

## NORFOLK BIODIVERSITY ACTION PLAN

### HOLLY-LEAVED NAIAD

#### (*Najas marina*)

Holly-leaved naiad is a dioecious (i.e. having male and female flowers on separate plants) annual which grows completely submerged in shallow lakes. It is usually found in meso-eutrophic water over deep substrates of silt or peaty mud in water deeper than 0.2m.

Ref 1/S29	Tranche 1	Species Action Plan 29
Plan Author:		English Nature
Plan Co-ordinator:		English Nature
Plan Leader:		Waterbodies Group
Date:		Stage:
31 December 1998		Final Draft
December 2000		Under Review

## 1. CURRENT STATUS

### National Status

- In the UK it has only been found in the Norfolk Broads. It is protected under Schedule 8 of the WCA 1981.

### Norfolk Status

- It occurs regularly at Upton Broad, Hickling Broad and Martham Broad, with transient populations in several other broads and newly-created turf ponds.

## 2. CURRENT FACTORS CAUSING LOSS OR DECLINE IN NORFOLK

- Eutrophication of water bodies caused by agricultural run off and sewage discharge. Turbulence and pollution associated with boat traffic on the Broads.

## 3. CURRENT ACTION IN NORFOLK

- The populations of this plant are being monitored regularly. The three permanent sites are nature reserves in SSSIs. The turf pond programme is creating new suitable habitat. The Broads are within an ESA. Research is being undertaken into the ecology and requirements of this species at the University of East Anglia. Work is continuing at the Royal Botanic Gardens, Kew to determine optimum conditions for seed storage.

## 4. ACTION PLAN OBJECTIVES AND TARGETS

### National

- Maintain at all known sites.
- Survey to confirm status of the species in the UK.
- Observe re-colonisation of five waterbodies (individually named rivers or broads) adjacent to existing sites by 2004.

### Norfolk

- Maintain at all known sites in the Broads.
- Survey to confirm status of the species in the Broads.
- Observe re-colonisation of five waterbodies (individually named rivers or broads) adjacent to existing sites by 2004.

## Holly-leaved Naiad - Norfolk Action Plan

NATIONAL ACTION		NORFOLK ACTION	ACTION BY:	PARTNERS:
<b>5.1</b>	<b>Policy and Legislation</b>			
<b>5.1.1</b>	Identify and encourage water quality standards in occupied waters which will favour this species.	Maintain and improve water quality standards in occupied waters. Identify and encourage better water quality standards in non-occupied waters.	EA, BA, EN	
<b>5.2</b>	<b>Site Safeguard and Management</b>			
<b>5.2.1</b>	Provide optimum conditions for growth and colonisation by this species, including removal of mud selectively on the larger Broads, and excavation of new sites.	Provide optimum conditions for growth and colonisation by this species, including removal of mud selectively on the larger Broads, and excavation of new sites (turf ponds).	BA, EN, EA	
<b>5.2.2</b>		Maintain current levels of phosphorous removal at Sewage Treatment Works and other major discharges in the Broads.	Water Companies and Industry	
<b>5.2.3</b>		Continue to reduce nutrient loading where possible and set target phosphorous levels for the Broads.	EA, EN, BA	Water Companies
<b>5.2.4</b>		Consider extension and improvement to the existing sewerage system in the Broads area.	Water Company	
<b>5.2.5</b>		Environment Agency's Review of Consents Process.	EA	
<b>5.3</b>	<b>Species Management and Protection</b>			
<b>5.3.1</b>	Re-establish colonies as sites become available after habitat restoration, seeking to re-colonise five waterways adjacent to	Allow re-establishment of colonies as sites become available after water quality improvement and/or habitat restoration.	BA, NWT, EN	

## Holly-leaved Naiad - Norfolk Action Plan

NATIONAL ACTION		NORFOLK ACTION	ACTION BY:	PARTNERS:
	existing colonies.			
5.3.2		Take into account and incorporate the monitoring results and experiences of the weed cutting programme.	BA	
5.3.3		Implement appropriate recommendations from the research and monitoring programme.	EN, NWT, BA	
5.4	<b>Advisory</b>			
5.4.1		Ensure that key bodies and landowners are aware of the legal protection afforded to <i>Najas marina</i> and its conservation requirements.	BA, EN	NWT
5.4.2		Raise awareness among the boat hire industry, sailing clubs and all other significant recreational interests of the presence and significance of <i>Najas marina</i> .	BA	Boating Industry
5.5	<b>Future Research and Monitoring</b>			
5.5.1	Continue to research ecological requirements, in particular seedling establishment and interspecific competition and determine the water quality requirements of the species.	Continue to research ecological requirements, in particular seedling establishment and interspecific competition (with <i>Chara</i> spp in particular) and determine the water quality and substrate requirements of the species.	UEA funded by EA, BA, EN	
		Monitor the effects of weedcutting and turf pond creation on this species.	BA	
5.5.2	Ensure regular monitoring	Ensure regular monitoring	EN, BA?	

## Holly-leaved Naiad - Norfolk Action Plan

NATIONAL ACTION		NORFOLK ACTION	ACTION BY:	PARTNERS:
	of the three permanent populations and identify any further threats to the species.	of extant Broads and turf pond habitats.		
<b>5.5.3</b>	Encourage research on the ecology and distribution of this species with other countries experiencing the same threats to the species, and use the information and experience gained towards its conservation in the UK.	Encourage further research on the ecology and distribution of this species. Liaise with other countries experiencing similar problems with the species, and use this information and experience towards furthering the conservation and protection of this species.	UEA funded by EA, BA, EN	
<b>5.5.4</b>	Pass information gathered during survey and monitoring of this species to Joint Nature Conservation Committee or Biological Records Centre so that it can be incorporated in national databases.	Pass information on sites, research etc to Joint Nature Conservation Committee or Biological Records Centre and Norfolk Biological Records Centre for incorporation into national and local databases.	BA	NBRC
<b>5.5.5</b>	Provide information annually to the World Conservation Monitoring Centre on the UK status of the species to contribute to maintenance of an up-to-date global Red Data List.	Provide information annually to the World Conservation Monitoring Centre on the status of <i>Najas marina</i> in the UK to contribute to maintenance of an up-to-date global Red Data List.		
<b>5.6</b>	<b>Communications and Publicity</b>			
<b>5.6.1</b>	Develop a strategy to educate Broads users and adjacent land managers about the effects of their activities on the Broads' wildlife, particularly the holly-leaved naiad.	Integrate this Species Action Plan with others, and the Environment Agency's proposed Eutrophication Action Plan into a Broads biodiversity strategy. Ensure that this is incorporated in the	EA, EN, NWT, BA	Waterway Managers and Users

## Holly-leaved Naiad - Norfolk Action Plan

NATIONAL ACTION		NORFOLK ACTION	ACTION BY:	PARTNERS:
		Broads Authority's proposed 'Management Strategy' for the Broads.		

## NORFOLK DISTRIBUTION

Current populations are confined to the Broads but historic data gathered through analysis of sediments in lakes across Norfolk confirm that it used to be more widely distributed.

The main strongholds in the Broads are at Upton Broad, Hickling Broad (particularly in Heigham Corner) and Martham Broad. In 1999 plants were additionally recorded at Cockshoot, Hoveton Little Broad, Hoveton Great Broad, Horsey Mere and Strumpshaw Broad. There have been occasional records from many parts of the Broads system but these tend to come and go as there are never enough plants growing at any one time to develop a viable population.

## MANAGEMENT GUIDANCE

**(This guidance is a general summary; for detailed information or advice consult the references or contacts below.)**

The Plants of *Najas marina* can be very badly affected by cutting. The later in the season that cutting occurs the greater the effect as seeds produced by the plant early in the year, but which are not yet matured, will be lost. Even if cutting is done early in the year, seed viability is badly affected as although the plant re-grows, new parts have a shorter period in which to produce seed and this leads to far greater numbers of seeds in the re-growth being non-viable.

*Najas marina* has an approximate 10:1, female:male sex ratio which may also lead to populations being badly affected by cutting. Although female plants can reproduce apomictically (without reproduction) new plants produced this way are essentially clones of the old. This leaves the population much more prone to disease or environmental change than if they could change their genetics through proper reproduction. If cutting removes or damages the smaller number of male plants, the chances of sexual reproduction are reduced.

Dredging can also very badly affect *Najas marina* populations for various reasons. Firstly there are the obvious physical effects on the plants themselves during dredging operations. Dredging, especially deep dredging or suction dredging that removes sediment representing greater than about the last 6-10 years of deposition, will remove the entire viable seed bank for this species. Exposure of firmer sediments by removal of soft, overlying sediment will also lead to failure of seedlings to establish. *Najas marina* plants have a very high root : shoot mass ratio and they therefore need deep, soft sediments in which to grow. Plants grown on firm sediments in lab conditions have a very low success rate and often end up detaching from the sediment and floating away.

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## PROGRESS ON PLAN ACTIONS (as at 27/02/01)

	Norfolk Action	Comments
5.1.1	Maintain and improve water quality standards in occupied waters. Identify and encourage better water quality standards in non-occupied waters.	Water quality improving in Rivers Ant and Bure following tertiary treatment at STWs. Lake Restoration Project improving water exchange at Cockshoot Broad.
5.2.1	Provide optimum conditions for growth and colonisation by this species, including removal of mud selectively on the larger Broads, and excavation of new sites (turf ponds).	Several turf ponds created in the Ant Valley.
5.2.2	Maintain current levels of phosphorous removal at Sewage Treatment Works and other major discharges in the Broads.	Completed in Bure and Ant Valleys.
5.2.3	Continue to reduce nutrient loading where possible and set target phosphorous levels for the Broads.	Target phosphorus levels set for all Natura 2000 sites that are designated for a water feature.
5.2.4	Consider extension and improvement to the existing sewerage system in the Broads area.	
5.2.5	Environment Agency's Review of Consents Process.	Entering Stage 3 (appropriate assessment)
5.3.1	Allow re-establishment of colonies as sites become available after water quality improvement and/or habitat restoration.	Lake Restoration Project is providing three potential new sites.
5.3.2	Take into account and incorporate the monitoring results and experiences of the weed cutting programme.	Broads Authority developing a protocol to determine conditions under which weed-cutting is to be considered necessary at Hickling Broad.
5.3.3	Implement appropriate recommendations from the research and monitoring programme.	
5.4.1	Ensure that key bodies and landowners are aware of the legal protection afforded to <i>Najas marina</i> and its conservation requirements.	All landowners of occupied sites are aware.
5.4.2	Raise awareness among the boat hire industry, sailing clubs and all other significant recreational interests of the presence and significance of <i>Najas marina</i> .	

	<b>Norfolk Action</b>	<b>Comments</b>
5.5.1	Continue to research ecological requirements, in particular seedling establishment and interspecific competition (with <i>Chara</i> spp in particular) and determine the water quality and substrate requirements of the species.	
5.5.1	Monitor the effects of weedcutting and turf pond creation on this species.	
5.5.2	Ensure regular monitoring of extant Broads and turf pond habitats.	Annual macrophyte survey
5.5.3	Encourage further research on the ecology and distribution of this species. Liaise with other countries experiencing similar problems with the species, and use this information and experience towards furthering the conservation and protection of this species.	English Nature and Broads Authority co-funded a survey in 2000 recording the distribution of <i>Najas marina</i> in the Upper Thurne area.
5.5.4	Pass information on sites, research etc to Joint Nature Conservation Committee or Biological Records Centre and Norfolk Biological Records Centre for incorporation into national and local databases.	
5.5.5	Provide information annually to the World Conservation Monitoring Centre on the status of <i>Najas marina</i> in the UK to contribute to maintenance of an up-to-date global Red Data List.	
5.6.1	Integrate this Species Action Plan with others, and the Environment Agency's proposed Eutrophication Action Plan into a Broads biodiversity strategy. Ensure that this is incorporated in the Broads Authority's proposed 'Management Strategy' for the Broads.	

## PROGRESS ON PLAN OBJECTIVES AND TARGETS

Maintain at all known Broads sites.	Target achieved.
Survey to confirm status of species in Broads.	Target achieved.
Observe re-colonisation of five waterbodies in the Broads by 2004.	Good progress. (see below)

In recent decades, the main populations of *Najas marina* have only existed at Hickling, Martham and Upton Broads although there have been occasional records from Cockshoot Broad and some turf ponds.

*Najas marina* is currently found in Hoveton Little Broad, Pound End, Hoveton Great Broad, Horsey Mere, Strumpshaw Broad and is extending its range in the Hickling area towards Heigham Sound. These sites are in addition to the three existing populations at Martham, Upton and Hickling Broad. Surveys over the next few years will determine if these are a permanent re-colonisation or “a one-off”. To satisfy the SAP target of “re-colonise five waterbodies by 2004” surveys will have to show the presence of *Najas marina* at all these sites in every year between 1999 and 2004.