

NORFOLK BIODIVERSITY ACTION PLAN

SALINE LAGOONS

Lagoons in the UK are essentially bodies, natural or artificial, of saline water partially separated from the adjacent sea. They retain a proportion of their sea water at low tide and may develop as brackish, full saline or hyper-saline water bodies.

Ref 1/H2	Tranche 1	Habitat Action Plan 2
Plan Author:	Norfolk Wildlife Trust	
Plan Co-ordinator:	Coastal BAP Topic Group	
Plan Leader:	Natural England	
Date: 31 Dec 1998	Stage: Final draft	
May 2006	Final revised draft	

1. CURRENT STATUS

National Status

- The largest lagoon in the UK is in excess of 800 ha (Loch of Stenness), although the rest are much smaller and some may be less than 1 ha. Lagoons can contain a variety of substrata, often soft sediments which in turn may support tasselweeds and stoneworts as well as filamentous green and brown algae. In addition, lagoons contain invertebrates rarely found elsewhere. They also provide important habitat for waterfowl, marshland birds and seabirds. The flora and invertebrate fauna present can be divided into three main components: those that are essentially freshwater in origin; those that are marine/brackish species; and those that are more specialist lagoonal species. The presence of certain indigenous and specialist plants and animals makes this habitat important to the UK's overall biodiversity.
- There are several different types of lagoons, ranging from those separated from the adjacent sea by a barrier of sand or shingle ('typical lagoons'), to those arising as ponded waters in depressions on soft sedimentary shores, to those separated by a rocky sill or artificial construction such as a sea wall. Sea water exchange in lagoons occurs through a natural or man-modified channel or by percolation through, or overtopping of, the barrier. The salinity of the systems is determined by various levels of fresh water input from ground or surface waters. The degree of separation and the nature of the material separating the lagoon from the sea are the basis for distinguishing several different physiographic types of lagoon.

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- All sites are within the North Norfolk Coast SAC except Snettisham lagoons, which lie within the Wash and North Norfolk Coast SAC. The North Norfolk ones also lie within the North Norfolk SPA/Ramsar site and the Wash ones within the Wash SPA/Ramsar site. See Table 1.
- They can be artificial or natural and are characterised by a range of salinities from brackish to hyper saline. They vary greatly in size (see Table 2). They support certain specialist invertebrates and plants which add to the UK's biodiversity. Norfolk lagoons are important for *Paramysis nouveli* (a shrimp), *Nematostella vectensis* (starlet sea anemone) and *Gammarus insensibilis* (lagoon sand shrimp). The latter two species are included in Schedule 5 of the Wildlife and Countryside Act; *Nematostella* is also a biodiversity Priority Species.
- Within Norfolk, saline lagoons are of three basic types: the salt marsh creek relic pools and the percolation pools behind the Blakeney spit, and the abandoned gravel pits at Snettisham.

- Reference should be made to 'Assessment of saline lagoons within Special Areas of Conservation' by Bamber (EN Research Report 235, 1997). Snettisham Pits data from RSPB.

Table 1: Area of saline lagoon biotopes in Norfolk (after Bamber 1997)

Habitat Type	Site
Muddy sand dominated by annelid worms.	Broadwater, Holme; Salt Holes, Holkham; Salthouse Broad and West of Gramborough Hill, Salthouse.
Muddy sand but poor worm fauna because of disturbance.	Broadwater, Holme; Seahorse Pond, Cley; Little Eye and East of Gramborough Hill, Salthouse.
Deep mud with lugworms dominant.	Salt Hole, Holkham; Abraham's Bosom, Wells; New Moon Pit and Arnold's Marsh, Cley; Salthouse Broad.
Firm sand with <i>Corophium</i> dominant.	Arnold's Marsh, Cley.
Submerged vegetation dominated by <i>Ruppia</i> and <i>Enteromorpha</i> .	Broadwater, Holme; Salt Holes, Holkham; Abraham's Bosom, Wells; Half Moon Pit, New Moon Pit and Arnold's Marsh, Cley; Salthouse Broad and West of Gramborough Hill, Salthouse.
No details currently available.	Snettisham Pits.

Table 2: Saline lagoons and key fauna and flora

Lagoon	Size ha	Owner/ Mgt	Key Species												
			Tenellia adspersa	Idotea chelipes	Palaemonetes varians	Cerastoderma glaucum	Littorina saxatilis	Nematostella vectensis	Gammarus insensibilis	Hydrobia ventrosa	Hydrobia neglecta	Paramysis nouveli	Conopeum seurati	Ruppia sp	Chaetomorpha linum
Broadwater	2.7	NWT		X	X	X					X				
Holkham Salt Holes	0.45	EN		X		X	X							X	X
Abraham's Bosom	1.5	Private			X	X									X
Half Moon Pond	0.1	NWT						X						X	
New Moon Pond	0.1	NWT		X					X						X
Seahorse Pond	1.4	NWT													
Arnold's Marsh	3	NWT		X						X					X
Salthouse Broad	3	Private		X			X	X		X	X	X			
Little Eye	0.5	NT		X					X			X	X		X
West of Gramborough Hill	0.13	NT		X					X	X		X			X
East of Gramborough Hill	0.2	NWT							X						
Snettisham Pits	33.08	RSPB	X	X							X				

2. CURRENT FACTORS AFFECTING HABITAT IN NORFOLK

The factors affecting this habitat are summarised in the Table 3 below.

Table 3: Factors potentially affecting the conservation status of saline lagoons in Norfolk.

Lagoon	Factors potentially affecting conservation status							
	Phragmites encroachment	Recreational use	Coastal erosion	Beach regrading	Dehydration	Cattle	Hypertrophication	Priority for action
Broadwater	Yes		Yes					Low
Holkham Salt Holes								Low
Abraham's Bosom	Yes	Yes						Moderate
Half Moon Pond			Yes	Yes				High
New Moon Pond			Yes	Yes				High
Seahorse Pond	Yes		Yes	Yes				Low
Arnold's Marsh	Yes		Yes	Yes				Low
Salthouse Broad	Yes		Yes	Yes				Moderate
Little Eye			Yes	Yes	Yes			High
West of Gramborough Hill			Yes	Yes	Yes			High
East of Gramborough Hill			Yes			Yes		Medium
Snettisham Pits							Yes	Medium

3. CURRENT ACTION

Current action for saline lagoons being undertaken in Norfolk is summarised in Table 4 below:

Table 4: Current action for saline lagoons in Norfolk.

Lagoon	Current action
Broadwater	New sluice installed to maintain level.
Holkham Salt Holes	-
Abraham's Bosom	-
Half Moon Pond	-
New Moon Pond	-
Seahorse Pond	-
Arnold's Marsh	-
Salthouse Broad	-
Little Eye	Making temporary lagoons permanent.
West of Gramborough Hill	-
East of Gramborough Hill	-
Snettisham Pits	Monitoring strategy.

4. ACTION PLAN OBJECTIVES AND TARGETS

National

- Maintain the current area (c.5,200 ha) of coastal saline lagoons.
- Maintain the current number and distribution of coastal saline lagoons.
- Maintain and improve, as necessary, the quality of coastal saline lagoons as measured by the retention of lagoonal specialist BAP Priority and Red Data Book species where these occur.
- Create, by the year 2015, 120 ha of saline lagoon.

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- Maintain extent and condition of the existing lagoons consistent with the development of a naturally functioning coastline.
- Create 5ha of new lagoon to make up for losses due to natural factors by 2010.

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NATIONAL ACTION		NORFOLK ACTION	ACTION BY:	PARTNERS:
5.1	Policy and Legislation			
5.1.1	Continue to take account of the coastal lagoon habitats in assessing the grant aiding of coastal defence works.	Ensure sea and flood defence works do not threaten any sites.	EA/NE	
5.1.2	Identify abstractions known, or likely to be adversely affecting (through reduced freshwater flows) lagoonal habitats of nature conservation importance. Abstractions should be revoked or reduced where the review identifies this as necessary.	Carry out desk studies to identify impacts of abstractions, then ensure assessments are carried out when necessary.	EA	
5.1.3	Review current marine aggregate extraction licences by 1997 as a means of assessing the combined impact of aggregate extraction on coastal processes relating to lagoons. This action is subject to the results of studies on the cumulative effects of individual aggregate operations which are ongoing.	No action proposed.		
5.2	Site Safeguard and Management			
5.2.1	Continue notification of sites which meet the SSSI/ASSI guidelines ensuring that representation of the full range of lagoonal types is covered.	No action proposed.		
5.2.2	Progress with the programme to designate lagoonal habitats as SPAs, Ramsar sites and SACs by 2004.	No action proposed.		

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NATIONAL ACTION		NORFOLK ACTION	ACTION BY:	PARTNERS:
5.2.3	Maintain and monitor the stable exchange of waters to and from lagoonal habitats as part of site management plans.	<p>Identify key sites for monitoring.</p> <p>Implement agreed monitoring protocol.</p> <p>Investigate cause of anoxia at Abraham's Bosom.</p> <p>Investigate water quality issues at Snettisham.</p>	<p>NE</p> <p>Site Managers</p> <p>NE</p> <p>NE</p>	
5.2.4	Encourage the production of management plans for lagoonal sites, especially SSSIs/ASSIs, NNRs, LNRs and NGO-owned nature reserves by 1998. These should include objectives for BAP priority species and may include objectives for all relevant Red Data Book species. Management objectives and actions for saline lagoons should be incorporated into broader management initiatives such as Local Environment Agency Plans and Estuary Management Plans.	Ensure management plans are produced and incorporate best practice management.	NE, RSPB, NWT	
5.2.5	Contribute to the different stages of producing shoreline management plans (including guidance on their preparation) to ensure that processes relevant to coastal lagoons are taken into account.	Seek incorporation of appropriate measures to protect and enhance saline lagoons.	EA/NE	

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	NATIONAL ACTION	NORFOLK ACTION	ACTION BY:	PARTNERS:
<p>5.2.6</p>	<p>In light of research results, consider establishing a management scheme, or adapting existing schemes such as agri-environment schemes and managed realignment initiatives, to contribute to creating, by 2010, sufficient lagoonal habitat to offset losses of the last 50 years, This scheme should also contribute to maintaining the coastal lagoon and saline pond resources, despite losses due to sea level rise. (This is unlikely to be possible behind shingle bars/spits which should be preserved where possible as they are exceedingly rare structures in the UK.)</p>	<p>Undertake a ditch survey to identify opportunities for possible saline lagoon creation by 2010</p> <p>Identify suitable locations and produce plans.</p> <p>Consider remedial works arising from sea defences at Cley/Salthouse.</p>	<p>NE/EA</p> <p>Coastal BAP Topic Group, Site Managers</p> <p>EA</p>	
<p>5.2.7</p>	<p>In so far as the legislation permits, the Government should take account of the potential benefits to lagoons when designating Nitrate Vulnerable Zones.</p>	<p>No action proposed.</p>		
<p>5.3 5.3.1</p>	<p>Advisory Create a lagoons working group to define best management practices, lagoon creation and colonisation/re-introduction of characteristic species by 1996.</p>	<p>Disseminate and implement best practice.</p>	<p>Coastal BAP Topic Group</p>	

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	NATIONAL ACTION	NORFOLK ACTION	ACTION BY:	PARTNERS:
5.4	International			
5.4.1	Develop liaison within Europe to ensure best practice in lagoonal conservation is exchanged and developed.	No action proposed.		
5.5	Future Research and Monitoring			
5.5.1	Establish inventory of all coastal lagoons currently of national and international importance by 1998. Where information is still inadequate, encourage surveys which assess the importance of lagoonal habitats.	Identify lagoon sites not surveyed eg Snettisham.	NE, RSPB	
5.5.2	Consider the development of coastal geomorphological modelling techniques which could assist in an understanding of the retention and development of lagoonal and other habitats, and consider supporting an associated programme for the monitoring of sediment supply and movement where appropriate.	No action proposed.		
5.5.3	Assess the feasibility of using some derelict docks as sites for the creation of lagoons including for possible ex-situ conservation of threatened lagoonal species.	No action proposed.		

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	NATIONAL ACTION	NORFOLK ACTION	ACTION BY:	PARTNERS:
5.5.4	Use saline lagoon habitat creation schemes to test methods and the approach for creating new habitat. Such opportunities may arise, for example, through coastal defence set-back and perhaps also land use by industry.	Seek creation schemes as part of other coastal works. See 5.2.6.	NE	
		Monitor success of Salthouse creation scheme.	NWT/NE	
5.5.5	Support research into the environmental requirements and other elements of the ecology and genetic viability of populations of certain key characterising lagoonal species. This would provide a sound basis for management.	Disseminate research findings and use results to refine and inform conservation management.	NE	
5.6	Communications and Publicity			
5.6.1	Raise public awareness by increasing links between schools, colleges and universities and local estuarine sites by providing educational resources and training on the interpretation of saline lagoonal habitats.	Seek interpretation at a key site.	NE	Holkham Estate (Pinewoods Caravan Park)

NORFOLK DISTRIBUTION

Distributed along the north Norfolk coast between Kelling and Holme, and on the Wash coast south of Snettisham scalp (see Tables 1 and 2).

MANAGEMENT GUIDANCE

See reference below.

KEY CONTACTS

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KEY REFERENCES

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