

# Lake Restoration Strategy for The Broads

Action Plan 2010/2011



**Broads Authority**  
The Broads - a member of the  
National Park family

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## 1. Introduction

The Lake Restoration Strategy published by the Broads Authority in 2008 clearly sets out the key challenges and principles guiding the Authority's approach to lake restoration in The Broads. The prioritisation of resources is through a risk-based approach, ensuring statutory waterbody targets are met, and enhancement is made of existing good quality sites. The strategy provides a framework for the sustainable long-term management for the Broads, in the face of pressures such as climate change and predicted sea-level rise. The Strategy document and Appendices are available to download from the Broads Authority website, please see <http://www.broads-authority.gov.uk/managing/rivers-and-broads/broads-restoration.html>. This Action Plan assumes that the reader is familiar with the Strategy and simply sets out what needs to be done to achieve the objectives of the Strategy in terms of priority, timescales, costs and partnerships involved.

Analysis of a diverse range of information sources has allowed waterbodies to be prioritised for restoration work, based on ecological and environmental data generated by the Broads Authority, Environment Agency, Natural England and a number of commercial partners.

The Action Plan will be updated annually to review progress and incorporate new information or changing circumstances, including changes to waterbody condition, which may affect prioritisation or delivery of works. These updates will be reported within the Broads Authority committee cycle and placed on the Broads Authority website. Legislative drivers influencing the restoration work in the shallow lakes of the Broads includes meeting waterbody targets set by the European Union Water Framework Directive (WFD) (2000/60/EC), achieving Favourable Conservation Status for Natura 2000 sites and Public Service Agreement (PSA) targets for waterbodies within Sites of Special Scientific Interest (SSSIs).

This annual Action Plan details the specific investment plans and projects planned for 2010/11 and lists those complete since 2008/09, as prioritised through the Lake Restoration Strategy framework. In addition to Lake Restoration actions, some priority work areas listed in the Broads Authority's Sediment Management Strategy (SMS) have been included in the action tables, specifically where they relate to feasibility studies identifying opportunities for sediment removal and mudpumping operations in isolated waterbodies. For more information on the sediment management strategy, its aims and planned works, please see <http://www.broads-authority.gov.uk/managing/rivers-and-broads/sediment-management/sediment-management-strategy.html>. Appendix 3 gives the 2010/11 expenditure plan for the third year of the Defra additional grant, which is the final year for expenditure specifically on "restoration of ecosystems" from this additional grant.

Actions which help deliver targets set by the Broads Local Biodiversity Action Plan, are also considered a high priority. The Broads Local Biodiversity Action Plan works on a partnership basis, to identify local priorities and to determine the contribution that can be made locally to the delivery of national Species and Habitat Action Plan targets. As such, where actions arising from the Lake Restoration Strategy can positively benefit specific Habitat or Species Action Plans important for conservation in the Broads, then these actions will be considered a priority.

## **2. Lake restoration Actions**

Generation of a five year list (2008/09 to 2012/13) of potential restoration projects, or actions, which the Broads Authority can take a lead role in delivering, is given in (Appendix 2). Input to this list of actions within the Broads and river catchments has been through the Water Quality Partnership and in consultation with Natural England (NE).

The Action Plan includes in-lake restoration works, as well as wider catchment measures influencing, for example, non-agricultural diffuse pollution to water. Both appendices demonstrate the multi-task approach to many of the projects, with feasibility work included in the early stages of restoration work at individual sites.

Actions are grouped within relevant “pressure” categories, as used by the Environment Agency (EA) in collating risks to waterbody status for the Water Framework Directive (WFD), as listed in the regional River Basin Management Plans. These work strands are:-

- (i) Salinity
- (ii) Nutrients
- (iii) Morphology
- (iv) Chemicals
- (v) Water resources
- (vi) Sediment
- (vii) Habitats (including fishery management and invasive species actions)

Based on the Strategy objectives for each identified pressure, the five year work programme reports on progress, identifies partnership working, establishes approximate Broads Authority costs for the delivery of projects and highlights the priority of each task.

## **3. Prioritisation of Actions**

Specific waterbodies have been prioritised for action within the Strategy, based on a matrix of the probability of success of restoration and the risk from saline incursion or breach.

Potential restoration projects vary in scale between site specific work and whole catchment actions. Prioritisation of actions has been based on a matrix of the timescale for delivery (see Table 1) and the impact of the project in reducing the identified pressure (effectiveness of measure). The waterbody priorities published in the Lake Restoration Strategy are used as an additional filter to rank projects of similar overall effectiveness, to ensure that actions at the highest priority sites and of greatest effectiveness are clearly identified. Table 1 shows the scoring method to rank each individual action.

Table 1. Effectiveness matrix guiding prioritisation of Actions

		TIMESCALE TO DELIVER			KEY	
		Short	Medium	Long	Priority for delivery	
		<1 yr	2-3 yrs	>3 yrs		
IMPACT	High	1	3	6	<div style="display: inline-block; width: 15px; height: 15px; background-color: red; margin-bottom: 5px;"></div> HIGH <div style="display: inline-block; width: 15px; height: 15px; background-color: yellow; margin-bottom: 5px;"></div> MEDIUM <div style="display: inline-block; width: 15px; height: 15px; background-color: green;"></div> LOW	
	Medium	2	5	8		
	Low	4	7	9		

The Lake Restoration Strategy outlines a “portfolio” approach, whereby a range of projects are to be selected, so as to avoid investing predominantly in “quick win” projects. This enables investment to be spread widely, securing the best possible outcomes for waterbodies across the Broads in the short and longer terms.

#### 4. Water Framework Directive

This Strategy focuses on new and ongoing local lake restoration measures that require further action. These are referred to as ‘M4 measures’ by the WFD River Basin Management Plan (RBMP). National measures such as potential Water Protection Zones, Water Company spending review, Review of Consents and the Catchment Sensitive Farming Initiative are not considered in this strategy. However, the local actions need to be cross referenced to the national measures in the RBMP, and ensure the Broads is prioritised as a target area for national measures.

Specific actions aim to be relevant to the scale of the issue, using the most effective method, whilst targeting the sector/s who need to take action for lake restoration. For example education and awareness raising may be sufficient for boat users to reduce their impact of grey water discharge from boats, where as further legislation to reduce phosphorus in detergents may be required at a national level. The measures listed Appendix 2 are designed to be ambitious and challenging and realistic and not so aspirational that they are therefore unachievable. Measures that are assessed as not technically feasible or disproportionately expensive have not been included in this Strategy.

In addition to operational measures, research measures that improve confidence in the link between specific actions and achievement of targets and which have particular relevance to pressures in the Broads have been included.

Should the combined measures not achieve the targets for waterbodies in the first WFD cycle (2008-2015), which is very likely, due to the long response lag of shallow lake ecosystems, the achievement of objectives will continue into the following River Basin Cycles to 2027.

## 4. Review

It is intended that the work programme will be reviewed annually, to monitor the progress of delivery, and ensure actions are appropriately prioritised given new management requirements and restoration opportunities, and the ability to progress works. From this, an updated annual Priority Actions table will be generated, and consulted upon.

Completed actions have been reported within Appendix 1, the 5-year work programme and the 2010/11 plan is set out in Appendix 2. Consultation with the Broads Forum and Water Quality Partnership members will be undertaken on an annual basis.

## 5. Glossary

AWS	Anglian Water Services
BA	Broads Authority
BAP	Biodiversity Action Plan
BESL	Broadland Environmental Services Ltd
BHBF	Broads Hire Boat Federation
EA	Environment Agency
ESW	Essex & Suffolk Water
NCC	Norfolk County Council
NE	Natural England
NHM	Natural History Museum
NNNSI	Norfolk Non-Native Species Initiative
NSBA	Norfolk & Suffolk Boating Association
NWT	Norfolk Wildlife Trust
RSPB	Royal Society for the Protection of Birds
SAC	Special Area for Conservation (EU Habitats Directive)
SPA	Special Protection Area (EU Birds Directive)
SSSI	Site of Special Scientific Interest
SWT	Suffolk Wildlife Trust
UCL	University College London
WMA	Water Management Alliance

## APPENDIX 1 - Five year work programme

### (i) Salinity

*Strategy Objective: Manage the risk of increased salinity and increased frequency of saline events to the freshwater ecology of the Broads*

Project	Report on Progress	Potential Partnerships	Indicative Cost (£)	Priority	Timescale for Delivery
<i>Desk study of ecological impacts of increased salinity in the Broads</i>	<i>Completed</i>	<i>Imperial College</i>	<i>500 act.</i>	<i>Medium</i>	<i>2010/11</i>
Increase salinity monitoring in the Broads waterways		EA	1,000 est.	Medium	2011/12
Broadland rivers salinity modelling and future sea-level rise scenarios report	Partners agreed project scope. Quote awaited	BESL, EA, Broads IDB	20,000 est.	Medium	2010/11

## (i) Nutrients

Strategy Objective: Engage in investigative, targeting and operational measures to decrease nutrients entering the Broads waterways

Project	Report on Progress	Potential Partnerships	Indicative Cost (£)	Priority	Timescale for Delivery
Trinity Broads & Lound Catchment Sensitive Farming Project	All elements progressing	ESW, landowners	27,000 est.	High	2010/11
<i>Alderfen Broad - Reduce nutrient discharge to (diverted) inflow stream by 1:1 advice to property owners</i>	<i>Completed. EA officers made visits summer 2009 &amp; spring 2010</i>	<i>EA</i>	<i>NA</i>	<i>High</i>	<i>2009/10</i>
Assist BHBF to source and publicise phosphate-free detergent usage on hire boats		BHBF	NA est.	Medium	2011/12
Diffuse pollution risk assessment of broadland streams	Arable fields digitised within BA area. Water sampling on-going. Report due Feb 2011		NA	Medium	2010/11
<i>Contribute to study assessing the significance of nutrient loss from septic tanks</i>	<i>Report complete, published as part of Natural England Research Series</i>	<i>NE</i>	<i>5,500 act.</i>	<i>Medium</i>	<i>2009/10</i>
Assess nutrient input and locations of non-connected sewage and produce a prioritised list of projects	South Walsham investigation complete	AWS, EA, CEH	10,000 est.	Medium	2011/12
Trial Phoslock as a phosphate reduction technique in The Broads	Site selection to be finalised		11,000 est.	Medium	2010/11
Implementing SUDs in the broads through retrospective and development conditions	As opportunities arise		NA	Medium	on-going
Annual water quality samples analysed from non-EA sampled broads	2010 results reported with water plant survey		1,000 p.a. est.	Medium	on-going
<i>Engagement with Open Air Laboratories (OPAL) lakes and ponds Water Survey - Citizen Science project</i>	<i>Training for survey conducted at Whitlingham Great Broad</i>	<i>NHM, UCL</i>	<i>NA</i>	<i>Medium</i>	<i>2010/11</i>

Project	Report on Progress	Potential Partnerships	Indicative Cost (£)	Priority	Timescale for Delivery
<i>Trinity Broads &amp; Lound CSFP - integrated lake management - presentation of case study</i>			<i>2,000</i>	<i>Medium</i>	<i>2009/10</i>
1-1 advice to farmers and septic tank owners arising from diffuse pollution risk assessment of broadland streams	Report due Feb 2012	EA	5,000 est.	Medium	2011/12
First time rural sewerage, assist parish Council in applying in key areas such		AW, Parish Councils	5,000 per application est.	Medium	on-going
Contribute to Greater Norwich Water Cycle Study	Tender for study prepared by Broadland District Council	BDC, NE, EA, AW	NA	Medium	2010/11
Extend partnership networks outside BA area to develop water-focused		NT	25,000 est.	Medium	
Contribute to and steer Great Yarmouth & Waveney Water Cycle Study	Inception stage reached		NA	Medium	2010/11
Contribute to and steer Racheath Ecotown and Norwich NE sector Water	Inception stage reached		NA	Medium	2010/11
Produce Broads water quality score card for residents	EA to design	EA	2,200	Medium	2010/11

### (iii) Morphology

*Strategy Objective: To mitigate against and reduce the impact of man-made structures on natural ecological and hydrological functioning*

Project	Report on Progress	Potential Partnerships	Indicative Cost (£)	Priority	Timescale for Delivery
Remove dams and reconnect/improve connection of fen ditch network to the river Ant and Barton Broad		NE, WMA, EA	1,000 est.	High	
Remove dams and reconnect/improve connection of fen ditch network between Hall Farm Fen and Ormesby Broad		NE, WMA, EA	1,000 est.	High	
<i>Develop Standard Operating Procedures (such as dredging disposal, weedcutting etc)</i>	<i>Completed. Available on BA website</i>	<i>NE, EA</i>	<i>500 act.</i>	<i>High</i>	<i>2008/09</i>
Evaluate BA managed water control structures with regard to the impacts of fish migration		EA, WMA, NE	NA est.	High	on-going
Use River Works Licences to mitigate impacts by conditioning design standards	As opportunities arise		NA	Medium	on-going
Workshop to develop best practice for soft engineering design and construction on riverside properties		EA, local contractors	1,000 est.	Medium	2010/11
Use Planning Process to mitigate impacts by conditioning design standards	As opportunities arise		NA	Medium	on-going
Careful planning of moorings to ensure facilities avoid particularly sensitive sites (Mooring Strategy)	As opportunities arise		NA	Medium	on-going
Calthorpe Broad - Reconnect site to its catchment following measures to improve inflow water quality		NE, WMA, EA	3,000 est.	Low	
Alderfen Broad - Remove dam and bypass ditch following catchment measures to lower nutrient concentration		NE, WMA, EA	5,000 est.	Low	

#### (iv) Chemicals

Strategy Objectives: Raise awareness of and support measures to reduce input of persistent and ecologically harmful chemicals

Project	Report on Progress	Potential Partnerships	Indicative Cost (£)	Priority	Timescale for Delivery
Develop best practice of safe sediment removal in boatyards to reduce concentrations of priority substances (TBT and PAH's)		EA, Green Blue	500 est.	Medium	2010/11
<i>Trial use of non-biocidal antifoul coatings</i>	<i>SeaJet Silicon Speed successfully used on ML Ant (Breydon launch)</i>	<i>Green Blue, Marine &amp; Industrial LLP</i>	<i>1,000 est.</i>	<i>Medium</i>	<i>2009/10</i>
Attend annual Green Boat show and other boating events to promote environmentally friendly boating	2009 show attended, increased BA input for 2010		200 p.a. est.	Medium	on-going
Provide information packs to boaters including how to be environmentally friendly in the Broads			5,000 est.	Medium	2011/12
<i>Promote safe removal and disposal of antifoul paint</i>	<i>Trial of Blast Green removal</i>	<i>Blast Green</i>	<i>100 act.</i>	<i>Medium</i>	<i>2010/11</i>
Promote installation of closed-loop boat wash down to minimise antifouling wash-off into the Broads - provision of grants	Advice given at pre-planning application stage	Green Blue, boatyards, SDF	NA est.	Medium	on-going
Promote and provide incentives for the use of biodiesel for all relevant craft using the Broads waters		Green Blue	10,000 est.	Low	

## (v) Water Resources

*Strategy Objectives: Promote water efficiency measures*

Project	Report on Progress	Potential Partnerships	Indicative Cost (£)	Priority	Timescale for Delivery
Promote Sustainability Design Guide, waste water reuse, water harvesting in planning process		EA	NA	Medium	on-going
Lound Lakes and Trinity Broads CSFP - Promote agricultural water efficiency		ESW, NE, EA	2,000 est.	Medium	

## (vi) Sediment

Strategy Objectives: Investigate the feasibility of, and conduct, sediment removal from waterbodies

Project	Report on Progress	Potential Partnerships	Indicative Cost (£)	Priority	Timescale for Delivery
Upton Great Broad - Partial removal of sediment to reduce nutrient and/or restore depth		NWT	40,000 est.	High	
Upton Little Broad - Remove sediment to reduce nutrient and/or restore depth	Feasibility investigations underway	NWT	40,000 est.	High	2010/11
Round Water/Woolner's Carr - Remove sediment to reduce nutrient and/or restore depth		SWT	17,500 est.	High	2010/11
Ormesby Broad East Arm - Remove sediment to reduce nutrient and/or restore depth	Project underway.	ESW, EA	14,500 est.	High	2010/11
<i>Calthorpe Broad - Remove sediment to reduce nutrient and/or restore depth</i>	<i>Completed. NE capital contribution and staff resource used.</i>	<i>NE</i>	<i>20,000 est.</i>	<i>High</i>	<i>2008/09</i>
Strumpshaw Broad - Partial removal of sediment to reduce nutrient and/or restore depth		RSPB	15,000 est.	High	
<i>Sotshole Broad - Remove sediment to reduce nutrient and/or restore depth</i>	<i>Landowner completed work with own contractors</i>	<i>Landowner</i>	<i>10,000 est.</i>	<i>High</i>	<i>2009/10</i>
<i>Burntfen Broad - Remove sediment to reduce nutrient and/or restore depth</i>	<i>Completed</i>	<i>Landowner</i>	<i>25,000 est.</i>	<i>High</i>	<i>2009/10</i>
Cockshoot Dyke - Remove sediment to reduce nutrient and/or restore depth		NE, NWT	8,000 est.	High	2011/12

<b>Project</b>	<b>Report on Progress</b>	<b>Potential Partnerships</b>	<b>Indicative Cost (£)</b>	<b>Priority</b>	<b>Timescale for Delivery</b>
<i>Norton's Broad - Remove sediment to reduce nutrient and/or restore depth</i>	<i>Completed</i>	<i>Landowner</i>	<i>22,000 est.</i>	<i>High</i>	<i>2008/09</i>
<i>Mautby Decoy - Partial removal of sediment to reduce nutrient and/or restore depth</i>	<i>Completed</i>	<i>Landowner</i>	<i>18,000 act.</i>	<i>High</i>	<i>2008/09</i>
Ormesby Little Broad - Partial removal of sediment to reduce nutrient and/or		ESW	120,000 est.	High	
Rollesby Broad - Partial removal of sediment to reduce nutrient and/or restore depth		ESW	120,000 est.	High	
Lily Broad - Partial removal of sediment to reduce nutrient and/or restore depth		ESW	90,000 est.	High	
Upton Little Broad - Feasibility study & geobag trials for dredged sediment re-use	Underway	NWT	8,500 est.	Medium	2010/11
<i>Trial of geotextile bags to dewater mudpumped sediment</i>	<i>Completed</i>	<i>NWT</i>	<i>8000 act.</i>	<i>Medium</i>	<i>2010/11</i>
<i>Analyse sediment stratigraphy &amp; macrofossils from dated sediment cores</i>	<i>Mautby Decoy, Fritton Decoy, Burntfen, Sotshole, Martham South, Norton's</i>	<i>Landowner</i>	<i>33,000 act.</i>	<i>Medium</i>	<i>2008/09</i>
<i>Trinity Broads - Options appraisal of sediment removal from different areas</i>	<i>Completed</i>	<i>ESW, NE</i>	<i>NA</i>	<i>Medium</i>	<i>2008/09</i>
Hudson's Bay - Remove sediment to reduce nutrient and/or restore depth		NE	60,000 est.	Medium	
Filby Broad - Partial removal of sediment to reduce nutrient and/or restore depth		ESW, NE, WMA	90,000 est.	Medium	
Fritton Lake - Partial removal of sediment to reduce nutrient and/or		Fritton Lake Partnership	780,000 est.	Medium	
Fritton Lake - Feasibility study for sediment removal		Fritton Lake Partnership	5,000 est.	Medium	

<b>Project</b>	<b>Report on Progress</b>	<b>Potential Partnerships</b>	<b>Indicative Cost (£)</b>	<b>Priority</b>	<b>Timescale for Delivery</b>
<i>Wheatfen Broad - Partial removal of sediment to restore depth (access only)</i>	<i>Completed</i>	<i>Ted Ellis Trust</i>	<i>4,000 act.</i>	<i>High</i>	<i>2008/09</i>
Salhouse Broad - Partial removal of sediment to reduce nutrient and/or restore depth		landowner	90,000 est.	Medium	
Hoveton Great Broad - Feasibility study for dredged sediment re-use		NE	5,000 est.	Medium	2010/11
<i>Hoveton Great Broad - Bathymetric survey of Hoveton Great Broad to</i>	<i>Survey completed</i>	<i>NE</i>	<i>1,500 act.</i>	<i>Medium</i>	<i>2008/09</i>
Rockland Broad - Partial removal of sediment to reduce nutrient and/or restore depth		RSPB	90,000 est.	Medium	
Hoveton Great Broad - Remove sediment to reduce nutrient and/or restore depth		NE	1,950,000 est.	Medium	
Target erosion protection at high risk sites to reduce sediment inputs	Priority sites identified on an annual basis	Local community	5,000 est.	Low	on-going

## (vii) Habitats & Species

Strategy Objective: Manage waterbodies to maintain or enhance native biodiversity and habitat quality

Project	Report on Progress	Potential Partnerships	Indicative Cost (£)	Priority	Timescale for Delivery
Cockshoot Broad - Biomanipulation (selective fish removals if problems)	Dependant upon annual survey results	NWT, NE	5,000 est.	High	on-going
Lily Broad - Isolation and biomanipulation		Trinity Broads Partnership	10,000 est.	High	
Burntfen Broad - Biomanipulation (whole lake)	Dependant upon feasibility study	landowner	15,000 est.	High	
<i>Whitlingham Great &amp; Little Broads - Contribute advice towards suitable</i>	<i>Full consultee on management of site</i>	<i>Whitlingham Charitable Trust</i>	-	<i>High</i>	<i>2009/10</i>
<i>Round Water - Marginal scrub clearance</i>	<i>Completed</i>	<i>SWT</i>	<i>1,500 act.</i>	<i>High</i>	<i>2008/09</i>
<i>Woolner's Carr - Marginal scrub clearance</i>	<i>Completed</i>	<i>SWT</i>	<i>1,500 act.</i>	<i>High</i>	<i>2008/09</i>
Trinity Broads - Investigate necessity and feasibility of further biomanipulation		Trinity Broads Partnership	1,000 est.	High	2010/11
<i>Marginal scrub clearance around the Trinity Broads</i>	<i>Contract set for sections of Ormesby and Ormesby Little</i>		<i>15,000 act.</i>	<i>High</i>	<i>2009/10</i>
<i>Alderfen Broad - Clearance of outflow dyke and replacement of water control structure</i>	<i>Completed</i>	<i>NWT</i>	<i>1,000 est.</i>	<i>High</i>	<i>2009/10</i>
Martham South Broad - Re-establishing marginal plants by introducing native, local plants	Typha in coir mats being grown		2,300 est.	High	2010/11
Barton Broad - Routine annual biomanipulation of exclosures	2009/10 contract set	NWT	3,000 est.	High	on-going
Barton Broad - maintenance and replacement of existing biomanipulation barriers	Replace Neatishead Arm North barrier		3,500 est.	High	2010/11
Biomanipulation exclosure in Ranworth Broad	Design completed. Planning application to be submitted	NWT	13,500 est.	High	2010/11

Project	Report on Progress	Potential Partnerships	Indicative Cost (£)	Priority	Timescale for Delivery
Transfer of inoculated stonewort to clear water sites	Receptor site feasibility study required	NE, EA	5,000	High	2011/12
Assess feasibility and install further fish barriers to protect freshwater fish from saline incursion		EA, landowner, BASG	20,000 est.	High	
Installation of Eel passes and modification of existing structures to allow the migration of Eels in/out of isolated broads	Requires EA prioritisation of structures	EA, BESL, WMA	10,000 est.	High	
Annual support for Non-Native Species Co-ordinator	Co-ordinator in post, based at NCC	Waterbodies Topic Group	5,000 act.	High	2010/11
<i>Develop and implement a Non-Native Invasive Species management plan for the Broad</i>	<i>Delivered through Norfolk Non-Native Species Initiative</i>	<i>Norfolk Non-Native Species Initiative</i>	<i>NA</i>	<i>High</i>	<i>2009/10</i>
Fritton Lake - Biomanipulation (whole lake)		Fritton Lake Partnership	30,000 est.	High	
River Waveney Floating Pennywort eradication project	River Waveney Floating Pennywort eradication project underway, good progress	NNNSI	NA	Medium	2010/11
Eradication of priority non-native invasive species from high-risk Broad sites	Contract let for Parrots feather spraying Autumn 2010; Floating pennywort removal at Rockland planned Nov 2010		5,000 est.	Medium	2010/11
Flixton Decoy - Investigate feasibility of biomanipulation	Survey Autumn 2010	Landowner, NE	3,000 est.	Medium	
<i>Hassingham &amp; Buckenham Broad - Investigate feasibility of biomanipulation</i>	<i>Landowners carried out survey. Low fish population. Biomanipulation not currently required</i>	<i>Landowner, NE</i>	<i>NA est.</i>	<i>Medium</i>	<i>2009/10</i>
Research project on water plant re-establishment from the seed bank following mudpumping	Pre-dredge survey completed.	UCL	10,800 act.	Medium	2010/11
Investigate feasibility of biomanipulation at new sites	Survey Autumn 2010 - Flixton Decoy, Burntfen Broad, Sotshole	Landowner	2,500 est.	Medium	2010/11

Project	Report on Progress	Potential Partnerships	Indicative Cost (£)	Priority	Timescale for Delivery
Replace water control structure at Cockshoot Broad		NWT	500 est.	Medium	2010/11
<i>Hickling Broad - protect reedswamp at Hill Common &amp; work with local residents</i>	<i>Faggots installed with financial contribution from local residents</i>	<i>Landowners, NWT</i>	<i>500 est.</i>	<i>Medium</i>	<i>2010/11</i>
Fritton Lake - Investigate feasibility for biomanipulation		Fritton Lake Partnership	5,000 est.	Medium	
Evaluate success of Bridge Broad floating island emergent vegetation establishment	Survey conducted at Bridge Broad		650 act.	Medium	2010/11
Hoveton Great Broad - Maintain and biomanipulate exclosure areas		NWT, NE	25,000 est.	Medium	
Install floating vegetation structures to reinforce eroding reed islands in Rockland Broad	Design completed. Planning permission to be submitted	Rockland Parish Council	10,000 est.	Medium	2010/11
Rockland Broad - Investigate feasibility of partial biomanipulation			1,000 est.	High	
Bargate Broad - Investigate feasibility of partial biomanipulation		NWT, RSPB	1,000 est.	High	
Fish community surveys at priority sites to inform water quality and habitat management			1,000 per site p.a.	Medium	on-going
<i>Survey of BAP and non-native bivalves in the navigable River Waveney</i>	<i>Completed</i>		<i>5,000 est.</i>	<i>Medium</i>	<i>2009/10</i>
Feasibility study for installing Eel passes to allow migration in and out of isolated broads		EA, BESL, WMA	3,000 est.	Medium	
Zone risk of saline incursion within the broads with climate change predictions	Requires outputs of salinity modelling	EA, NE,	1,000 est.	Medium	2011/12
"Soft" bank protection workshop & produce planning design guidance			1,000 est.	Medium	2010/11

Project	Report on Progress	Potential Partnerships	Indicative Cost (£)	Priority	Timescale for Delivery
Evaluate success of goose barriers as reedswamp protection in the Upper Thurne	Reed growth and sediment survey to be completed autumn 2010	NWT	500 est.	Medium	2010/11
Assess increased pressure of more visitors to the Broads on a site and policy basis			20,000 est.	Medium	
<i>Provide training for staff in key non-native species identification</i>	<i>Events attended and ID handouts produced and distributed</i>		NA	<i>Medium</i>	<i>2009/10</i>
Develop identification guides for key non-native species to be used by officers, contractors, river users and volunteers	Design complete	NNNSI	500 est.	Medium	2010/11
Work with aquatic plant suppliers in the Broads area to raise awareness and encourage to not sell invasive non-native plants		Waterbodies Topic Group	1,000 est.	Medium	
Work with the Ports in the Broads area to raise awareness of invasive non-native species		East Port, ABP Lowestoft	- est.	Medium	
Awareness raising to prevent spread of non-native species	Don't spread frogspawn campaign; Himalayan Balsam control guidance		600 est.	Medium	2010/11
Barton Broad - Biomanipulate further enclosure areas		NWT	25,000 est.	Medium	
Continue assessing feasibility of wetland enhancements and seeking opportunities to deliver Lake Restoration Strategy objectives		EA, BESL, NE, NWT, RSPB,	10,000 est.	Medium	on-going

## APPENDIX 2 - 2010/11 Priority Actions

Funding for projects outlined for delivery in 2010/11 predominantly comes from the Defra Additional Grant Fund. Supporting contributions arise from existing annually set BA budgets and some external contribution from partners on specific projects. Direct capital contributions are described in the text.

Other areas of the AGF budget not detailed in these tables includes maintenance dredging which falls under the Sediment Management Strategy and the Adaptation to Climate Change projects, such as the Wetland Connectivity Project (see Appendix 3 for a breakdown of 2010/11 expenditure from the AGF)

### (i) Salinity

*Strategy Objective: Manage the risk of increased salinity and increased frequency of saline events to the freshwater ecology of the Broad*

Project	Report on Progress	Potential Partnerships	Indicative Cost (£)	Priority	Delivery
<b>2010/11</b>					
Desk study of ecological impacts of increased salinity in the Broad	Advertised as an MSc student project	Imperial College	500 act.	Medium	2010/11
Broadland rivers salinity modelling and future sea-level rise scenarios report	Partners agreed project scope. Quote awaited	BESL, EA, Broad IDB	5,000 est.	Medium	2010/11
<b>2010/11 Total</b>			<b>£5,500</b>		

## (ii) Nutrients

*Strategy Objective: Engage in investigative, targeting and operational measures to decrease nutrients entering the Broads waterways*

Project	Report on Progress	Potential Partnerships	Indicative Cost (£)	Priority	Delivery
<b>2010/11</b>					
Trinity Broads & Lound Catchment Sensitive Farming Project	All elements progressing	ESW, landowners	27,000 est.	High	on-going
Diffuse pollution risk assessment of broadland streams	Arable fields digitised within BA area. Water sampling on-going. Report due Feb 2011		NA	Medium	2010/11
Trial Phoslock as a phosphate reduction technique in The Broads	Site selection to be finalised		11,000 est.	Medium	2010/11
Implementing SUDs in the broads through retrospective and development conditions	As opportunities arise		NA	Medium	on-going
Annual water quality samples analysed from non-EA sampled broads	2010 results reported with water plant survey		1,000 p.a. est.	Medium	on-going
Engagement with Open Air Laboratories (OPAL) lakes and ponds Water Survey - Citizen Science project	Training for survey conducted at Whitlingham Great Broad	NHM, UCL	NA	Medium	2010/11
Contribute to and steer Racheath Ecotown and Norwich NE sector Water Cycle Study	Inception stage reached		NA	Medium	2010/11
Produce Broads water quality score card for residents	EA to design	EA	2,200 est.	Medium	2010/11
<b>2010/11 Total</b>			<b>£41,200</b>		

### (iii) Morphology

*Strategy Objective: To mitigate against and reduce the impact of man-made structures on natural ecological and hydrological functioning*

Project	Report on Progress	Potential Partnerships	Indicative Cost (£)	Priority	Delivery
<b>2010/11</b>					
Evaluate existing or proposed BA managed water control structures with regard to the impacts of fish migration and spawning within a functioning lake/floodplain system		EA, WMA, NE	NA est.	High	on-going
Use River Works Licences to mitigate impacts by conditioning design standards	As opportunities arise		NA	Medium	on-going
Workshop to develop best practice for soft engineering design and construction on riverside properties		EA, local contractors	1,000 est.	Medium	2010/11
Use Planning Process to mitigate impacts by conditioning design standards	As opportunities arise		NA	Medium	on-going
Careful planning of moorings to ensure facilities avoid particularly sensitive sites and are appropriate to enhancing the visitor experience (Mooring Strategy)	As opportunities arise		NA	Medium	on-going
<b>2010/11 Total</b>			<b>£1,000</b>		

#### (iv) Chemicals

*Strategy Objectives: Raise awareness of and support measures to reduce input of persistent and ecologically harmful chemicals*

Project	Report on Progress	Potential Partnerships	Indicative Cost (£)	Priority	Delivery
<b>2010/11</b>					
Develop best practice of safe sediment removal in boatyards to reduce concentrations of priority substances (TBT and PAHs)		EA, Green Blue	500 est.	Medium	2010/11
Attend annual Green Boat show and other boating events to promote environmentally friendly boating	2009 show attended, increased BA input for 2010		200 p.a. est.	Medium	on-going
Promote safe removal and disposal of antifoul paint	Trial of Blast Green removal	Blast Green	100 act.	Medium	2010/11
Promote installation of closed-loop boat wash down to minimise antifouling wash-off into the Broads - provision of grants	Advice given at pre-planning application stage	Green Blue, boatyards, SDF	NA est.	Medium	on-going
<b>2010/11 Total</b>			<b>£800</b>		

#### (v) Water Resources

*Strategy Objectives: Promote water efficiency measures*

Project	Report on Progress	Potential Partnerships	Indicative Cost (£)	Priority	Delivery
<b>2010/11</b>					
Promote Sustainability Design Guide, waste water reuse, water harvesting in planning process		EA	NA	Medium	on-going
<b>2010/11 Total</b>			<b>0</b>		

## (vi) Sediment

*Strategy Objectives: Investigate the feasibility of, and conduct, sediment removal from waterbodies*

Project	Report on Progress	Potential Partnerships	Indicative Cost (£)	Priority	Delivery
<b>2010/11</b>					
Upton Little Broad - Remove sediment to reduce nutrient and/or restore depth	Feasibility investigations underway	NWT	40,000 est.	High	2010/11
Round Water/Woolner's Carr - Remove sediment to reduce nutrient and/or restore depth		SWT	17,500 est.	High	2010/11
Ormesby Broad East Arm - Remove sediment to reduce nutrient and/or restore depth	Project underway.	ESW, EA	14,500 est.	High	2010/11
Upton Little Broad - Feasibility study & geobag trials for dredged sediment re-use	Underway	NWT	8,500 act.	Medium	2010/11
Hoveton Great Broad - Feasibility study for dredged sediment re-use		NE	5,000 est.	Medium	2010/11
Trial of geotextile bags to dewater mudpumped sediment	Completed	NWT	8,000 act.	Medium	2010/11
Target erosion protection at high risk sites to reduce sediment inputs	Priority sites identified on an annual basis	Local community	5,000 est.	Low	on-going
<b>2010/11 Total</b>			<b>£98,500</b>		

## (vii) Habitats & Species

*Strategy Objective: Manage waterbodies to maintain or enhance native biodiversity and habitat quality*

Project	Report on Progress	Potential Partnerships	Indicative Cost (£)	Priority	Delivery
<b>2010/11</b>					
Trinity Broads - Investigate necessity and feasibility of further biomanipulation		Trinity Broads Partnership	1,000 est.	High	2010/11
Martham South Broad - Re-establishing marginal plants by introducing native, local plants	Typha in coir mats being grown		2,300 est.	High	2010/11
Barton Broad - Routine annual biomanipulation of exclosures	2009/10 contract set	NWT	2,300 est.	High	on-going
Barton Broad - maintenance and replacement of existing biomanipulation barriers	Replace Neatishead Arm North barrier		3,500 est.	High	2010/11
Biomanipulation exclosure in Ranworth Broad	Design completed. Planning application to be submitted	NWT	13,500 est.	High	2010/11
Annual support for Non-Native Species Co-ordinator	Co-ordinator in post, based at NCC	Waterbodies BAP Topic Group, NNNSI	5,000 act.	High	2010/11
River Waveney Floating Pennywort eradication project	River Waveney Floating Pennywort eradication project underway, good	NNNSI	NA	Medium	2010/11
Eradication of priority non-native invasive species from high-risk Broads sites	Contract let for Parrots feather spraying Autumn 2010; Floating pennywort removal at Rockland planned Nov 2010		5,000 est.	Medium	2010/11
Research project on water plant re-establishment from the seed bank following mudpumping	Pre-dredge survey completed.	UCL	10,800 act.	Medium	2010/11
Investigate feasibility of biomanipulation at new sites	Survey Autumn 2010 - Flixton Decoy, Burntfen Broad, Sotshole Broad	Landowner	2,500 est.	Medium	2010/11
Replace water control structure at Cockshoot Broad		NWT	500 est.	Medium	2010/11
Hickling Broad - protect reedswamp at Hill Common & work with local residents	Faggots installed with financial contribution from local residents	Landowners, NWT	500 est.	Medium	2010/11
Evaluate success of Bridge Broad floating island emergent vegetation establishment	Survey conducted at Bridge Broad		650 act.	Medium	2010/11

Project	Report on Progress	Potential Partnerships	Indicative Cost (£)	Medium	2010/11
Install floating vegetation structures to reinforce eroding reed islands in Rockland Broad	Design completed. Planning permission to be submitted	Rockland Parish Council	10,000 est.	Medium	2010/11
Fish community surveys at priority sites to inform water quality and habitat management	2010 survey sites - Sotshole, Burntfen, Flixton		2,200 act.	Medium	2010/11
Evaluate success of goose barriers as reedswamp protection in the Upper Thurne	Reed growth and sediment survey to be completed autumn 2010	NWT	500 est.	Medium	2010/11
Develop identification guides for key non-native species to be used by officers, contractors, river users and volunteers	Design complete	NNNSI	500 est.	Medium	2010/11
Awareness raising to prevent spread of non-native species	Don't spread frogspawn campaign; Himalayan Balsam control guidance		600 est.	Medium	2010/11
Continue assessing feasibility of wetland enhancements and seeking opportunities to deliver Lake Restoration Strategy objectives		EA, BESL, NE, NWT, RSPB,	10,000 est.	Medium	2010/11
<b>2010/11 Total</b>			<b>£71,350</b>		

The funding for the projects outlined for the period 2008/09 until 2010/11 has predominantly been sourced from the Defra Additional Grant Fund, with Broads Authority's "Conservation of Waterbodies" budget lines supporting this work.

The focus of Broads Authority expenditure on the Sediment, Nutrient and Habitats & Species work strands for the Lake Restoration Strategy reflects the skills and internal resource to deliver actions in these areas. The additional amount in the proposed 2009/10 budget arises from under spend on Year 1 AGF projects, which in part occurred through internal delivery of mudpumping works on time and below the allocated budget. Supporting contributions also arise from existing annually set BA budgets and additional partner funding for a number of projects including the Ormesby East Arm mudpumping. Direct capital contributions are described in the text.

Table 2 Summary of 2010/11 planned expenditure

<b>Work Strand</b>	<b>2009/10</b>
(i) Salinity	£5,500
(ii) Nutrients	£41,200
(iii) Morphology	£1,000
(iv) Chemicals	£800
(v) Water Resources	£0
(vi) Sediment	£98,500
(vii) Habitats & Species	£71,350
<b>Total</b>	<b>£218,350</b>

Appendix 3 - Planned Additional Grant Fund (AGF) Expenditure in 2010/11 for Lake Restoration

<b>Sediment Management Strategy</b>	<b>£s</b>	
Mudpumping <ul style="list-style-type: none"> <li>• Upton Little Broad mudpumping &amp; feasibility work</li> <li>• Feasibility study for mudpumping Hoveton Great Broad</li> <li>• Mudpump vessel maintenance</li> <li>• Mudpump Ormesby East Arm</li> <li>• Burntfen mudpumping &amp; site restoration</li> <li>• Sediment removal &amp; restoration at Round Water/Woolners Carr</li> </ul>	48,500 5,000 2,000 14,500 2,000 17,500	
Source Control <ul style="list-style-type: none"> <li>• “Soft” erosion protection measures</li> <li>• Develop best practice guidance on sediment disposal</li> </ul>	5,000 500	
	<b>95,000</b>	
<b>Lake Restoration Strategy</b>		
Trinities & Lound Catchment Project	27,000	
Nutrient & Chemical Control <ul style="list-style-type: none"> <li>• Assessment of nutrient loads to selected Broad</li> <li>• Safe antifoul removal trial</li> <li>• Phoslock application</li> </ul>	2,200 100 11,000	
Fish Management <ul style="list-style-type: none"> <li>• Biomanipulation feasibility at new sites</li> <li>• Ranworth Broad biomanipulation enclosure</li> <li>• Replace Barton biomanipulation enclosures</li> </ul>	2,500 13,500 3,500	
Invasive species control <ul style="list-style-type: none"> <li>• Norfolk Non-Native Species Initiative projects</li> <li>• Priority eradication projects</li> <li>• Non-native species awareness raising</li> </ul>	5,000 5,000 1,100	
Habitats & Species management <ul style="list-style-type: none"> <li>• Martham Broad reedswamp enhancement</li> <li>• Hickling Broad reedswamp enhancement</li> <li>• Rockland Broad reed island protection</li> <li>• Goose guard evaluation &amp; reed regeneration survey</li> <li>• “Soft” bank protection workshop &amp; design guidance</li> </ul>	2,300 500 10,000 500 1,000	
	<b>85,200</b>	
<b>Total 2010/11 planned expenditure</b>	<b>180,200</b>	