

Proposed Project to Enhance Tree and Scrub Clearance
Report by Chief Executive

Summary: This report considers an initiative sponsored by the Broads Society to develop a project to remove trees and scrub along the north bank of the River Bure. The view of the Navigation Committee has been included within this report.

Recommendation:

That the Authority:

- (i) supports the proposal by the Broads Society to develop a project to remove trees and scrub from the margins of water bodies;
- (ii) confirms that officer support be offered to help in providing guidance on external funding opportunities; and
- (iii) makes provision in its budgets for potential contributions of £10,000 from each of the Navigation and General Accounts towards the costs of a Tree and Scrub Management Project. The availability of this funding would be subject to match funding of at least £20,000 being provided from the Broads Society and other partners in the scheme, an agreed specification and securing all necessary consents. Any subsequent contract would need to be let and supervised by a competent public body such as Natural England or the Broads Authority.

1 Background

- 1.1 In recent years, and particularly since the Best Value Review of Navigation in July 2002, the Authority has shifted some of its resources from patrolling the rivers and broads into the maintenance of the navigation, particularly dredging and tree and scrub clearance. To quote from the 2002 report: "*The Review Team's deliberations were very largely about the best and most appropriate use of resources. The most significant recommendation is a moderate change in favour of maintenance work at the expense of river patrolling.*"
- 1.2 The new arrangements have involved increased activity in the winter removing vegetation overhanging the navigation and joint working with a number of bodies including the Broads Society's Broadsword volunteers and members of the Norfolk Broads Yacht Club. The Authority, working with the Broadland Flood Alleviation Project, has also developed a policy document to guide the management of trees and scrub.

- 1.3 Although much has been achieved since 2002, the scale of the task is such that the volume of tree and scrub the Authority would in an ideal world like to see removed is enormous.

2 Natural England and the Alaska Machine

- 2.1 Over the last five years English Nature, now Natural England, and the Norfolk Wildlife Trust have been working with a private contractor, Wetland Restoration Contracting Limited, to carry out two contracts, clearing scrub willow and alder from wet fen sites. The project involved the restoration in excess of 120 hectares of scrubbed over fen. Appendix 1 contains an article giving some background to the project.

3 Broads Society Meeting and Proposals

- 3.1 The Broads Society held a meeting on the evening of 15 May at Horning Sailing Club to canvass support and views on a plan to clear tree growth along a length of the north bank of the River Bure from Blackhorse Broad past Dydall's Mill to Hoveton Great Broad using the same machinery.
- 3.2 The Society group took the Belle of the Broads and cruised upstream on the Bure from Horning to Salhouse to look at examples of tree clearance carried out by Horning Sailing Club and an area cleared by the Wildlife Trust opposite Hoveton Little Broad. The evening ended with a commitment from a Steering Group to formulate a project to gauge feasibility, permissions, mitigation and costing of the scheme.

4 Navigation Committee Considerations

- 4.1 The Vice-Chairman of the Navigation Committee is heavily involved in promoting the project and has written a paper in support which was forwarded to the Navigation Committee on 4 June 2009. A copy of this report is attached at Appendix 2.
- 4.2 The Navigation Committee Members discussed the initiative including the financial issues, the need for funding, partnership issues and whether and how it should be progressed. The majority of members welcomed the initiative and recognised the potential benefits to the Broads but acknowledged that there were a number of practical issues to be taken into account especially the need for large scale funding. The Committee considered that any financial contribution by the Authority should at the very least be matched by other parties involved.
- 4.3 The Navigation Committee has recommended to the Broads Authority
 - (i) that the proposal by the Broads Society to develop a project to remove trees and scrub from the margins of water bodies;
 - (ii) that officer support be offered to help in providing guidance on external funding opportunities; and

- (iii) that a contribution of £10,000 be made from the Navigation Account, and a minimum of £10,000 contribution be considered from the General Account, towards the cost of a Tree and Scrub Management Scheme, subject to match funding of at least the total of these contributions being provided from the Broads Society and other partners in the scheme.

4.4 The recommendations from the Navigation Committee are supported. Given the excellent outcome from the provisional figures from last year's Navigation Account with income exceeding expenditure by just under £20,000, and the positive news about toll plaques renewals for this year, it is considered that the contribution of £10,000 from the Navigation Account for this initiative should be supported. The General Account is also capable of matching this contribution, and the Navigation Committee's recommendation to make the Authority's contributions subject to match funding of at least the total of Authority contribution from the Broads Society and other partners in the scheme is fully supported.

5 Further Considerations

- 5.1 The initiative by the Broads Society should be welcomed as it has a range of positive benefits. Firstly, reduction of tree and scrub will provide significant advantages by allowing light in to permit a strong reed fringe, which can reduce bank erosion. The reduction of tree and scrub will also help to reduce wind shadow for the sailing community. It also has biodiversity benefits in the Bure Marshes National Nature Reserve (though wet woodland is an important habitat in itself). Secondly, Broads Authority support for an initiative emanating from the Broads Society would assist the Society in developing a new facet of their activities that might be attractive to new members.
- 5.2 There is much work to be done before the project can proceed. The scope of the project still has to be fleshed out and the extent of the tree clearance has still to be agreed. Natural England's initial advice is that the maximum width for clearance should be 20 metres. It will be important to ensure such work either enhances or at least does not weaken landscape character and promotes local distinctiveness. An average width of 20m is probably acceptable for this subject to more detailed surveys.
- 5.3 Land owner consent would be crucial as would permission from Natural England and the requirement for a felling licence. There would also be a need for a range of surveys checking for bats, identifying mature trees for retention, locations opening up views, water vole habitats (they were thinking about re-profiling the bank edge in places), etc. Previous clearance in certain places has led to sailing vessels starting to use the full width of the water and finding the margins too shallow, or underwater hazards. As in the River Waveney, the removal of large swathes of trees could be contentious with many people just not liking change and the Society would need to consider how it managed the messages to the public and in particular to anglers who would be concerned about the impact on their sport.

- 5.4 There are also many practical issues to be resolved and points of principle, such as who would manage the project and award a contract to undertake ongoing management and what should be done with the felled material. As we start moving to a low carbon world it will be important to try and mitigate use of fossil fuels by seeing if there can be a beneficial after-use of the material rather than just burning it.
- 5.5 Once the work was complete, roughly 10% of the tree stumps would require treatment to deal with re-growth; potentially a couple of weeks work that the Authority could offer as support in kind.

6 Financial Implications

- 6.1 The potential cost of these works is substantial at £11-12,000 per hectare. So a 20 metre strip, 4 or 5 kilometres long, could cost potentially £120,000. The Society envisage raising much of the money from external funding sources.

Background papers: Nil

Author: John Packman

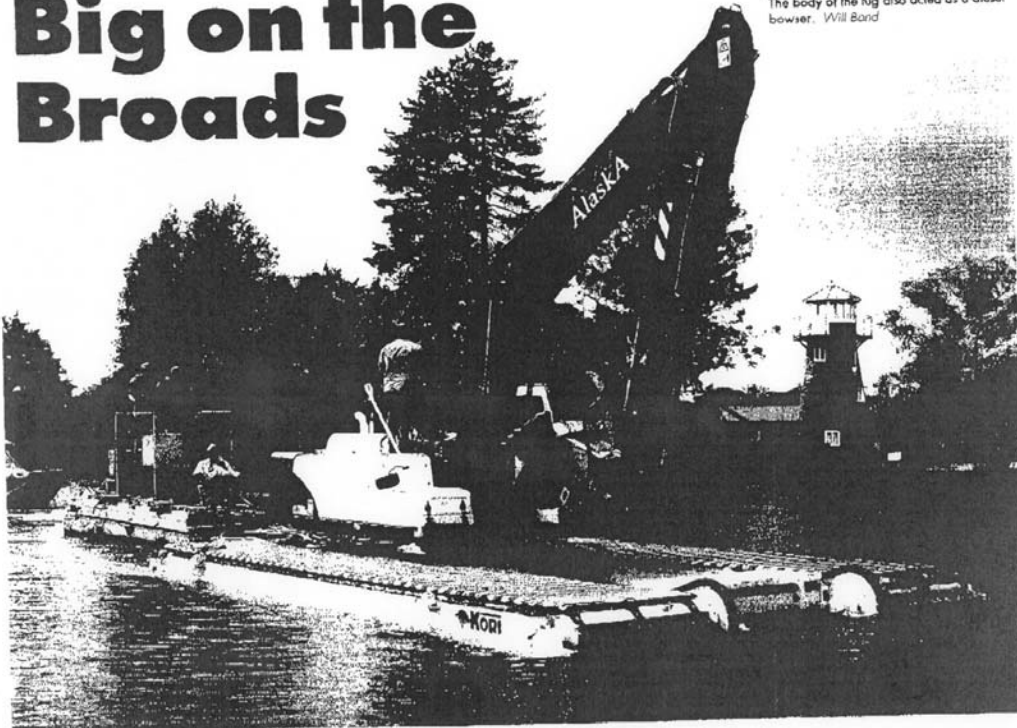
Date of report: 11 June 2009

Appendices: APPENDIX 1 – "Big on the Broads - large-scale fen restoration" in Conservation Land Management Vol. 4 No 4, Winter 2006, pp 9-11.
APPENDIX 2 - Paper by Philip Ollier on Tree and Scrub Clearance from the Margins of Water Bodies

APPENDIX 1

The amphibious excavator being propelled down the River Bure by a tug. The body of the tug also acted as a diesel bowser. Will Bond

Big on the Broads



large-scale fen restoration

In 1997 the Broads Authority and English Nature produced a Fen Management Strategy, which was supported by all of the conservation organisations in the Broads. This document identified 1,130ha of fen within the Broads which could be restored by clearing young (post 1946) scrub. 1946 was a useful benchmark, being the date of the earliest available aerial photographs which allowed identification of areas that had since been colonised by scrub. Ground survey revealed that such areas held viable

understoreys, which could be expected to regenerate into full fen communities, while the wet woodland interest had not yet developed to a point where removing it would cause significant biodiversity losses.

The nature of the sites

The scrub was nearly all in dense blocks of 40-60-year-old willow, birch, alder, oak or ash. Much of it was low growing, having blown/fallen over or been dwarfed by wind or high water levels.

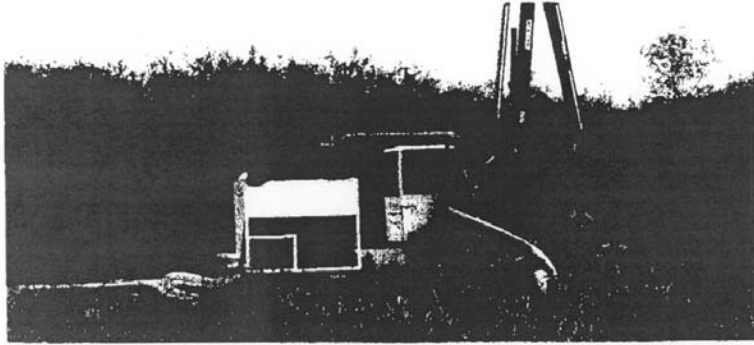
Part of the challenge, therefore, was in the variability of the material to be processed,

and also in the ground conditions. Where grown-over turf diggings ('hover') occur, the 'ground' is like the skin of a rice pudding. The greatest restriction that this presents to mechanisation is the number of machine passes that can be made over it; repeated passes can cause the surface to tear, particularly when cornering.

The principal aim of the scrub clearance was to produce 'instant fen' (see box page 10), in contrast to previous efforts where recovery of the full fen community had taken many years, if it happened at all.

Most land managers' experience of scrub clearance is of small areas in relatively easy working conditions. David Price and Rick Southwood describe the lessons learnt when doing things in a big way to restore fen vegetation in the Norfolk Broads.

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Above The Moose in action. The felling head pulls whole trees to the front-mounted chipper. The woodchip hopper has two pipes connected to it. One pipe has 'empty' air from a blower unit on an access track, the second pipe carries woodchip within the airflow to the chip heap. *Tim Hanks*

Instant fen

In order for fen vegetation to develop quickly after scrub clearance, the following were required:

- A level surface with an undisturbed peat structure – to prevent oxidation of wet peat and consequent nutrient changes affecting fen communities. This rules out stump removal, and probably the usual small-scale method of chainsaw felling, due to trampling, and uncontained bonfires which will result in local phosphate deposition.
- No cut material to be left on site, and all stumps to be no higher than the fen surface – to facilitate future management of the fen.

Right The amphibious excavator loading the incinerator on some particularly soft ground at Norfolk Wildlife Trust's Ebb & Flow Marshes reserve. *David Price*

Parallel project management

In 1999, taking the Fen Management Strategy as their starting point, both English Nature and the Norfolk Wildlife Trust started projects that included wetland scrub clearance from an area totalling 117ha across Norfolk, of which 80ha was in the Broads. Here, English Nature selected Woodbastwick Marshes, part of Bure Marshes NNR, for the initial clearance work, while the Norfolk Wildlife Trust's work was centred on three reserves on the River Bure.

Because of the common aims and problems associated with these projects it was decided to engage in a parallel tender process using common specifications. Each organisation sent out separate tender

documents but site visits for interested contractors were held jointly. Although the assessment of tenders was undertaken jointly, the organisations made no commitment to award contracts to the same party. It was hoped, however, that a common benefit would be the development of new methods that would ease future fen management work.

The advantages of this arrangement for contractors included:

- the time-saving effect of considering two tenders as one;
- the ability to look at common solutions on a group of sites;
- the possibility that a large contract might generate sufficient income to fund the development of a new mechanised method.

Specifications and tender analysis

The tender invitations were not specific about methods. Instead, we provided details of the desired state at the end of the contract, i.e. conditions which would allow the development of instant fen (see box), and the constraints which applied.

The selection of contractors was based on the following criteria:

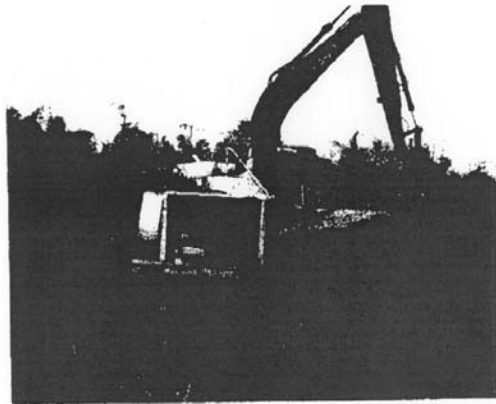
- Quality – potential of the methodology to create instant fen.
- Value for money.
- Timescales – taking account of, for example, seasonal flooding and breeding birds.
- Health & Safety – showing particular regard to the risk posed by changing water levels and the remoteness of the sites.
- Environmental responsibility (initially, the burning of large volumes of material was regarded as being unacceptable).
- Previous experience of sensitive sites and knowledge of equipment and ecological issues.

Initial clearances

Wetland Restoration Contracting Ltd (WRCL) won both the English Nature and Norfolk Wildlife Trust contracts. To carry out the work, they developed a machine that they called Moose. This was based on a Morooka dumper chassis and had 1m-wide rubber tracks, a 10m-reach forestry crane, guillotine felling head with bunching mechanism and a 300mm-capacity chipper.

Felled trees, including bunched small stems, were fed into the chipper. Woodchips were then fed from a hopper through a rotary valve into a piped air-stream, and blown up to 1,300m offsite to a stockpile. There were, however, problems with this system:

- high interdependency within the system created an uneconomic amount of downtime;
- moving pipelines around the



site created similar ground impact, albeit less severe, as other methods of moving woodchips;

- a further machine pass was required to lower stumps, as the felling head could not cut stumps low enough;
- variability of tree size caused huge problems.

More significantly, the contractors could not make the system profitable and so, having developed a system that produced some very high quality results, it became apparent that a more robust approach was required. Consequently, the Norfolk Wildlife Trust/WRCL contract was cancelled and all work was re-tendered. WRCL were again the successful contractors. Meanwhile, the English Nature/WRCL contract was renegotiated by mutual consent.

improving the system

The successor to the Moose system was based around two pieces of amphibious equipment.

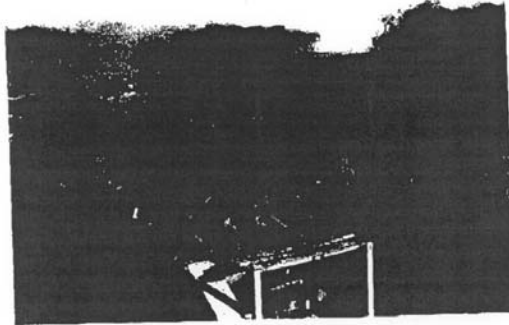
Amphibious excavator

WRCL imported an amphibious track-base (effectively two pontoons with tracks rotating around them) from the USA, where it is used in the Louisiana swamps. This was fitted with a conventional excavator turret and arm, for which two heads were provided:

- a BirdEye stump grinder that provided for felling and levelling of stumps;
- a grapple with guillotine cutting capability for loading an incinerator.

Air-curtain incinerator

In an air-curtain incinerator, a high-velocity curtain of air directed across the burning chamber traps unburned particles in the high-temperature zone. This allows for much faster burn times than bonfires, plus a secondary-burn process reduces gas and smoke emissions. The nature of the sites required a specially-built lightweight unit,



Contractors

Wetland Restoration Contracting Limited, Contact: c/o Alaska Environmental Ltd, Stokelord Farm, East Stoke, Wareham, Dorset BH20 6AL; tel: 01929 463301; e-mail: Will Bond: will@alaska.ltd.uk; Tim Hanks: tmw53@btinternet.com

which was coupled with twin flotation tanks, one on either side.

Both the excavator and incinerator unit could be floated down the river, propelled by a tug. The excavator then climbed up the river wall and on to the marsh. Once on the marsh, the excavator pulled the incinerator out of the water and moved it around the site. The body of the tug also acted as a diesel bowser. In addition a Jetfloat barge with a diesel bowser (see box on equipment), was used to travel through the dyke system to supply fuel to the excavator on site.

The clearance process

Felling and stump grinding was undertaken in strips, and trees were windrowed from adjacent passes of the machine, creating a 36m-wide clearance between each windrow. In a separate pass, the incinerator unit was pulled by the excavator along the route used for the felling pass and the windrows fed into the firebox. Periodically ash was

removed from the incinerator into skips. It was found that by putting lids on the skips the volume of the still-hot ash would further reduce due to continued burning. Skips were moved at the same time as the incinerator, to avoid additional machine movements.

The greatest limiting factor during the operation of this system was high winds during incineration. Very strong winds could stop work occasionally, but generally problems related to changing wind direction. The excavator needs to feed the incinerator with the wind behind it, to avoid the risk of sparks landing on dry reeds and vegetation that build up on the body of the excavator. Changing wind directions require additional machine movements.

Site impact

The success of the system was mainly due to minimising both the proportion of the site that was tracked over (<30%), and the number of passes made by each machine. This was

Work rates

The speed of clearance work achieved by the incinerator system is inevitably dictated by the size and density of the trees involved. Larger trees create greater strains on the machine, increasing downtime. For volumes of up to 75 tonnes per ha a rate of 1ha per week is anticipated for felling, stump grinding and windrowing; a further 1 week per ha is required for incinerating.

Incinerating rates are faster if the material is felled in winter with no leaf and less sap. The longer the interval between felling and burning, the quicker the incinerating rate, although this has implications for work planning.

Left The air-curtain incinerator in use. David Price

Equipment

Excavator

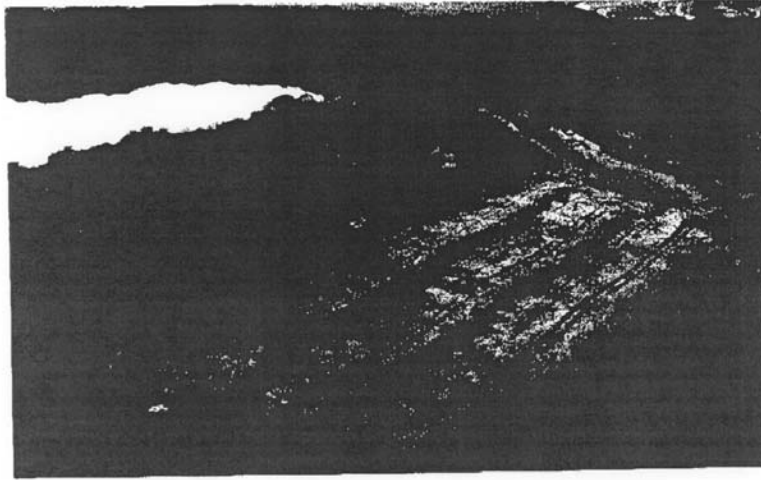
Volvo SE210 turret mounted on a Sunland-Kori amphibious undercarriage
Ground pressure: 1.5psi
Vehicle weight: 26.5t
Maximum reach: 10m
Track width: 1.8m
Track length: 9.5m
Overall machine width: 5.5m
www.koribuilt.com

Felling head

Bird-eye stump grinder
www.marshalllogging.co.uk
Grapple with guillotine cutting capability;
special-build by Alaska

The lightweight air-curtain incinerator and the tug used for river mobilisation were both special-build by Alaska.

Jetfloats for water access:
www.jetfloat.co.uk;
contact Nick Ash, tel: 01644 444395



Above Norfolk Wildlife Trust's Upton Broads and Marshes reserve. This aerial view clearly shows the windrows of felled material and the excavator working against the wall of scrub. Towards the bottom of the picture is the Jetfloat barge used for fuel delivery. At the far end of the cleared area ponds have been created by removing roofplates. Mike Page

Costs

The budget for this work was based on an estimate of £7,000 per ha. The first tender produced direct contractor costs of £5,850 per ha. After the re-tendering these costs rose to £10,000 (-VAT = £11,750) and the clearance areas involved were reduced to keep within budget.

Although £10,000 per ha may seem high, it is worth noting that this is for complete clearance and removal of material, with a high chance of achieving 'instant fen' in a fairly short time.

Mobilising the excavator alone takes two articulated lorry movements, the use of a crane and several days to disassemble and reassemble. Therefore the larger the area undertaken at any one time, the smaller the proportion of the budget spent on set-up costs.

The Norfolk Wildlife Trust's 'Securing the Future' project undertook work to the value of £3m on 26 nature reserves, and was funded by the Heritage Lottery Fund. This included £280,000 on scrub clearance work on Norfolk Wildlife Trust sites in the Broads. Project management costs were absorbed into the overall project costs. English Nature funded clearance work at Woodbastwick to the value of £178,000.

achieved by:

- Replacing the excavator's rear counterweight with a very large reserve diesel tank, and the use of the Jetfloat barge diesel bowser to reduce the need for refuelling trips.
- Operating the machines in straight lines.
- Understanding of the limitations of the system and designing clearance areas accordingly.
- Minimising breakdowns by good system design, so reducing the need to bring machines off site for repairs.

Results

Fen vegetation has established quickly. Significant amounts of milk parsley are now found in cleared areas at Woodbastwick, attracting swallowtail butterflies, and bearded reedlings have been seen for the first time in decades on Ranworth Marshes.

In some places, where unavoidable excessive machine movement had created impassable conditions, the surface has healed and can again be walked over. A bonus in some of these areas has been local lowering of the surface providing wet patches, with noticeably different communities.

With stump levelling and felling being part of the same

operation, there was no opportunity to treat the fresh stumps with glyphosate. Time will tell how significant a problem this is. Large areas of the clearances undertaken in 2004-05 were flooded due to high winter water levels. Recent ad-hoc surveys of these areas show no more regrowth than would be expected after chemical treatment, suggesting the stumps have been drowned. A longer period of monitoring will be required to assess this aspect of the work.

Lessons learnt

All are agreed that without the mutual trust and support established between English Nature, Norfolk Wildlife Trust and WRCL this work would not have been completed with the additional benefits that it has had. An open and flexible approach to achieving targets within realistic deadlines and a joint determination to produce a quality result have paid dividends.

It was assumed that contracting large areas would produce a lower unit cost, but this did not prove to be the case. Although the cost of some elements are spread over a greater area, the additional costs that can be incurred by being

bound into one large contract for a protracted time can be greater. For example, if a smaller operation has several small sites to work, when water is high on one site they can easily move to another site and keep working. Large-scale working can reduce this effect of being able to offset overheads on other jobs.

All involved had undertaken practical scrub clearance in the past, but all had underestimated the difficulties involved in a larger-scale operation. It was assumed that all scrub was similar, but with hindsight this assessment was based on experience of tackling the easiest and most accessible areas.

It was very ambitious to attempt to add the additional goal of developing a new methodology and system, particularly at this scale. The initial requirement for no burning of cut material turned out to be a distraction which delayed the development of the incinerator technique. In the event, the English Nature project required a one-year extension, the Norfolk Wildlife Trust project two years.

The desire to establish a system that could go on to undertake further large-scale restoration projects has been achieved. Since work was completed in Norfolk in March 2006, the machinery has been used to clear scrub on the RSPB's Loch of Strathbeg reserve in Aberdeenshire, and it has now returned to Ranworth Marshes, in the Broads, where it will continue to play a major part in the implementation of the Fen Management Strategy.

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Rick Southwood is Natural England's Site Manager for North East Norfolk and the Broads. Contact: Rick Southwood, 19 The Green, Woodbastwick, Norwich NR13 6HH. tel: 01603 720788; e-mail: rick.southwood@naturalengland.org.uk

Tree and Scrub Clearance from the Margins of Water Bodies

Paper by Vice-Chairman, Navigation Committee

Summary: This paper sets out the arguments for the Authority to take an increased role in facilitating the clearance of trees and scrub from the margins of the navigation thereby delivering on priorities TR16 and TR17 of the Broads Plan 2004.

1 The Broads Plan 2004

1.1 The Broads Plan 2004 contains the following statements:

Issue: Bank erosion is a recurring problem for landowners and impacts on water quality. A range of bank protection measures is used, and the Authority promotes 'soft' or natural engineering solutions where possible.

20-year aim: Bank erosion will be minimal, with sustainable and where practicable natural or 'soft' engineering solutions used to protect the more vulnerable stretches of waterways.

5-year priority objectives:

TR16 Minimise bank erosion where caused by boating activity.

TR17 Protect and restore vulnerable banks and ronds.

The 5 year action plan picks up on this objective in the following terms:

"restore river-banks by removal of excessive tree and scrub growth, and maintain through routine clearance/coppicing."

1.2 These objectives do not provide measures for identifying their achievement within the identified timescale but they do provide a justification for action by the Authority to address the problems caused to the navigation and the environment by riparian tree and scrub growth.

2 The problems caused by riparian tree and scrub growth

2.1 In many places on the Broads the water bodies were surrounded by undrained fens dominated by reedswamp species. The reeds were cut regularly for thatch and this prevented sapling growth. Rivers are natural vectors for the dispersal of tree and plant seeds. In the past, on marshland, trees and scrub were kept under control by the efforts of a combination of reedcutters, coppicers and wherry-men. With the decline in traditional management techniques, scrub invaded the fens. Placing of dredged spoil on the river banks, without spreading the material thinly, and the deliberate creation of raised flood banks also provided dry areas where reeds were unable to grow and trees and scrub could take hold.

2.2 The two main components of the marginal reedswamp, Lesser Reedmace (*Typha angustifolia*) and Reed (*Phragmites australis*) are intolerant of shade.

The latter species will survive, albeit in a depauperate condition for many years under an Alder canopy, but eventually both species will be shaded out of existence. Loss of these species and the incursion of scrub deprive a number of other species of their preferred habitat.

- 2.3 Research at Wallingford has demonstrated the effectiveness of riparian reed beds in protecting the river banks from erosion by waves caused both by wind and boat wash. The philosophy behind the current Broads Flood Alleviation Project (BFAP) is to replace hard engineered vertical river banks, topped by raised flood banks, with soft engineered sloping river banks backed by reeded ronds with the flood banks set back from the river edge. The soils of the river bank are then protected from erosion by reed growth in the shallower (up to 1.5m) water at the edge of the navigation.
- 2.4 Once trees establish themselves on the edges of the waterways, their roots undermine and loosen the banks, in many cases creating unstable overhangs which lead to the development of embayments. Their annual leaf fall adds to the sediment load. The bulk of tree growth overhanging the waterways reduces the effective width of the channel; catastrophically so when trees fall across the navigation and require removal.
- 2.5 Trees and scrub growing on earth floodbanks reduce access for maintenance and, by their root action, destabilise the banks.

3 Examples of tree and scrub clearance in the Broads

- 3.1 BA Riverworks teams have dealt with fallen trees in the navigation and have cleared trees and scrub from the banks on an ad hoc basis during winter months.
- 3.2 In co-operation with Riverworks Teams, Broads Society "Broadsword" volunteers have assisted with tree and scrub clearance, operating teams in both the Northern and Southern Rivers during the winter period. A number of sailing clubs deploy winter working parties to fell trees and scrub which blanket wind in their favoured sailing areas.
- 3.3 In carrying out the BFAP, BESL has cleared a significant amount of scrub and willow along the Broadland river system since starting work in 2001. These include:
 - River Waveney – true right bank between Beccles Sailing Club and Share Drainage Mill over 10 kilometres (compartment 26,27 & 28).
 - River Waveney – true left bank Long Dam Level. 2 kilometres (Compartment 24).
 - River Ant – true left bank How Hill 1 kilometre (Compartment 4).
 - River Yare – true left bank Strumpshaw 800 m (Compartment 16).
 - River Thurne true left bank Martham. 1000m (Compartment 7).
- 3.4 Various conservation organisations and local landowners have carried out fen restoration projects in the Broads in recent years and management plans for

some designated areas include further work of this nature. Examples of work carried out include fen restoration in the Bure Marshes National Nature Reserve, around Upton Broad and on the Yare at Strumpshaw and Rockland. The last five years have seen the development of techniques, largely funded by Natural England to use mechanical equipment to clear trees and scrub from former fenland and restore the reedswamp habitats.

- 3.5 While this work has had a beneficial effect on parts of the Broads, it has really only scratched the surface. In particular, it has had no effect on large areas where the BFAP places its defences well back from the edge of the waterway.

4 Benefits of tree and scrub clearance from the edges of the waterway

- 4.1 The edges of the waterways will gain a much more 'open' and 'natural' appearance. The vistas will return to those experienced in the early part of the last century.
- 4.2 It will help to restore the biodiversity of the fen ecosystem. Although the alder woodland so characteristic of the region is of great national ecological importance, we should not want to see all the fens in the region dominated by this community – a balance between the different types of fen community is required.
- 4.3 It provides an opportunity for reedswamp species to re-colonise the banks of rivers and broads. This is highly desirable as it will, *inter alia*, help to check the rapid rate at which the edges of the fens are being eroded by a combination of boat wash and wind-generated waves; dredging costs will thus be reduced.
- 4.4 As far as the use of the waterways for navigation is concerned, the effective channel width will be increased, the amount of sediment entering the waterways will be reduced and the incidence of fallen trees partially blocking the navigation will be reduced. Sailing craft will experience clearer wind.

5 Practical considerations

- 5.1 However carrying out tree and scrub clearance is an expensive process. On small areas, say less than 2 hectares, hand clearance and mechanical methods cost similar amounts - around £10,000 – 15,000 per hectare. Surprisingly, mechanical methods cause less damage to the underlying peat layers because of the reduced tramping around and the ability of the machines to lift felled material clear, rather than dragging it across the ground. On larger areas, the mechanical methods prove more cost effective because mobilisation costs are spread more thinly.
- 5.2 Current BA funding streams are not sufficient to mount an effective clearance programme. However, it remains the case that the objectives exist within the Broads Plan and the Authority should be seeking ways to deliver them.

- 5.3 Recent work carried out under the Natural England initiative has demonstrated that projects of this nature can be funded and carried out successfully in compliance with the relevant UK and European laws and objectives.
- 5.4 Tree and scrub clearance is one of the few activities that will attract support from most groups of Broads stakeholders. Conservationists, navigators, anglers, rambblers, landscape artists and government departments with interests and duties in the area would all support an initiative to increase activity of this nature.
- 5.5 For effective development of a sustainable 'soft' edge to the waterway it is advisable to ensure that trees growing right on the bank of the river are removed completely (rather than just felled and stumps ground out) and the edge of the waterway should be re-profiled to a slope that will allow reed growth to re-establish for a width that will allow absorption of wave energy.
- 5.6 Once clearance has been carried out and the reedswamp species have re-colonised (possibly by means of replanting but usually as a natural result of the clearance work), it will be necessary to carry out maintenance work on a regular cycle to prevent resumed scrub incursion. Given suitable equipment and planning, this should not be impossible to achieve.
- 5.7 There would appear to be funding sources available for this sort of work. EU funds, Aggregates Levy and Landfill Tax seem the most likely but this is not an exhaustive list. Some of these sources can be accessed by statutory bodies, others by private organisations, community groups or charities. Geographical restrictions are placed on some funding streams so that funds available for work in one part of the Broads might not be available for similar work elsewhere. Recent government job creation initiatives emphasising "green" outcomes might be applicable.
- 5.8 In July 2005 the Authority published "River Corridor Tree and Scrub Management Guidance – A Guide for managers in the Broads" which provides quick reference to key relevant legislation, reasons for removal and retention of trees, best practice and case studies. The Authority has also published a pamphlet entitled "Broads Design & Management Information, Environment & Landscape. How do I plan and manage trees and scrub alongside rivers?"

6 Recent Developments

- 6.1 The Broads Society has decided to take an interest in this subject. On 15 May it organised a meeting at Horning Sailing Club to which it invited a wide range of people from all groups of Broads Stakeholders, together with Broads Authority members and staff, local politicians and technical experts. A trip on the river Bure between Horning and Salhouse allowed people to see sections of river bank that had been cleared by sailing club volunteers and other sections that had been cleared under the Natural England initiative. It was

possible to contrast these areas with those that remained overgrown. The effects on the landscape, navigation and wildlife were clearly visible.

- 6.2 A meeting held after the river trip identified wide support for the sort of clearance work that had been observed and discussed a number of possible sources and mechanisms for funding and carrying out the work. The Society will now seek to establish a steering group to take the project forward.

7 Recommendations to the Broads Authority

- 7.1 The Committee is invited to recommend to the Broads Authority that it should take a more pro-active role in delivering the 5-year priority objectives TR16 and TR17 in the Broads plan 2004.
- 7.2 The Committee is invited to recommend to the Broads Authority that it should ask staff to work in partnership with other interested parties to identify appropriate funding streams and mechanisms and facilitate the application of those funds to the purpose of clearing trees and scrub and the re-establishment of reeded ronds to appropriate sections of the waterways, providing practical help and assistance where necessary.
- 7.3 The Committee is invited to recommend to the Authority that any direct financial contribution from the Authority in support of this work should be drawn in appropriate proportions from the General Fund and the Navigation Account as the outcomes will support all three of the Authority's statutory objectives.

Background papers: Broads Plan 2004
River Corridor Tree and Scrub Management Guidance
Broads Design & Management Information

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