://www.nonnativespecies.org/checkcleandry/">http://www.nonnativespecies.org/checkcleandry/</a> |
| <b>American jack knife clam</b> | <i>Ensis directus</i>             |   | Exploited commercially in UK waters   | Sand or muddy sand in the low intertidal and subtidal areas in marine and brackish water | In abundance it can impact communities and sediment structure due to burrowing, potential recreational impact due to stepping on them (similar to native razor clams) | GB NNSS factsheet:<br><a href="http://www.nonnativespecies.org/factsheet/factsheet.cfm?speciesId=1322">http://www.nonnativespecies.org/factsheet/factsheet.cfm?speciesId=1322</a> |  |
| <b>American Piddock</b>         | <i>Petricolaria pholadiformis</i> |   | Accidental introduction from aquaculture (e.g. Pacific Oyster), natural dispersal via floating vegetation | Estuarine and marine areas   |   | CABI invasive species compendium:<br><a href="https://www.cabi.org/ISC/datasheet/108908">https://www.cabi.org/ISC/datasheet/108908</a>  |  |

| Common Name               | Latin Name                        | Risk of Introduction   | Pathways   | Areas affected   | Impacts   | Identification  | Management  |
|---------------------------|-----------------------------------|--|--|--|---|---|---|
| <b>Atlantic Rangia</b>    | <i>Rangia cuneata</i>             | Recently introduced to GB in Lincolnshire                        | Unknown  | Brackish water   | Unknown   | GB NNSS risk assessment<br><a href="http://www.nonnative-species.org/download/Document.cfm?id=1526">http://www.nonnative-species.org/download/Document.cfm?id=1526</a>              | Unknown, Promote awareness of fouling species and transport, Check Clean Dry campaign:<br><a href="http://www.nonnativespecies.org/checkcleandry/">http://www.nonnativespecies.org/checkcleandry/</a> |
| <b>Bitterling</b>         | <i>Rhodeus amarus</i>             |  | Imported and released, probably for ornamental purposes, natural spread along waterways that have Unionid mussels that are required for reproduction | Still or slow-flowing water with dense aquatic vegetation and sand-silt bottom | Mostly unknown, acts as a parasite in unionid mussels and may predate upon fish eggs.   | GB NNSS factsheet:<br><a href="http://www.nonnative-species.org/factsheet/factsheet.cfm?speciesid=3001">http://www.nonnative-species.org/factsheet/factsheet.cfm?speciesid=3001</a> |   |
| <b>Bladder snails</b>     | <i>Physa spp</i>                  | Introduced to GB 1800-1825                                       | Various, natural spread  | Freshwater   | Unknown   | bladder snails  | Unknown / difficult in high numbers   |
| <b>Canada Goose</b>       | <i>Branta canadensis</i>          | High - widespread throughout UK                                  | Originally deliberately introduced but has since spread naturally  | Still and slow flowing waters  | Heavy grazers of aquatic and farmland vegetation, droppings can pollute waters and cause a slipping hazard, suspected of transmitting Salmonella to cattle. | GB NNSS factsheet:<br><a href="http://www.nonnative-species.org/factsheet/factsheet.cfm?speciesid=533">http://www.nonnative-species.org/factsheet/factsheet.cfm?speciesid=533</a>   | Eradication is difficult and expensive. See CABI invasive species compendium:<br><a href="https://www.cabi.org/isc/datasheet/91754">https://www.cabi.org/isc/datasheet/91754</a>                      |
| <b>Caspian mud shrimp</b> | <i>Chelicorophium curvispinum</i> | Has been identified in most EE catchments although is still rare |  | Rivers estuaries and brackish water on hard rocky substrates                   | Creates silty tubes than can change the ecosystem, can form high densities although impact is minimal   | CABI invasive species compendium:<br><a href="https://www.cabi.org/ISC/datasheet/108307">https://www.cabi.org/ISC/datasheet/108307</a>  | Raise public awareness and maintain good biosecurity.   |

| Common Name                | Latin Name                     | Risk of Introduction                                   | Pathways   | Areas affected   | Impacts  | Identification   | Management  |
|----------------------------|--------------------------------|--|--|--|--|--|---|
| <b>Chinese Water Deer</b>  | <i>Hydropotes inermis</i>      |  | Ornamental animals that have accidentally escaped and established slowly expanding populations | Marshes with reeds, sedges or coarse grasses,  | Minimal, although has been known to eat crops  | GB NNSS factsheet: <a href="http://www.nonnative-species.org/factsheet/factsheet.cfm?speciesid=1770">http://www.nonnative-species.org/factsheet/factsheet.cfm?speciesid=1770</a> |   |
| <b>Common Carp</b>         | <i>Cyprinus carpio</i>         | widespread   | Introduced for aquaculture and angling, spreads by reproduction, now widespread                | Warm, deep, slow-flowing and still waters, rivers, prefers vegetation and soft bottoms | Reduce water quality and degrade habitats, alter ecosystems                                | GB NNSS factsheet: <a href="http://www.nonnative-species.org/factsheet/factsheet.cfm?speciesid=1135">http://www.nonnative-species.org/factsheet/factsheet.cfm?speciesid=1135</a> | Raise public awareness  |
| <b>Crucian Carp</b>        | <i>Carassius carassius</i>     | Medium   | Transported for angling purposes   | Freshwater   | Minimal, positive impact where introduced for recreational water body users (e.g. anglers) | CABI invasive species compendium: <a href="https://www.cabi.org/ISC/datasheet/90564">https://www.cabi.org/ISC/datasheet/90564</a>  | Probably susceptible to rotenone (a known piscicide)  |
| <b>Darwin's barnacle</b>   | <i>Austrominius modestus</i>   | Already widespread                                     | Attached to ships hulls and in ballast water, now established in the UK                        | Intertidal hard surfaces (manmade or natural)  | Fouling, competes with native species  | GB NNSS factsheet: <a href="http://www.nonnative-species.org/factsheet/factsheet.cfm?speciesid=1301">http://www.nonnative-species.org/factsheet/factsheet.cfm?speciesid=1301</a> | Check Clean Dry campaign: <a href="http://www.nonnativespecies.org/checkcleandry/">http://www.nonnativespecies.org/checkcleandry/</a><br><br>See <a href="#">Green Blue project</a> and <a href="#">RAPID biosecurity</a> webpages. |
| <b>Fresh water shrimps</b> | <i>Cryptorchestia cavimana</i> | Low number of sightings in Broadlands and East Suffolk | Unknown  | Rivers   | Unknown  | Small shrimps  | Unknown   |

| Common Name                   | Latin Name                      | Risk of Introduction  | Pathways   | Areas affected  | Impacts  | Identification  | Management  |
|-------------------------------|---------------------------------|---|--|---|--|---|---|
| <b>Jenkins' Spire Snail</b>   | <i>Potamopyrgus antipodarum</i> | High - Widespread throughout GB                               | Introduced in drinking water barrels from Australia and released, natural spread                               | Estuaries, standing and flowing freshwaters                     | Can establish dense population and quickly crowd out other snails and invertebrates  | GB NNESS factsheet: <a href="http://www.nonnative-species.org/factsheet/factsheet.cfm?speciesid=2811">http://www.nonnative-species.org/factsheet/factsheet.cfm?speciesid=2811</a> | Effective control once established is difficult. CABI invasive species compendium: <a href="https://www.cabi.org/ISC/datasheet/43672">https://www.cabi.org/ISC/datasheet/43672</a>        |
| <b>Manila Clam</b>            | <i>Ruditapes philippinarum</i>  |   | Used in bivalve fisheries, accidental release / escape likely, it can be found contaminating oyster seed       | Coastal sediments   |  | CABI invasive species compendium: <a href="https://www.cabi.org/ISC/datasheet/61697">https://www.cabi.org/ISC/datasheet/61697</a>   | Practice good biosecurity, Check Clean Dry campaign: <a href="http://www.nonnativespecies.org/checkcleandry/">http://www.nonnativespecies.org/checkcleandry/</a> , Raise public awareness |
| <b>Midwife Toad</b>           | <i>Alytes obstetricans</i>      |   | Accidental import of tadpoles with nursery water plants  | Warm humid areas, ponds   | Minor, potential carrier of pathogens  | GB NNESS factsheet: <a href="http://www.nonnative-species.org/factsheet/factsheet.cfm?speciesid=148">http://www.nonnative-species.org/factsheet/factsheet.cfm?speciesid=148</a>   |   |
| <b>Muntjac deer</b>           | <i>Muntiacus reevesi</i>        | High - already widespread throughout the EE region            | Originally an ornamental species that escaped or were released deliberately. They have since spread naturally. | Largely found in wooded areas but prefer to be close to streams | Feeding on brambles and shrubs can lead to damage and degradation of habitat for other species. This species has been observed to displace native roe deer | GB NNESS: <a href="http://www.nonnative-species.org/factsheet/factsheet.cfm?speciesid=2263">http://www.nonnative-species.org/factsheet/factsheet.cfm?speciesid=2263</a>           | Control by shooting as part of deer management plan   |
| <b>Orange-striped anemone</b> | <i>Diadumene lineata</i>        | First recorded in GB before 1800 and commonly found on coasts | Unknown origin, naturally dispersed  | Marine  | Unknown  | Marlin website: <a href="https://www.marlin.ac.uk/species/detail/2299">https://www.marlin.ac.uk/species/detail/2299</a>   | Unknown   |

| Common Name                        | Latin Name                      | Risk of Introduction                        | Pathways   | Areas affected  | Impacts   | Identification   | Management   |
|------------------------------------|---------------------------------|---|--|---|---|--|--|
| <b>Pile worm</b>                   | <i>Alitta succinea</i>          |   |  |   |   | CABI invasive species compendium:<br><a href="https://www.cabi.org/ISC/datasheet/107757">https://www.cabi.org/ISC/datasheet/107757</a>   | CABI invasive species compendium:<br><a href="https://www.cabi.org/ISC/datasheet/107757">https://www.cabi.org/ISC/datasheet/107757</a> |
| <b>Planaria torva</b>              | <i>Planaria torva</i>           |   | Associated with canals and port areas                  | Freshwater lakes, canals and slow-flowing streams                               | Competition with native flatworms is a possibility        | GB NNS factsheet:<br><a href="http://www.nonnative-species.org/factsheet/factsheet.cfm?speciesId=2745">http://www.nonnative-species.org/factsheet/factsheet.cfm?speciesId=2745</a> |  |
| <b>Northern River Crangonyctid</b> | <i>Crangonyx pseudogracilis</i> | Medium (already widespread in high numbers) | Accidental introduction on garden plants               | Lakes, permanent and temporary ponds, rivers, streams and interstitial habitats | Can sometimes replace native populations                  | GB NNS factsheet:<br><a href="http://www.nonnative-species.org/factsheet/factsheet.cfm?speciesId=1010">http://www.nonnative-species.org/factsheet/factsheet.cfm?speciesId=1010</a> | Correct disposal of aquatic and garden waste, raise public awareness   |
| <b>Quahog</b>                      | <i>Mercenaria mercenaria</i>    | Likely - present in SE and Essex catchments | Introduced with oysters and has since spread naturally | Sheltered brackish and marine water   | Limited as this species is also used as a fishery species | GBNNS factsheet:<br><a href="http://www.nonnative-species.org/factsheet/factsheet.cfm?speciesId=2206">http://www.nonnative-species.org/factsheet/factsheet.cfm?speciesId=2206</a>  | Enact good biosecurity practices   |
| <b>Rainbow Trout</b>               | <i>Oncorhynchus mykiss</i>      | High  | Escape from fish farms                                 | Freshwater and marine   | Competitive, can displace native trout                    | CABI invasive species compendium:<br><a href="https://www.cabi.org/ISC/datasheet/71813">https://www.cabi.org/ISC/datasheet/71813</a>   | Raise awareness, practice good biosecurity, eradication programmes   |

| Common Name                  | Latin Name                       | Risk of Introduction                                       | Pathways  | Areas affected                                  | Impacts   | Identification   | Management  |
|------------------------------|----------------------------------|--|---|---|---|--|---|
| <b>Sand Gaper</b>            | <i>Mya arenaria</i>              | Introduced to GB in 1899                                   | Natural dispersal   | Brackish waters, estuaries, and marine habitats | Potential ecological changes  | <a href="http://www.iucngisd.org/gisd/speciesname/Mya+arenaria">http://www.iucngisd.org/gisd/speciesname/Mya+arenaria</a>  | <a href="http://www.iucngisd.org/gisd/speciesname/Mya+arenaria">http://www.iucngisd.org/gisd/speciesname/Mya+arenaria</a>         |
| <b>Slender-tube amphipod</b> | <i>Monocorophium acherusicum</i> | Recorded since 1935  | Native to mainland Europe, probably introduced by shipping processes  | Estuaries                                       |   | GB NNSF factsheet: <a href="http://www.nonnative-species.org/factsheet/factsheet.cfm?speciesid=914">http://www.nonnative-species.org/factsheet/factsheet.cfm?speciesid=914</a> |   |
| <b>Smooth Coil Snail</b>     | <i>Helicodiscus singleyanus</i>  |  | Rare species spotted in the Upper Bedford catchment   | Soils   | Unknown   |  | Unknown   |
| <b>Sunbleak</b>              | <i>Leucaspis delineatus</i>      |  | Accidental introduction / inadvertent dispersal with aquaculture species, spreads naturally downstream and connected waterbodies, eggs can contaminate anglers nets and be spread among locations | Rivers ponds and lakes                          | Predates on eggs of other fish species, potential carrier for the non-native parasite <i>Ergasilus briani</i> | CABI invasive species compendium: <a href="https://www.cabi.org/ISC/datasheet/77347">https://www.cabi.org/ISC/datasheet/77347</a>  | CABI invasive species compendium: <a href="https://www.cabi.org/ISC/datasheet/77347">https://www.cabi.org/ISC/datasheet/77347</a> |
| <b>Tadpole physa</b>         | <i>Physella gyrina</i>           | Only identified rarely in East Suffolk catchment within EE | Unknown, possible escape  | Rivers and wetlands                             | Unknown   | <a href="http://www.habitas.org.uk/molluscireland/species.asp?ID=59">http://www.habitas.org.uk/molluscireland/species.asp?ID=59</a>  | Removal as part of a management plan  |



| Common Name             | Latin Name                              | Risk of Introduction   | Pathways   | Areas affected                                      | Impacts   | Identification  | Management  |
|-------------------------|---|--|--|---|---|---|---|
| <b>Water flea</b>       | <i>Daphnia (Daphnia) ambigua</i>        | rarely identified so far in Combined Essex and East Suffolk catchments | Unknown  | Cool deep water                                     | Unknown   | Water flea  | Unknown   |
| <b>Wautier's Limpet</b> | <i>Ferrissia (Petancyclus) wautieri</i> |  | Aquarium species   | Freshwater  |   |   |   |
| <b>Wels Catfish</b>     | <i>Silurus glanis</i>                   |  | Originally introduced for aquaculture but has also been stocked for angling purposes | Lowland rivers, backwaters and well vegetated lakes | Potential impact on predated species, it has a wide ranging diet, in GB it is typically used as an angling or food fish | GB NNS factsheet: <a href="http://www.nonnative-species.org/factsheet/factsheet.cfm?speciesId=3269">http://www.nonnative-species.org/factsheet/factsheet.cfm?speciesId=3269</a> |   |
| <b>Zander</b>           | <i>Sander lucioperca</i>                |  | Introduced for recreational fishing  | Rivers and lakes                                    | Preys on native species affecting native fish populations, an important recreational fished species                     | GB NNS factsheet: <a href="http://www.nonnative-species.org/factsheet/factsheet.cfm?speciesId=3131">http://www.nonnative-species.org/factsheet/factsheet.cfm?speciesId=3131</a> | CABI invasive species compendium: <a href="https://www.cabi.org/ISC/datasheet/65338">https://www.cabi.org/ISC/datasheet/65338</a> |

**Table 13: INNS management priorities for East of England Region – Plants and Algae Green Management Species List**

| Common Name                | Latin Name                     | Risk of Introduction   | Pathways   | Areas affected                                      | Impacts                    | Identification  | Management |
|----------------------------|--------------------------------|--|--|---|----------------------------|---|------------|
| <b>Angular Sea-fig</b>     | <i>Carpobrotus glaucescens</i> | Rarely found in GB, has been observed in the East Suffolk catchment  | Horticultural plant that has since spread naturally and via dispersion of stem fragments | Rocks, cliffs, walls and roadside verges by the sea | Currently no known effects | Online atlas of British and Irish Flora:<br><a href="https://www.brc.ac.uk/plantatlas/plant/carpobrotus-glaucescens">https://www.brc.ac.uk/plantatlas/plant/carpobrotus-glaucescens</a> | Unknown    |
| <b>Annual Buttonweed</b>   | <i>Cotula australis</i>        | Has been identified only within the Witham catchment although rarely | Unknown, possibly horticultural escape   |   | Unknown                    | Grows in a thin mat   | Unknown    |
| <b>Arrow Bamboo</b>        | <i>Pseudosasa japonica</i>     | Rare occurrences observed in most EE catchments                      | Horticultural species, possible escape   |   | Unknown                    | Bamboo  | Unknown    |
| <b>Branched Horsetail</b>  | <i>Equisetum ramosissimum</i>  | Low, rare spot in the Witham catchment.                              | Unknown, possible escape   |   | Unknown                    |   | Unknown    |
| <b>Broad-leaved Bamboo</b> | <i>Sasa palmata</i>            | Low - Rare find in some EE catchments                                | Unknown, possible escape   | Rivers and wetlands                                 | Unknown                    | Bamboo  | Unknown    |

| Common Name               | Latin Name                   | Risk of Introduction   | Pathways   | Areas affected                     | Impacts | Identification  | Management |
|---------------------------|------------------------------|--|--|------------------------------------|---------|---|------------|
| <b>Buttonweed</b>         | <i>Cotula coronopifolia</i>  | Found in many EE catchments although rare in abundance           | Unknown, possibly horticultural escape           |                                    | Unknown | yellow button like flowers  | Unknown    |
| <b>Canadian Waterweed</b> | <i>Elodea canadensis</i>     | Widespread   |  | Nutrient-rich lakes and ponds both |         | GB NNESS factsheet: <a href="http://www.nonnative-species.org/factsheet/factsheet.cfm?speciesId=1303">http://www.nonnative-species.org/factsheet/factsheet.cfm?speciesId=1303</a> |            |
| <b>Cape-pondweed</b>      | <i>Aponogeton distachyos</i> | Has been rarely found in Broadland, combined Essex and Witham    | Horticultural aquatic plant, possible escape     | Unknown                            | Unknown | <a href="http://www.nonnative-species.org/factsheet/factsheet.cfm?speciesId=302">http://www.nonnative-species.org/factsheet/factsheet.cfm?speciesId=302</a>                       | Unknown    |
| <b>Dwarf Bamboo</b>       | <i>Pleioblastus pygmaeus</i> | Rare occurrences observed in south Essex catchments              | Horticultural species, possible escape           |                                    | Unknown | Bamboo  | Unknown    |
| <b>Fish-plant</b>         | <i>Houttuynia cordata</i>    | Rare- has been spotted in the wild only in South Essex catchment | Ornamental plant, can spread through fragmenting | Freshwater plant                   | Unknown | Orange-scented, heart-shaped leaves and tiny yellow flowers   | Unknown    |

| Common Name                                       | Latin Name                    | Risk of Introduction  | Pathways   | Areas affected   | Impacts  | Identification  | Management   |
|---|-------------------------------|---|--|--|--|---|--|
| <b>Greater Cuckooflower</b>                       | <i>Cardamine raphanifolia</i> | Rarely found in GB, has been observed in the Combined Essex catchment | horticultural plant that was first recorded in the wild over 100 years ago, spreads along rivers     | Rivers and stream sides  | Unknown  | Online atlas of British and Irish Flora:<br><a href="https://www.brc.ac.uk/plantatlas/plant/cardamine-raphanifolia">https://www.brc.ac.uk/plantatlas/plant/cardamine-raphanifolia</a> | Unknown  |
| <b>Hairy Bamboo</b>                               | <i>Sasa ramosa</i>            | Low - spotted only in Welland (rare in the wild)                      | Unknown, possible escape   | Rivers and wetlands  | Unknown  | Bamboo  | Unknown  |
| <b>Hybrid Monkeyflower (M. guttatus x luteus)</b> | <i>Mimulus x robertsii</i>    |   | Unknown, hybrid species  | Streambanks and river shingle  | Unknown  |   | Unknown  |
| <b>Large-flowered Waterweed</b>                   | <i>Egeria densa</i>           | High  | Widely sold for aquarium and as an oxygenating plant   | Canals, ponds and quarries   | Rapid growth can block light, disrupt recreation in waterways and smothering, effects unlikely unless populations increase | GB NNSS factsheet:<br><a href="http://www.nonnative-species.org/factsheet/factsheet.cfm?speciesId=1290">http://www.nonnative-species.org/factsheet/factsheet.cfm?speciesId=1290</a>   | Herbicide  |
| <b>Least Duckweed</b>                             | <i>Lemna minuta</i>           |   | Likely introduced accidentally but has since spread via contaminated clothing, equipment and animals | Standing water, slow-flowing water courses such as canals and rivers and in backwaters | Not known  | GB NNSS factsheet:<br><a href="http://www.nonnative-species.org/factsheet/factsheet.cfm?speciesId=1940">http://www.nonnative-species.org/factsheet/factsheet.cfm?speciesId=1940</a>   | CABI invasive species compendium:<br><a href="https://www.cabi.org/ISC/datasheet/108968">https://www.cabi.org/ISC/datasheet/108968</a> |

| Common Name                     | Latin Name                      | Risk of Introduction  | Pathways   | Areas affected   | Impacts  | Identification   | Management |
|---------------------------------|---------------------------------|---|--|--|--|--|------------|
| <b>Monkeyflower</b>             | <i>Mimulus guttatus</i>         | Widespread throughout EE  | Introduced through cultivation, spread by seed and by stolons                                    | Streambanks and river shingle  | It can form dense aggregations but unlikely to cause major impacts | GB NNSS factsheet: <a href="http://www.nonnative-species.org/factsheet/factsheet.cfm?speciesId=2231">http://www.nonnative-species.org/factsheet/factsheet.cfm?speciesId=2231</a> | Unknown    |
| <b>Musk</b>                     | <i>Mimulus moschatus</i>        | widespread throughout Western England with some sightings in EE | Introduced through cultivation, spread by seeds  | Streambanks and river shingle  | Unknown  |  | Unknown    |
| <b>Narihira Bamboo</b>          | <i>Semiarundinaria fastuosa</i> | Low - spotted only in Combined Essex (rare in the wild)         | Unknown, possible escape   | Rivers and wetlands  | Unknown  | Bamboo   | Unknown    |
| <b>New Zealand Bitter-cress</b> | <i>Cardamine corymbosa</i>      | Rarely spotted in Broadland, East Suffolk and Witham catchments | Brought in with garden compost and has escaped and spread (often a garden weed)                  | Unknown  | Unknown  | Bright green leaves, white flowers   | Herbicides |
| <b>New Zealand Willowherb</b>   | <i>Epilobium brunnescens</i>    |   | Originally brought in for horticulture and has since spread, possibly escaped via wind dispersal | Stream beds, flushes, disturbed river gravel and other open, moist rocky places, in areas of high rainfall | Sometimes overgrowing native plants                                | GB NNSS factsheet: <a href="http://www.nonnative-species.org/factsheet/factsheet.cfm?speciesId=1335">http://www.nonnative-species.org/factsheet/factsheet.cfm?speciesId=1335</a> | Herbicide  |

| Common Name                  | Latin Name  | Risk of Introduction                                  | Pathways  | Areas affected   | Impacts   | Identification  | Management  |
|------------------------------|---|---|---|--|---|---|---|
| <b>Rhododendron</b>          | <i>Rhododendron ponticum</i>                              | High - widespread throughout EE region                | Originally introduced for horticultural purposes and has since spread | Moorland, woods, screes, rocky banks, derelict gardens and streamside's. | Outgrows and outcompetes native species - to the complete exclusion of those species. Tends to invade moorland inhabited by game birds.   | <a href="http://www.nonnative-species.org/factsheet/factsheet.cfm?speciesId=3004">http://www.nonnative-species.org/factsheet/factsheet.cfm?speciesId=3004</a> | CABI invasive species compendium: <a href="https://www.cabi.org/ISC/datasheet/47272">https://www.cabi.org/ISC/datasheet/47272</a> |
| <b>Seaside Daisy</b>         | <i>Erigeron glaucus</i>                                   | Low - has been found in most EE catchments but rarely | Unknown, possible horticultural escape, still for sale                | Coastal areas and sand dunes   | Unknown   | Daisy   | Unknown   |
| <b>Townsend's Cord-grass</b> | <i>Spartina maritima x alterniflora = S. x townsendii</i> |   | Hybrid species  | Sheltered estuarine mudflats   | Rapid growth rates can cause decline of mudflat habitat, it can also alter succession in ecosystems by replacing native pioneer species. It can also benefit coastlines by helping to stabilise sediments |   | Unknown   |
| <b>Turion duckweed</b>       | <i>Lemna turionifera</i>                                  | rarely found in EE and GB in the wild                 | unknown, possible escape  | lakes ponds, rivers and streams  | unknown   |   | unknown   |
| <b>Water Bent</b>            | <i>Polypogon viridis</i>                                  | widespread throughout most EE                         | spreads as a weed of nurseries  | lowland, often in waste areas  |   | <a href="http://www.brc.ac.uk/plantatlas/plant/polypogon-viridis">http://www.brc.ac.uk/plantatlas/plant/polypogon-viridis</a>                                 | unknown   |

| Common Name          | Latin Name               | Risk of Introduction              | Pathways   | Areas affected  | Impacts   | Identification   | Management   |
|----------------------|--------------------------|-----------------------------------|--|---|---|--|--|
| <b>Water-lettuce</b> | <i>Pistia stratiotes</i> | low (tropical warm water species) | Accidental or deliberate release from ornamental, aquaculture and pet trade. Possible hitchhiker | brackish lagoons, freshwater lakes, ponds reservoirs and irrigation channels, also possible in estuaries and rivers | rapidly forms dense mats, impacting recreation, irrigation and drainage, navigation and fishing, it influences nutrient balance and plankton diversity causing degrading water conditions | CABI invasive species compendium:<br><a href="https://www.cabi.org/ISC/datasheet/41496">https://www.cabi.org/ISC/datasheet/41496</a> | CABI invasive species compendium:<br><a href="https://www.cabi.org/ISC/datasheet/41496">https://www.cabi.org/ISC/datasheet/41496</a> |

**Table 14: INNS management priorities for each catchment - Animals**

| Common Name                    | Broad-land | Cam Ely Ouse | Louth Grimsby Ancholne | Combined Essex | East Suffolk | Nene   | North West Norfolk | North Norfolk | Old Bedford | South Essex | Upper and Bedford Ouse | Welland | Witham |
|--------------------------------|------------|--------------|------------------------|----------------|--------------|--------|--------------------|---------------|-------------|-------------|------------------------|---------|--------|
| A tube worm                    | Green      |              |                        |                |              |        |                    |               |             |             |                        |         |        |
| A sea spider                   |            |              |                        | Green          |              |        |                    |               |             |             |                        |         |        |
| African Clawed Toad            | Grey       | Grey         | Grey                   | Grey           | Grey         | Grey   | Grey               | Grey          | Grey        | Grey        | Grey                   | Grey    | Grey   |
| American bullfrog              | Grey       | Grey         | Grey                   | Grey           | Grey         | Grey   | Grey               | Grey          | Grey        | Grey        | Grey                   | Grey    | Grey   |
| American jack knife clam       | Green      |              |                        |                |              |        |                    |               |             |             |                        |         |        |
| American Mink                  | Yellow     | Yellow       | Yellow                 | Yellow         | Yellow       | Yellow | Yellow             | Yellow        | Yellow      | Grey        | Yellow                 | Yellow  | Yellow |
| American Oyster Drill          | Grey       | Grey         | Grey                   | Yellow         | Grey         | Grey   | Grey               | Grey          | Grey        | Grey        | Grey                   | Grey    | Grey   |
| American Piddock               |            |              |                        | Green          |              |        |                    |               |             |             |                        |         |        |
| American Slipper Limpet        | Yellow     |              |                        | Yellow         |              |        |                    | Yellow        |             | Yellow      |                        |         | Yellow |
| <i>Amphibalanus improvisus</i> |            |              |                        |                | Yellow       |        |                    |               |             |             |                        |         | Yellow |
| Amur sleeper                   | Grey       | Grey         | Grey                   | Grey           | Grey         | Grey   | Grey               | Grey          | Grey        | Grey        | Grey                   | Grey    | Grey   |
| Asian Shore Crab               | Grey       | Grey         | Grey                   | Grey           | Yellow       | Grey   | Grey               | Grey          | Grey        | Grey        | Grey                   | Grey    | Grey   |
| Asiatic Clam                   | Yellow     |              |                        |                |              |        |                    |               |             |             |                        |         |        |
| Atlantic Rangia                |            |              |                        |                |              |        |                    |               |             |             |                        |         | Green  |
| Bitterling                     |            | Green        |                        |                |              |        |                    |               |             |             |                        |         |        |
| Bladder snails                 |            |              | Green                  |                |              |        |                    |               |             |             |                        |         |        |
| Bloody-red Mysid               |            |              | Yellow                 |                |              |        |                    |               |             |             |                        | Yellow  | Yellow |
| Brush clawed shore crab        | Grey       | Grey         | Grey                   | Yellow         | Yellow       | Grey   | Grey               | Grey          | Grey        | Grey        | Grey                   | Grey    | Grey   |
| <i>Bugula simplex</i>          | Yellow     |              |                        | Yellow         |              |        |                    |               |             |             |                        |         |        |
| <i>Bugula stolonifera</i>      | Yellow     |              |                        | Yellow         |              |        |                    |               |             |             |                        |         |        |
| Canada Goose                   | Green      | Green        | Green                  | Green          | Green        | Green  | Green              | Green         | Green       | Green       | Green                  | Green   | Green  |



| Common Name              | Broad-land | Cam Ely Ouse | Louth Grimsby Ancholne | Combined Essex | East Suffolk | Nene   | North West Norfolk | North Norfolk | Old Bedford | South Essex | Upper and Bedford Ouse | Welland | Witham |
|--------------------------|------------|--------------|------------------------|----------------|--------------|--------|--------------------|---------------|-------------|-------------|------------------------|---------|--------|
| Carpet Sea-squirt        |            |              |                        |                |              |        |                    |               |             |             |                        |         |        |
| Caspian mud shrimp       | Green      |              | Green                  |                | Green        | Green  |                    |               |             |             |                        | Green   | Green  |
| Chinese mitten crab      | Yellow     | Yellow       | Yellow                 | Yellow         | Grey         | Yellow | Yellow             | Yellow        | Yellow      | Grey        | Yellow                 | Yellow  | Yellow |
| Chinese Water Deer       | Green      | Green        |                        |                | Green        |        | Green              | Green         | Green       |             | Green                  | Green   | Green  |
| Coati                    |            |              |                        |                |              |        |                    |               |             |             |                        |         |        |
| Common Carp              | Green      | Green        | Green                  | Green          | Green        | Green  |                    |               |             |             | Green                  | Green   | Green  |
| Compass Sea Squirt       | Yellow     |              | Yellow                 | Yellow         |              |        |                    | Yellow        |             |             |                        |         |        |
| Coypu                    |            |              |                        |                |              |        |                    |               |             |             |                        |         |        |
| Crucian Carp             |            |              |                        |                |              |        |                    |               |             |             |                        | Green   |        |
| Darwin's barnacle        | Green      |              | Green                  | Green          |              |        |                    |               |             |             |                        |         | Green  |
| Demon Shrimps            |            | Yellow       |                        |                |              | Yellow |                    |               | Yellow      |             | Yellow                 | Yellow  | Yellow |
| Edible Frog              |            |              |                        |                |              |        |                    |               |             |             |                        |         |        |
| Egyptian Goose           | Yellow     | Yellow       | Yellow                 | Yellow         | Yellow       |        | Yellow             | Yellow        | Yellow      | Yellow      | Yellow                 | Yellow  | Yellow |
| False Dark Mussel        |            |              |                        |                |              | Yellow |                    |               |             |             |                        |         | Yellow |
| Fox squirrel             |            |              |                        |                |              |        |                    |               |             |             |                        |         |        |
| Fresh water shrimps      | Green      |              |                        |                | Green        |        |                    |               |             |             |                        |         |        |
| Freshwater hydroid       |            |              |                        |                | Yellow       |        |                    |               |             |             |                        |         |        |
| Goldfish                 | Grey       | Red          | Grey                   | Red            | Red          | Grey   | Red                | Grey          | Grey        | Grey        | Red                    | Red     | Red    |
| Japanese Skeleton Shrimp | Yellow     |              |                        |                |              |        |                    |               |             |             |                        |         |        |
| Jenkins' Spire Snail     | Green      | Green        | Green                  | Green          | Green        | Green  |                    | Green         | Green       | Green       | Green                  | Green   | Green  |
| Killer shrimps           | Yellow     | Grey         | Grey                   | Grey           | Grey         | Yellow | Grey               | Grey          | Grey        | Grey        | Yellow                 | Grey    | Grey   |
| Leathery Sea Squirt      | Yellow     | Grey         | Yellow                 | Yellow         | Yellow       | Grey   |                    |               |             |             |                        |         |        |
| Manila Clam              |            |              |                        | Green          |              |        |                    |               |             |             |                        |         |        |
| Marbled crayfish         |            |              |                        |                |              |        |                    |               |             |             |                        |         |        |

| Common Name                 | Broad-land | Cam Ely Ouse | Louth Grimsby Ancholne | Combined Essex | East Suffolk | Nene   | North West Norfolk | North Norfolk | Old Bedford | South Essex | Upper and Bedford Ouse | Welland | Witham |
|-----------------------------|------------|--------------|------------------------|----------------|--------------|--------|--------------------|---------------|-------------|-------------|------------------------|---------|--------|
| Marsh Frog                  | Red        |              |                        | Red            | Red          |        |                    |               |             |             |                        |         |        |
| Midwife Toad                |            | Green        |                        |                |              | Green  |                    |               |             |             | Green                  |         |        |
| Muntjac deer                | Green      | Green        | Green                  | Green          | Green        | Green  | Green              | Green         | Green       | Green       | Green                  | Green   | Green  |
| Musk Rat                    |            |              |                        |                |              |        |                    |               |             |             |                        |         |        |
| Northern River Crangonyctid | Green      | Green        | Green                  | Green          | Green        | Green  |                    | Green         | Green       |             | Green                  | Green   | Green  |
| Orange cloak sea squirt     | Yellow     |              |                        | Yellow         |              |        |                    |               |             |             |                        |         |        |
| Orange-striped anemone      |            |              |                        |                |              |        |                    |               |             |             |                        |         | Green  |
| Orange-tipped sea squirt    | Yellow     |              |                        | Yellow         | Yellow       |        |                    |               |             |             |                        |         |        |
| Pacific/Portuguese oyster   |            |              |                        | Yellow         | Yellow       |        |                    |               |             |             |                        |         |        |
| Pile worm                   |            |              |                        | Green          |              |        |                    |               |             |             |                        |         |        |
| <i>Planaria torva</i>       | Green      |              | Green                  |                |              |        |                    |               |             |             |                        | Green   | Green  |
| Quagga Mussel               |            |              |                        |                |              |        |                    |               |             |             |                        |         |        |
| Quahog                      |            |              |                        | Green          |              |        |                    |               |             |             |                        |         |        |
| Racoon                      |            |              |                        |                |              |        |                    |               |             |             |                        |         |        |
| Racoon dog                  |            |              |                        |                |              |        |                    |               |             |             |                        |         |        |
| Rainbow Trout               |            | Green        | Green                  | Green          |              |        | Green              |               |             |             | Green                  | Green   | Green  |
| Red swamp crayfish          |            |              |                        |                |              |        |                    |               |             |             |                        |         |        |
| Ruby bryozoan               | Yellow     |              |                        | Yellow         |              |        |                    |               |             |             |                        |         |        |
| Ruddy duck                  | Red        | Red          | Red                    | Red            | Red          | Red    | Red                | Red           | Red         | Red         | Red                    | Red     | Red    |
| Sacred ibis                 |            |              |                        |                |              |        |                    |               |             |             |                        |         |        |
| Sand Gaper                  |            |              |                        | Green          |              |        |                    |               |             |             |                        |         |        |
| Sideswimmer                 |            |              | Yellow                 |                |              | Yellow |                    |               |             |             |                        | Yellow  | Yellow |
| Signal crayfish             | Yellow     | Yellow       | Yellow                 | Yellow         | Yellow       | Yellow | Red                | Yellow        | Red         |             | Yellow                 | Yellow  | Yellow |

| Common Name                     | Broad-land | Cam Ely Ouse | Louth Grimsby Ancholne | Combined Essex | East Suffolk | Nene | North West Norfolk | North Norfolk | Old Bedford | South Essex | Upper and Bedford Ouse | Welland | Witham |
|---------------------------------|------------|--------------|------------------------|----------------|--------------|------|--------------------|---------------|-------------|-------------|------------------------|---------|--------|
| Slender-tube amphipod           |            |              |                        |                |              |      |                    |               |             |             |                        |         |        |
| Smooth Coil Snail               |            |              |                        |                |              |      |                    |               |             |             |                        |         |        |
| Spiny cheek crayfish            |            |              |                        |                |              |      |                    |               |             |             |                        |         |        |
| Stone moroko / Topmouth Gudgeon |            |              |                        |                |              |      |                    |               |             |             |                        |         |        |
| Sunbleak                        |            |              |                        |                |              |      |                    |               |             |             |                        |         |        |
| Tadpole physa                   |            |              |                        |                |              |      |                    |               |             |             |                        |         |        |
| Terrapins                       |            |              |                        |                |              |      |                    |               |             |             |                        |         |        |
| <i>Tricellaria inopinata</i>    |            |              |                        |                |              |      |                    |               |             |             |                        |         |        |
| Turkish Crayfish                |            |              |                        |                |              |      |                    |               |             |             |                        |         |        |
| Virile crayfish                 |            |              |                        |                |              |      |                    |               |             |             |                        |         |        |
| Wautier's Limpet                |            |              |                        |                |              |      |                    |               |             |             |                        |         |        |
| Water flea                      |            |              |                        |                |              |      |                    |               |             |             |                        |         |        |
| Wels Catfish                    |            |              |                        |                |              |      |                    |               |             |             |                        |         |        |
| Zander                          |            |              |                        |                |              |      |                    |               |             |             |                        |         |        |
| Zebra Mussel                    |            |              |                        |                |              |      |                    |               |             |             |                        |         |        |

**Table 15: INNS management priorities for each catchment – Plants and Algae**

| Common Name             | Broad-land | Cam Ely Ouse | Louth Grimsby Ancholne | Combined Essex | East Suffolk | Nene   | North West Norfolk | North Norfolk | Old Bedford | South Essex | Upper and Bedford Ouse | Welland | Witham |
|-------------------------|------------|--------------|------------------------|----------------|--------------|--------|--------------------|---------------|-------------|-------------|------------------------|---------|--------|
| Alligator weed          |            |              |                        |                |              |        |                    |               |             |             |                        |         |        |
| American skunk cabbage  | Red        | Red          | Grey                   | Red            | Red          | Grey   | Grey               | Red           | Grey        | Grey        | Red                    | Red     | Red    |
| American Willowherb     | Yellow     | Yellow       | Yellow                 | Yellow         | Yellow       | Yellow | Yellow             | Yellow        | Yellow      | Yellow      | Yellow                 | Yellow  | Yellow |
| Angular Sea-fig         |            |              |                        |                | Green        |        |                    |               |             |             |                        |         |        |
| Annual Buttonweed       |            |              |                        |                |              |        |                    |               |             |             |                        |         | Green  |
| Arrow Bamboo            | Green      | Green        | Green                  | Green          | Green        |        |                    |               |             | Green       | Green                  | Green   |        |
| Asiatic tearthumb       |            |              |                        |                |              |        |                    |               |             |             |                        |         |        |
| Branched Horsetail      |            |              |                        |                |              |        |                    |               |             |             |                        |         | Green  |
| Brazilian Giant-rhubarb |            |              | Yellow                 |                |              |        |                    |               |             |             | Yellow                 | Grey    | Yellow |
| Broadleaf watermilfoil  |            |              | Grey                   | Grey           |              |        |                    |               |             |             | Grey                   | Grey    |        |
| Broad-leaved Bamboo     |            |              |                        | Green          |              |        |                    |               |             |             |                        |         | Green  |
| Buttonweed              | Green      |              | Green                  | Green          | Green        |        |                    |               |             |             |                        |         | Green  |
| Canadian Goldenrod      | Yellow     | Yellow       | Yellow                 | Yellow         | Yellow       | Yellow | Yellow             | Grey          | Yellow      | Yellow      | Yellow                 | Yellow  | Yellow |
| Canadian Waterweed      | Green      | Green        | Green                  | Green          | Green        | Green  | Green              |               | Green       |             | Green                  | Green   | Green  |
| Cape-pondweed           | Green      |              |                        | Green          |              |        |                    |               |             |             |                        |         | Green  |
| Carolina fanwort        |            |              |                        | Grey           | Grey         |        |                    |               |             | Grey        |                        |         | Grey   |
| Common milkweed         |            |              |                        |                |              |        |                    |               |             |             |                        |         |        |
| Curly waterweed         |            |              | Red                    | Yellow         |              |        |                    |               |             | Yellow      |                        | Red     | Red    |
| Dwarf Bamboo            |            |              |                        |                |              |        |                    |               |             | Green       |                        |         |        |
| Early Goldenrod         | Grey       | Yellow       | Yellow                 | Grey           | Yellow       | Yellow | Grey               | Grey          | Grey        | Yellow      | Yellow                 | Yellow  | Yellow |
| Fish-plant              |            |              |                        |                |              |        |                    |               |             | Green       |                        |         |        |

| Common Name              | Broad-land | Cam Ely Ouse | Louth Grimsby Ancholne | Combined Essex | East Suffolk | Nene   | North West Norfolk | North Norfolk | Old Bedford | South Essex | Upper and Bedford Ouse | Welland | Witham |
|--------------------------|------------|--------------|------------------------|----------------|--------------|--------|--------------------|---------------|-------------|-------------|------------------------|---------|--------|
| Floating pennywort       | Red        | Yellow       | Grey                   | Red            | Red          | Red    | Grey               | Red           | Red         | Red         | Yellow                 | Grey    | Grey   |
| Floating primrose-willow | Grey       | Grey         | Grey                   | Grey           | Grey         | Grey   | Grey               | Grey          | Grey        | Grey        | Grey                   | Grey    | Grey   |
| Giant hogweed            | Yellow     | Yellow       | Red                    | Yellow         | Yellow       | Red    | Red                | Yellow        | Red         | Red         | Yellow                 | Yellow  | Yellow |
| Giant Knotweed           | Yellow     | Yellow       | Grey                   | Yellow         | Grey         | Grey   | Grey               | Yellow        | Grey        | Grey        | Grey                   | Grey    | Yellow |
| Giant-rhubarb            | Grey       | Grey         | Yellow                 | Yellow         | Yellow       | Grey   | Grey               | Grey          | Grey        | Grey        | Yellow                 | Grey    | Yellow |
| Greater Cuckooflower     | White      | White        | White                  | Green          | White        | White  | White              | White         | White       | White       | White                  | White   | White  |
| Hairy Bamboo             | White      | White        | White                  | White          | White        | White  | White              | White         | White       | White       | White                  | Green   | White  |
| Himalayan balsam         | Yellow     | Yellow       | Yellow                 | Yellow         | Yellow       | Yellow | Red                | Yellow        | Red         | Red         | Yellow                 | Red     | Red    |
| Himalayan Knotweed       | Grey       | Grey         | Grey                   | Grey           | Grey         | Grey   | Grey               | Grey          | Grey        | Grey        | Grey                   | Grey    | Grey   |
| Hottentot-fig            | Grey       | Grey         | Grey                   | Grey           | Red          | Grey   | Grey               | Grey          | Grey        | Grey        | Grey                   | Grey    | Grey   |
| Hybrid Monkeyflower      | White      | White        | Green                  | White          | White        | White  | White              | White         | White       | White       | White                  | White   | Green  |
| Japanese Knotweed        | Yellow     | Yellow       | Yellow                 | Yellow         | Yellow       | Yellow | Yellow             | Yellow        | Yellow      | Yellow      | Yellow                 | Yellow  | Yellow |
| Japanese stiltgrass      | Grey       | Grey         | Grey                   | Grey           | Grey         | Grey   | Grey               | Grey          | Grey        | Grey        | Grey                   | Grey    | Grey   |
| Large-flowered Waterweed | White      | White        | White                  | Green          | White        | White  | White              | White         | White       | White       | White                  | White   | White  |
| Least Duckweed           | Green      | Green        | Green                  | Green          | Green        | Green  | Green              | Green         | Green       | Green       | Green                  | Green   | Green  |
| Monkeyflower             | Green      | Green        | White                  | Green          | Green        | White  | Green              | Green         | White       | White       | Green                  | Green   | Green  |
| Musk                     | White      | White        | White                  | Green          | White        | White  | White              | White         | White       | White       | White                  | White   | White  |
| Narihira Bamboo          | White      | White        | White                  | Green          | White        | White  | White              | White         | White       | White       | White                  | White   | White  |
| New Zealand Bitter-cress | Green      | White        | White                  | White          | Green        | White  | White              | White         | White       | White       | White                  | White   | Green  |
| New Zealand Pygmyweed    | Yellow     | Yellow       | Yellow                 | Yellow         | Yellow       | Yellow | Yellow             | Yellow        | Yellow      | Yellow      | Yellow                 | Red     | Red    |

| Common Name            | Broad-land | Cam Ely Ouse | Louth Grimsby Ancholne | Combined Essex | East Suffolk | Nene   | North West Norfolk | North Norfolk | Old Bedford | South Essex | Upper and Bedford Ouse | Welland | Witham |
|------------------------|------------|--------------|------------------------|----------------|--------------|--------|--------------------|---------------|-------------|-------------|------------------------|---------|--------|
| New Zealand Willowherb |            |              |                        |                |              |        |                    |               |             |             | Green                  |         |        |
| Nuttall's waterweed    | Yellow     | Yellow       | Yellow                 | Yellow         | Yellow       | Yellow | Red                | Grey          | Yellow      | Red         | Yellow                 | Yellow  | Yellow |
| Orange Balsam          | Yellow     | Yellow       |                        | Yellow         |              | Yellow |                    |               | Red         |             | Yellow                 | Yellow  | Red    |
| Parrot's feather       | Yellow     | Yellow       |                        | Yellow         | Yellow       | Yellow | Yellow             | Yellow        |             |             |                        |         | Yellow |
| Persian hogweed        | Grey       | Grey         | Grey                   | Grey           | Grey         | Grey   | Grey               | Grey          | Grey        | Grey        | Grey                   | Grey    | Grey   |
| Pickerel weed          | Yellow     |              |                        | Yellow         |              |        |                    |               |             |             |                        |         |        |
| Pirri Pirri Burr       | Grey       | Grey         | Grey                   | Grey           | Yellow       | Grey   | Yellow             | Grey          | Grey        | Grey        | Grey                   | Grey    | Grey   |
| Rhododendron           | Green      | Green        | Green                  | Green          | Green        | Green  | Green              | Green         | Green       | Green       | Green                  | Green   | Green  |
| Seaside Daisy          | Green      | Green        | Green                  | Green          | Green        |        |                    |               |             | Green       |                        |         | Green  |
| Sosnowsky's hogweed    | Grey       | Grey         | Grey                   | Grey           | Grey         | Grey   | Grey               | Grey          | Grey        | Grey        | Grey                   | Grey    | Grey   |
| Townsend's Cord-grass  |            |              |                        |                | Green        |        |                    |               |             |             |                        |         | Green  |
| Tree Groundsel         | Grey       | Grey         | Grey                   | Grey           | Grey         | Grey   | Grey               | Grey          | Grey        | Grey        | Grey                   | Grey    | Grey   |
| turion duckweed        |            |              |                        |                |              |        |                    |               |             |             |                        |         | Green  |
| Uruguay Water-primrose | Grey       | Red          | Grey                   | Grey           | Red          | Grey   | Grey               | Grey          | Grey        | Grey        | Grey                   | Grey    | Grey   |
| Wakame                 | Yellow     |              | Yellow                 | Yellow         | Yellow       |        |                    |               |             |             |                        |         |        |
| Water Bent             | Green      | Green        | Green                  | Green          | Green        | Green  | Green              |               |             | Green       | Green                  | Green   | Green  |
| Water Fern             | Red        | Red          | Red                    | Red            | Red          | Red    | Red                | Grey          | Red         | Grey        | Yellow                 | Red     | Yellow |
| Water hyacinth         | Grey       | Grey         | Grey                   | Grey           | Red          | Grey   | Grey               | Grey          | Grey        | Grey        | Grey                   | Grey    | Grey   |
| Water-lettuce          | Green      |              |                        |                |              |        |                    |               |             |             |                        |         |        |
| Whiteweed              | Grey       | Grey         | Grey                   | Grey           | Grey         | Grey   | Grey               | Grey          | Grey        | Grey        | Grey                   | Grey    | Grey   |
| Wireweed               | Grey       | Grey         | Grey                   | Yellow         | Grey         | Grey   | Grey               | Grey          | Grey        | Grey        | Grey                   | Grey    | Grey   |

## Section 7: Future work and recommendations

### The document

It is intended that this document be regularly updated to reflect changes in species presence, distribution and approaches to management. To this end it is envisaged that an regular review of the document should take place.

This will take the following approach:

- An assessment of available data to update the action and catchment species lists
- A review of current management approaches to update recommendations
- Update of action lists based on occurrences of new species
- Review of current legislation to incorporate any changes
- A consultation event to update stakeholders on progress and to gather additional information

Using these an updated RIMP will be produced and promoted to stakeholders.

### The messages

The contents of the RIMP should be used to provide information that can be promoted to stakeholders and the wider public. This could take the form

of regular social media posts by LAGs and others, press releases, targeted workshops, signage at the hotspots identified and other appropriate methods. Previous projects such as the [Check, Clean Dry campaign](#) and [Be Plantwise](#) can provide guidance on how to approach this

### Supporting data collection

There is an ongoing need for recording of invasive species in order to act as an early warning system and to inform management. To this end recording of species needs to be encouraged and supported. The data gathered for this document has shown that there is a wealth of data available and a network of people actively recording species information. Work should be undertaken to support and develop this to ensure that robust data is available in the future. This should be developed through the stakeholder workshops as part of the annual review. Opportunities should also be taken to work with established local recording networks and the NBN to support the collection and publication of invasive species data.

## Appendix I: Glossary

| Term                      | Explanation  |
|---------------------------|--|
| <b>Alert species</b>      | Are target species of concern for GB. Sightings should be reported immediately to GB NNSS and/or local authorities   |
| <b>Biocontrol</b>         | The use of a natural enemy or predator to control an invasive non-native species   |
| <b>Biosecurity</b>        | A set of preventative measures designed to reduce the likelihood of transferring INNS (such as the Check, Clean Dry campaign)  |
| <b>Black list</b>         | A list of invasive non-native species for which there are measures in place to prevent its entry to a country or region. Black list species are associated with high risk of severe detrimental impacts on native biodiversity, health or economy. |
| <b>Early detection</b>    | When an INNS arrives and it is quickly noticed or recorded and this information is passed on to the relevant authorities, enables rapid response.  |
| <b>Eradication</b>        | Removing a species entirely from the region, or country, using INNS control and management methods.  |
| <b>GB INNS strategy</b>   | A document from GBNSS (2008, 2015) outlining aims and objectives underpinning action on INNS in Great Britain until 2020.  |
| <b>GBNNS</b>              | The Great Britain Non-Native Species Secretariat.  |
| <b>Hotspot</b>            | Areas at greatest risk of INNS impact, introduction or transfer.   |
| <b>IAS</b>                | Invasive Alien Species (European term for INNS)  |
| <b>INNS</b>               | Invasive Non Native Species (also known as IAS)  |
| <b>Non-native species</b> | Species that have been introduced to areas outside of their natural range – i.e. human mediated dispersal  |
| <b>Pathway</b>            | Term used to describe the way in which INNS can become introduced or spread to a region including the potential purpose, route and mode of introduction.   |
| <b>Prevention</b>         | Stopping a species of INNS coming into the region or into the country through counter measures (usually biosecurity).  |
| <b>RAPID LIFE</b>         | RAPID is a three-year EU Life funded project whose objective is to deliver a package of measures to reduce the impact and spread of INNS in freshwater aquatic, riparian and coastal environments across England.                                  |
| <b>Rapid response</b>     | The instigation of action against an INNS threat at a stage when a locally, regionally or nationally important strategic win might still be achievable.  |
| <b>Regions</b>            | As part of the RAPID LIFE project, England has been split into five regions of which this RIMP covers the East of England region   |
| <b>RIMP</b>               | Regional INNS Management Plan. There are 5 RIMPs for England of which this one is related to the East of England (EE)  |
| <b>Riparian</b>           | Habitats along the sides of river banks, lakes or wetlands.  |



## Appendix II: Map of RAPID LIFE regions



## Appendix III: List of INNS of European Union concern

The following list represents species governed by Regulation (EU) 1143/2014. The species designated on this list are subject to measures and restrictions designed to limit the spread of these species. These restrictions relate to the keeping, importing, selling, breeding and growing of the following species.

| A) Plants | Common name              | Latin name                         |
|-----------|--------------------------|------------------------------------|
|           | Alligator weed           | <i>Alternanthera philoxeroides</i> |
|           | American skunk cabbage   | <i>Lysichiton americanus</i>       |
|           | Asiatic tearthumb        | <i>Persicaria perfoliata</i>       |
|           | Broadleaf watermilfoil   | <i>Myriophyllum heterophyllum</i>  |
|           | Chilean rhubarb          | <i>Gunnera tinctoria</i>           |
|           | Common milkweed          | <i>Asclepias syriaca</i>           |
|           | Crimson fountaingrass    | <i>Pennisetum setaceum</i>         |
|           | Curly waterweed          | <i>Lagarosiphon major</i>          |
|           | Eastern baccharis        | <i>Baccharis halimifolia</i>       |
|           | Fanwort                  | <i>Cabomba caroliniana</i>         |
|           | Floating pennywort       | <i>Hydrocotyle ranunculoides</i>   |
|           | Floating primrose-willow | <i>Ludwigia peploides</i>          |
|           | Giant hogweed            | <i>Heracleum mantegazzianum</i>    |
|           | Indian balsam            | <i>Impatiens glandulifera</i>      |
|           | Japanese stiltgrass      | <i>Microstegium vimineum</i>       |
|           | Kudzu vine               | <i>Pueraria lobata</i>             |
|           | Nuttall's waterweed      | <i>Elodea nuttallii</i>            |
|           | Parrot's feather         | <i>Myriophyllum aquaticum</i>      |
|           | Persian hogweed          | <i>Heracleum persicum</i>          |
|           | Sosnowsky's hogweed      | <i>Heracleum sosnowskyi</i>        |
|           | Water hyacinth           | <i>Eichhornia crassipes</i>        |
|           | Water-primrose           | <i>Ludwigia grandiflora</i>        |
|           | Whitetop weed            | <i>Parthenium hysterophorus</i>    |
|           |                          |                                    |

| <b>B) Animals</b> | <b>Common name</b>                               | <b>Latin name</b>                              |
|-------------------|--|--|
|                   | American bullfrog                                | <i>Lithobates catesbeianus</i>                 |
|                   | Amur sleeper                                     | <i>Percottus glenii</i>                        |
|                   | Asian hornet                                     | <i>Vespa velutina nigrithorax</i>              |
|                   | Chinese mitten crab                              | <i>Eriocheir sinensis</i>                      |
|                   | Coati  | <i>Nasua nasua</i>                             |
|                   | Coypu  | <i>Myocastor coypus</i>                        |
|                   | Egyptian goose                                   | <i>Alopochen aegyptiacus</i>                   |
|                   | Fox squirrel                                     | <i>Sciurus niger</i>                           |
|                   | Grey squirrel                                    | <i>Sciurus carolinensis</i>                    |
|                   | Indian house crow                                | <i>Corvus splendens</i>                        |
|                   | Marbled crayfish                                 | <i>Procambarus fallax</i> f. <i>virginalis</i> |
|                   | Muntjac deer                                     | <i>Muntiacus reevesi</i>                       |
|                   | Muskrat  | <i>Ondatra zibethicus</i>                      |
|                   | Pallas' squirrel                                 | <i>Callosciurus erythraeus</i>                 |
|                   | Raccoon  | <i>Procyon lotor</i>                           |
|                   | Raccoon dog                                      | <i>Nyctereutes procyonoides</i>                |
|                   | Red swamp crayfish                               | <i>Procambarus clarkii</i>                     |
|                   | Red-eared, yellow-bellied and Cumberland sliders | <i>Trachemys scripta</i>                       |
|                   | Ruddy duck                                       | <i>Oxyura jamaicensis</i>                      |
|                   | Sacred ibis                                      | <i>Threskiornis aethiopicus</i>                |
|                   | Siberian chipmunk                                | <i>Tamias sibiricus</i>                        |
|                   | Signal crayfish                                  | <i>Pacifastacus leniusculus</i>                |
|                   | Small Asian mongoose                             | <i>Herpestes javanicus</i>                     |
|                   | Spiny-cheek crayfish                             | <i>Orconectes limosus</i>                      |
|                   | Stone moroko                                     | <i>Pseudorasbora parva</i>                     |
|                   | Virile crayfish                                  | <i>Orconectes virilis</i>                      |

## Appendix IV: Non-native wetland bird species

There are many non-native bird species that have been observed in the EE catchments. Many of these species have either escaped from collections or are considered vagrant to GB, however few are currently classed as invasive and causing a problem (listed in Section 6). Due to the high number of sightings of non-native birds in the EE, this list has been compiled to highlight the species that have been found in EE during the last 10 years and in which catchments. At present these species are not currently classed as invasive however if numbers were to increase and/or animals were to form breeding populations, these could become invasive in the future. Therefore those that have been identified have been listed here for reference purposes only.

| Common Name                 | Broad-land | Cam Ely Ouse | Louth Grimsby Ancholne | Combined Essex | East Suffolk | Nene | North West Norfolk | North Norfolk | Old Bedford | South Essex | Upper and Bedford Ouse | Welland | Witham |
|-----------------------------|------------|--------------|------------------------|----------------|--------------|------|--------------------|---------------|-------------|-------------|------------------------|---------|--------|
| American Wigeon             |            |              |                        |                |              |      |                    |               |             |             |                        |         |        |
| Argentine Blue-billed Duck  |            |              |                        |                |              |      |                    |               |             |             |                        |         |        |
| Australian Shelduck         |            |              |                        |                |              |      |                    |               |             |             |                        |         |        |
| Baikal Teal                 |            |              |                        |                |              |      |                    |               |             |             |                        |         |        |
| Bar-headed Goose            |            |              |                        |                |              |      |                    |               |             |             |                        |         |        |
| Black Swan                  |            |              |                        |                |              |      |                    |               |             |             |                        |         |        |
| Black-crowned Night Heron   |            |              |                        |                |              |      |                    |               |             |             |                        |         |        |
| Blue-winged Teal            |            |              |                        |                |              |      |                    |               |             |             |                        |         |        |
| Bufflehead                  |            |              |                        |                |              |      |                    |               |             |             |                        |         |        |
| Canvasback                  |            |              |                        |                |              |      |                    |               |             |             |                        |         |        |
| Cape Teal                   |            |              |                        |                |              |      |                    |               |             |             |                        |         |        |
| Cape/South African Shelduck |            |              |                        |                |              |      |                    |               |             |             |                        |         |        |
| Chestnut Teal               |            |              |                        |                |              |      |                    |               |             |             |                        |         |        |
| Chilean Flamingo            |            |              |                        |                |              |      |                    |               |             |             |                        |         |        |

| Common Name            | Broad-land | Cam Ely Ouse | Louth Grimsby Ancholne | Combined Essex | East Suffolk | Nene | North West Norfolk | North Norfolk | Old Bedford | South Essex | Upper and Bedford Ouse | Welland | Witham |
|------------------------|------------|--------------|------------------------|----------------|--------------|------|--------------------|---------------|-------------|-------------|------------------------|---------|--------|
| Chiloë Wigeon          |            |              |                        |                |              |      |                    |               |             |             |                        |         |        |
| Emperor Goose          |            |              |                        |                |              |      |                    |               |             |             |                        |         |        |
| Falcated Teal          |            |              |                        |                |              |      |                    |               |             |             |                        |         |        |
| Ferruginous Duck       |            |              |                        |                |              |      |                    |               |             |             |                        |         |        |
| Fulvous Whistling Duck |            |              |                        |                |              |      |                    |               |             |             |                        |         |        |
| Glossy Ibis            |            |              |                        |                |              |      |                    |               |             |             |                        |         |        |
| Greater Flamingo       |            |              |                        |                |              |      |                    |               |             |             |                        |         |        |
| Hawaiian Goose         |            |              |                        |                |              |      |                    |               |             |             |                        |         |        |
| Hottentot Teal         |            |              |                        |                |              |      |                    |               |             |             |                        |         |        |
| Lesser Canada Goose    |            |              |                        |                |              |      |                    |               |             |             |                        |         |        |
| Mandarin Duck          |            |              |                        |                |              |      |                    |               |             |             |                        |         |        |
| Maned Duck             |            |              |                        |                |              |      |                    |               |             |             |                        |         |        |
| Marbled Duck           |            |              |                        |                |              |      |                    |               |             |             |                        |         |        |
| Muscovy Duck           |            |              |                        |                |              |      |                    |               |             |             |                        |         |        |
| New Zealand Scaup      |            |              |                        |                |              |      |                    |               |             |             |                        |         |        |
| Puna Teal              |            |              |                        |                |              |      |                    |               |             |             |                        |         |        |
| Purple Swamphen        |            |              |                        |                |              |      |                    |               |             |             |                        |         |        |
| Red-breasted Goose     |            |              |                        |                |              |      |                    |               |             |             |                        |         |        |
| Red-crested Pochard    |            |              |                        |                |              |      |                    |               |             |             |                        |         |        |
| Ringed Teal            |            |              |                        |                |              |      |                    |               |             |             |                        |         |        |
| Ross's Goose           |            |              |                        |                |              |      |                    |               |             |             |                        |         |        |
| Ruddy Shelduck         |            |              |                        |                |              |      |                    |               |             |             |                        |         |        |
| Scarlet Ibis           |            |              |                        |                |              |      |                    |               |             |             |                        |         |        |

| Common Name                | Broad-land | Cam Ely Ouse | Louth Grimsby Ancholne | Combined Essex | East Suffolk | Nene | North West Norfolk | North Norfolk | Old Bedford | South Essex | Upper and Bedford Ouse | Welland | Witham |
|----------------------------|------------|--------------|------------------------|----------------|--------------|------|--------------------|---------------|-------------|-------------|------------------------|---------|--------|
| Silver Teal                |            |              |                        |                |              |      |                    |               |             |             |                        |         |        |
| Snow Goose                 |            |              |                        |                |              |      |                    |               |             |             |                        |         |        |
| Southern Pochard           |            |              |                        |                |              |      |                    |               |             |             |                        |         |        |
| Speckled/Chilean Teal      |            |              |                        |                |              |      |                    |               |             |             |                        |         |        |
| Swan Goose                 |            |              |                        |                |              |      |                    |               |             |             |                        |         |        |
| Trumpeter Swan             |            |              |                        |                |              |      |                    |               |             |             |                        |         |        |
| White-checked Pintail      |            |              |                        |                |              |      |                    |               |             |             |                        |         |        |
| White-faced Whistling Duck |            |              |                        |                |              |      |                    |               |             |             |                        |         |        |
| Wood Duck                  |            |              |                        |                |              |      |                    |               |             |             |                        |         |        |
| Yellow-billed Pintail      |            |              |                        |                |              |      |                    |               |             |             |                        |         |        |

## Appendix V: Terrestrial species

The following table lists species that have been identified during RIMP creation process as species of concern within GB and EU, however these are not truly riparian aquatic species and so not the focus of the RIMP. Many of these species may occasionally visit or be found in riparian habitats and so are listed here for reference. These species are of UK and GB concern and any sighting should be reported as soon as possible.

| Common Name           | Latin Name                      | Risk of Introduction   | Pathways   | Areas affected  | Impacts  | Identification  | Management  |
|-----------------------|---------------------------------|--|--|---|--|---|---|
| Asian hornet          | <i>Vespa velutina</i>           | High, recent recordings in the South of England  | Accidental release in France and subsequent spread   | Tall trees in urban and rural areas. Also found in structures – garages, sheds, decking | Predator of social wasps and bees (e.g. honeybees) and other invertebrate insects. This can result in large losses of commercial honeybees and also result in large eradication and replacement costs. Multiple stings can cause serious health problems | GB NNESS alert species, GB NNESS factsheet: <a href="http://www.nonnative-species.org/factsheet/factsheet.cfm?speciesid=3826">http://www.nonnative-species.org/factsheet/factsheet.cfm?speciesid=3826</a> | GB NNESS alert species, report as soon as possible: <a href="http://www.nonnativespecies.org/alerts/index.cfm?id=4">http://www.nonnativespecies.org/alerts/index.cfm?id=4</a>   |
| Asian longhorn beetle | <i>Anoplophora glabripennis</i> | Medium risk – not yet recorded in GB however interceptions have been made                                | Introduction via hardwood timber and timber products, stowaways on land vehicles, natural dispersal (up to 1km). | Woodland. In GB have only been found in warehouses where they were intercepted.         | Can attack and kill tree species, altering woodland habitats and reduce biodiversity. This can be problematic and costly in urban wooded areas.  | GB NNESS alert species, GB NNESS factsheet: <a href="http://www.nonnative-species.org/factsheet/factsheet.cfm?speciesid=243">http://www.nonnative-species.org/factsheet/factsheet.cfm?speciesid=243</a>   | Report sightings as soon as possible: <a href="http://www.brc.ac.uk/risc/alert.php?species=asian_longhorn">http://www.brc.ac.uk/risc/alert.php?species=asian_longhorn</a>   |
| Eurasian Eagle Owl    | <i>Bubo bubo</i>                | High (present in GB with estimated 65 lost into the wild each year – it has been known in EE catchments) | Captive birds lost in the wild and deliberate introductions  | High cliffs and rocky outcrops  | Preys on native mammals and have been known to attack birds, potential threat to small dogs and other pets   | GB NNESS alert species, GB NNESS factsheet: <a href="http://www.nonnative-species.org/factsheet/factsheet.cfm?speciesid=573">http://www.nonnative-species.org/factsheet/factsheet.cfm?speciesid=573</a>   | GB NNESS alert species, report as soon as possible, GB NNESS factsheet: <a href="http://www.nonnativespecies.org/factsheet/factsheet.cfm?speciesid=573">http://www.nonnativespecies.org/factsheet/factsheet.cfm?speciesid=573</a> |
| Indian house crow     | <i>Corvus splendens</i>         | High – arrival is expected (found in Ireland, Netherlands and Denmark)                                   | Daily movements of up to 20km, its main pathway of invasion is by travelling on ships impacting port cities      | In urban areas, occurs in high densities of human population                            | A nest predator, feeds on carrion and rubbish and is a known disease carrier in urban locations. Often regarded as a pest, it can also impact and damage crops, livestock farming, and tourism.  | GB NNESS alert species, GB NNESS factsheet: <a href="http://www.nonnative-species.org/factsheet/factsheet.cfm?speciesid=924">http://www.nonnative-species.org/factsheet/factsheet.cfm?speciesid=924</a>   | Report sightings as soon as possible: <a href="http://www.brc.ac.uk/risc/alert.php?species=indian_housecrow">http://www.brc.ac.uk/risc/alert.php?species=indian_housecrow</a>   |

| Common Name                | Latin Name                     | Risk of Introduction   | Pathways  | Areas affected   | Impacts   | Identification  | Management  |
|----------------------------|--------------------------------|--|---|--|---|---|---|
| <b>Invasive garden ant</b> | <i>Lasius neglectus</i>        | High (it has spread among European countries with a few records confirmed in GB) | Accidentally introduced in plant material or soil (e.g. from garden centres).         | Gardens, parks and houses  | Formation of super colonies covering a large area, known to attack and outcompete other ants to become dominant. Encourages large aphid populations on trees.                   | GB NNS alert species, GB NNS factsheet: <a href="http://www.nonnative-species.org/factsheet/factsheet.cfm?speciesid=3807">http://www.nonnative-species.org/factsheet/factsheet.cfm?speciesid=3807</a> | Report Sightings as soon as possible: <a href="http://www.nonnativespecies.org/alerts/index.cfm">http://www.nonnativespecies.org/alerts/index.cfm</a> <a href="https://secure.fera.defra.gov.uk/nonnativespecies/downloadDocument.cfm?id=1505">https://secure.fera.defra.gov.uk/nonnativespecies/downloadDocument.cfm?id=1505</a> |
| <b>Kudzu vine</b>          | <i>Pueraria lobata</i>         | Medium (tropical species capable of living in temperate regions)                 | Has been used in other countries as an ornamental plant, food and fodder              | Road and rail sides, forest and marginal habitats, grassland, river and stream banks, wetlands and abandoned fields. | Smothering other species, suppressing their growth by blocking light, modifies the structure of the ecosystem   | GB NNS factsheet: <a href="http://www.nonnative-species.org/factsheet/factsheet.cfm?speciesid=4379">http://www.nonnative-species.org/factsheet/factsheet.cfm?speciesid=4379</a>                       | EU blacklisted species, CABI: <a href="https://www.cabi.org/isc/datasheet/45903">https://www.cabi.org/isc/datasheet/45903</a>   |
| <b>Monk Parakeet</b>       | <i>Myiopsitta monachus</i>     | High (isolated breeding colonies in London and Hertfordshire)                    | Breeding populations found in the UK, potential for others to escape from collections | Woodlands and urban areas  | Has been observed to kill and through competition limit food resources of native birds. Can be considered a nuisance (e.g. noise) and carry diseases to other birds and humans. | GB NNS alert species, GB NNS factsheet: <a href="http://www.nonnative-species.org/factsheet/factsheet.cfm?speciesid=2281">http://www.nonnative-species.org/factsheet/factsheet.cfm?speciesid=2281</a> | Report Sightings as soon as possible: <a href="http://www.brc.ac.uk/risc/alert.php?species=monk_parakeet">http://www.brc.ac.uk/risc/alert.php?species=monk_parakeet</a>   |
| <b>Pallas' squirrel</b>    | <i>Callosciurus erythraeus</i> | Not yet recorded in GB   | Escape from captivity or deliberate release for ornamental reasons                    | Forest, parks and gardens  | This species cause damage to trees by removing bark resulting in economic impacts to forestry sector. They can also displace native squirrel species.                           | GB NNS factsheet: <a href="http://www.nonnative-species.org/factsheet/factsheet.cfm?speciesid=4363">http://www.nonnative-species.org/factsheet/factsheet.cfm?speciesid=4363</a>                       | EU Blacklisted species  |
| <b>Siberian chipmunk</b>   | <i>Tamias sibiricus</i>        | Medium (no breeding in wild reported)  | Escapees and deliberate release of captive animals. Often kept as pets.               | Coniferous and mixed boreal and temperate forests, parks, gardens and cemeteries                                     | Predates on ground nesting birds, competes with small native woodland animals, this species is a vector for diseases (including rabies) and can cause damage to urban areas.    | GB NNS alert species, GB NNS factsheet: <a href="http://www.nonnative-species.org/factsheet/factsheet.cfm?speciesid=3472">http://www.nonnative-species.org/factsheet/factsheet.cfm?speciesid=3472</a> | Report Sightings as soon as possible: <a href="http://www.brc.ac.uk/risc/alert.php?species=siberian_chipmunk">http://www.brc.ac.uk/risc/alert.php?species=siberian_chipmunk</a>   |