

NRA THAMES REGION:

AUDIT SURVEYS 1991/92

A report on the re-surveys of selected reaches of  
river following maintenance dredging.

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March 1992

ENVIRONMENT AGENCY



092271

## NRA THAMES REGION : AUDIT SURVEYS 1991/92

### Summary

Audit surveys have been carried out over the past two and a half years as part of an ongoing programme to assess the effectiveness of the river corridor survey in integrating wildlife and engineering requirements. During the 1991-92 programme a larger number of re-surveys has been carried out in order to assess the range of variation across the Thames Region and examine the number and variety of enhancement projects carried out as well as the conservation of existing features.

The selection of lengths of river for audit was made so that examples were taken from each of the three Areas within the Region and the sub-areas within them. The lengths also cover a range of river types and engineering problems. From a total of 113 river corridor surveys carried out between January 1989 and March 1991 twenty-nine stretches of river totalling 49km have been re-surveyed (See Appendix 1). This represents 22.5% of the length of watercourses for which river corridor surveys were carried out during that period.

The method of audit survey is described and some suggestions made for ways in which audit and river corridor surveys can be improved. Some of the most frequent problems encountered by operational staff in following the recommendations in the river corridor survey reports are:

- i) disagreement with landowners over recommended conservation or enhancement works;
- ii) additional work carried out by landowners on sections of main river or adjacent land;
- iii) insufficient detail on the working maps provided by the river corridor surveyor to allow particular plants or features to be identified on site, or to understand what is required.

Additional problems were created for the surveyor by an apparent lack of continuity in records of work carried out and the changeover of staffing and regional organisation in 1989/90. This meant that it was not always possible to find out why changes were made or certain recommendations not followed. Information on whether lengths were dredged or not and when and how the work was carried out was particularly difficult to obtain in the Lee Area.

The main conclusions from the audit are:

- a) there is a good approach to the retention of wildlife habitats and important features along the river corridor in all of the areas, with no significant difference between areas (see Table 1);
- b) the greatest success has been with retention of bank features such as cliffs and shallow banks and the retention of trees and shrubs on banks; the least success has been with gravel bed and shoals and marginal flora and fringes (see Table 2);
- c) although there are few enhancement recommendations made in the river corridor survey reports, there is a much lower take-up of these than the retention recommendations; there is some variation across the region; Lee Area scored lowest, but had the fewest enhancements recommended (see Table 1 and Appendix 3);
- d) the greatest response has been to construction of in-channel features such as berms and the least response, allowing for the number of times recommended, to pollarding and deepening in-channel pools (see Table 3).

## INTRODUCTION

Audit surveys in Thames Region are intended to assess:

- a) the habitats and features which are routinely safeguarded and those which are more vulnerable during maintenance dredging;
- b) the types of enhancement which are carried out and those which are not;
- c) any differences between the approach in different areas;
- d) the success or otherwise of the river corridor survey and working map approach and how well the maps are understood;
- e) any other problems which affect the retention and enhancement of wildlife during routine dredging operations.

The audits are not intended to be a check only on the machine operators, inspectors, or other operational and engineering staff, but also on conservation personnel. In addition, they provide a means of evaluating the methods used to assess and explain conservation aims and integrate them as far as possible with the engineering requirements.

## METHODOLOGY

The lengths of river re-surveyed are listed with the dates of river corridor surveys and audits in Appendix 1. Ideally an equal number of river lengths should be selected from each of the three areas, Upper Thames, Lower Thames and Lee Areas. The spread of reaches selected was the best which could be achieved given the number of jobs which had not been carried out or had only recently been completed. Additional audits were carried out by the Conservation Officer for the Lower Thames Area, but these have not been included in this analysis.

The re-surveys were executed by walking the river and over-marking the original river corridor survey dredging recommendations with current information, noting the features retained, lost or enhanced. Field sheets from the river corridor survey were also used where details of plant species or important features needed to be checked. Photographs were taken at the points used in the original survey, or at suitable locations where there was no previous photographic record. A visual assessment was made of the degree of success achieved (a) in retaining features and species highlighted in the original report and (b) of any enhancement works carried out.

Wherever possible, discussions were then held with the relevant Inspector or Supervisor to clarify any points about the way in which the works were executed, problems which may have arisen, the machine used and the timing of the jobs. With the re-organisation of staff and areas over the period of the study, it was not always possible to obtain this information.

A report has been written for each stretch, including a brief description of the site, dates of surveys, a summary of the maintenance operation and an appraisal of the effects of the work. A table has been drawn up for each audit, summarising the findings under three headings:-

- a) Bank and channel features
- b) Bank vegetation
- c) Channel vegetation

An example of an audit report is given in Appendix 2. Each line of the table at the back of the report covers one 500m length and the 0-5 scores are in percentage bands, as follows:

- 0 : No retention or enhancement carried out
- 1 : 1-20% of recommendations undertaken
- 2 : 21-40% " " "
- 3 : 41-60% " " "
- 4 : 61-80% " " "
- 5 : 81-100% " " "

N/A or Not Applicable means that there were no recommendations for enhancement on that 500m length. RET. stands for Retention and ENH. for Enhancement.

**RESULTS**

For each survey average scores have been calculated down the columns. The average scores for all of the audit surveys within each area have been drawn together in a single table. These three tables are shown in Appendix 3. The percentage scores and abbreviations are as above, with one modification. The enhancement columns may show both a score and NA; for example 0/NA. where recommended enhancements were not carried out in one length (0) and no enhancements were recommended in another length (NA).

An overall average score for each area is given along the bottom line of each of the three tables and these have been abstracted below.

**Table 1. Average Scores for Retention and Enhancement**

Area	Bank & Channel Features		Bank Vegetation		Channel Vegetation		No. Surveys	Km.
	RET	ENH	RET	ENH	RET	ENH		
Upper Thames	4.88	1.61	4.75	1.27	4.62	5.00	13	28.5
Lower Thames	4.87	3.00	4.57	2.87	4.32	1.50	9	6.0
Lee	4.79	1.50	4.04	0	4.46	0	7	14.0

Taking into account the difference in the number of surveys and lengths of river audited, there is no significant difference between the areas for retention. Upper Thames scores highest for retention of existing features in all three categories, Bank and Channel Features, Bank Vegetation and Channel Vegetation, and the Lee Area scores the lowest. The scores for enhancements are more variable but lowest in the Lee area. However, there were fewer enhancements recommended in the Lee Area. More detail on the retention and enhancement of different features is given below.

**1 Habitat Retention**

The overall retention of existing features and habitats has been good. The individual features are discussed below under the categories Bank Features, Channel Features, Bank Vegetation and Channel Vegetation, following the general format of the tables.

## 1.1 Bank Features

### **Shelves and Shallow Banks**

A good percentage of the identified features have been retained. Banks have been left untouched in the majority of dredging operations, apart from some scraping and spoil spillage (see also Bank Vegetation). There has been some loss of riparian flora on one river (UT) where spoil was spread on shelves which should have been left untouched. In this case it was unfortunate as the rest of the operation was carried out with great sensitivity. On another site (Lee) a shallow bank with a rich marsh flora on the bank has been destroyed as the result of trampling by fishermen. However, if the dredging had been carried out as recommended the bank would not have been used by fishermen and the rich flora would have been untouched.

### **Cliffs**

Few cliffs were noted on the surveys, but where these are present they have been left untouched. Occasionally fallen trees provide suitable cliff-like structures on the upturned root ball and these have been retained where recommended.

## 1.2 Channel Features

### **Runs, Riffles and Gravel Beds**

There has been a fairly good retention of these features overall. One riffle section was removed where the bed had to be lowered to prevent flooding (LT). There are cases where gravel has been removed, but only in small quantities and mixed with silt. The exception is one length where a shallow gravel bed was dredged against recommendations, but as this was only a light dredge the characteristics and flora of the bed have not been significantly altered (LT).

Removal of marginal shoals of silt and vegetation coupled with low flows has resulted in silting over of gravel in three cases (LT,UT). Low flow, poor water quality and public misuse has resulted in an algal/bacterial overgrowth of gravel and excess of rubbish on the bed of another river (Lee). Scour under a bridge has removed a gravel riffle. This is a dynamic habitat and other small changes in location and extent of features have occurred naturally.

### **In-Channel Pools**

Existing pools have generally been retained, although some silting up of pools has occurred where there was no recommendation to deepen, or deepening has not been carried out (all areas).

## 1.3 Bank Vegetation

### **Herbaceous Plants**

Only a few of the rivers audited had sections with a particularly rich bank flora. The banks have been left largely untouched and so existing bank floras have been retained over the majority of the lengths. Losses have occurred where spoil has been spilt accidentally, spread on the bank in small areas (UT, LT) or spread close to the top of the bank and then either spilt or been pushed by stock down the bank face (Lee, UT). Short sections of bank has been scraped, particularly on narrow watercourses where access is difficult. Small marshy hollows along the working bank were filled in at the request of the landowner on one reach (UT).

On a few rivers spoil has fallen over some sections of bank due to the farmer ploughing very close to the top of the bank and in another case (UT) the landowner has built the banks up by some 2m in places and re-seeded with rye-grass. Damage has also been caused by landowners carrying out dredging and spreading spoil on the banks. (LT, UT)

### **Trees and Shrubs**

A great deal of care has been taken in all the areas to work round trees and shrubs. There has been the loss of a strip of trees along one bank for access (Lee), a proposal agreed with the Conservation Officer after the river corridor survey, and limited coppicing of shrubs in all areas where necessary. The recommendation to retain low branches for birds is not always carried out, even when there are suitable branches which would not cause obstruction to flow. This may be because leaving low branches has been viewed as an "untidy" working practice.

### **Adjacent Habitats**

Almost without exception good wildlife habitats identified in the river corridor surveys have been avoided by machines or spoil, apart from the agreed bankside areas. There has been the loss of one small area of marshy vegetation (Lee) due to pool creation and the loss of a short strip of richer grassland (UT) due to spoil spreading. Other losses have been due to works carried out directly by landowners or others such as the highway authority. Woodland habitats and areas of scrub have been left untouched, except where agreed for access or tree management.

## **1.4 Channel Vegetation**

The recommendations in a number of the river corridor survey reports include leaving an undredged strip along one or both sides of the channel to retain both aquatic and marginal floras. This has been carried out in most of the wider rivers in all three areas with success, retaining specific plants such as reed, rich fringes or beds of aquatic plants. However, a few of the wider reaches in all areas have been dredged in such a way that a large percentage of the aquatic and marginal vegetation has been removed on one or more lengths. The reasons include landowners requesting this, work carried out subsequently by landowners and the attitude or approach adopted by the machine driver. In one case extensive removal of marginal fringes in the central reach has resulted in siltation of the channel and development of stands of emergents in the middle of the river (LT). This contrasts with the upstream and downstream reaches of the same river where there are good fringes and a central, open channel.

In three of the audits of wider watercourses (UT, LT) too much emergent vegetation has been left and there has been a significant re-growth of stands in the centre of the channel. This is unfortunate since particular care was taken by the machine drivers to retain the marginal and aquatic flora. In one case he had attempted to create a sinuous dredged channel, as requested, which has had the effect of further reducing the flow and speeding up the siltation process. This problem of siltation in many rivers across the region has been exacerbated by recent dry summers and low flows.

Smaller watercourses where there is a limited flow present a greater problem in achieving a balance between maintaining an adequate channel and retaining the variety of riparian plant species and the habitat they provide for aquatic animals. There has been a mixed response to the recommendation to leave a narrow strip undredged in such channels. In a number of cases this has been done with success. However, some of the watercourses surveyed have so little flow that the re-growth of vegetation has completely filled the channel. Small clumps of marginal plants, rather than a complete fringe, have been retained in several other sections. This can be an acceptable solution, but may need a more detailed identification and marking of key plants by the surveyor.

A few reaches where rich beds of aquatic plants or good stands of plants such as water-crowfoot were highlighted have been left undredged so that these important features have been retained. Where gravel beds have been lightly scraped to remove silt there has generally been a good recovery of the aquatic plants such as Starwort. Some losses of aquatic flora have occurred, but the reasons are not always clear. In other cases the removal of dense emergent vegetation has

had the beneficial effect of allowing smaller aquatic plants to become established (UT) or spread.

Individual stands or fringes of certain species were noted in many of the river corridor surveys. Most have been retained by leaving undredged areas, retaining a proportion of stands such as reed or by working round individual clumps where they could be identified on site. Losses have occurred where the channel has been dredged across the width (UT) or the plant species could not be seen or identified by the engineers. In other cases the audit survey was carried out too early in the year to be able to see whether particular species such as water plantain were still present.

**Table 2. Summary of Retention of Features and Habitats**

Feature or Habitat	Occasions Retained	Occasions Not Retained	Percent Retained
<b>1. Bank Features</b>			
1.1 Shelves and Shallow Banks	18	3	86%
1.2 Cliffs	3	0	100%
<b>2. Channel Features</b>			
2.1 Runs and Riffles	6	3	67%
2.2 Gravel Bed and Shoals	10	6	62.5%
<b>3. Bank Vegetation</b>			
3.1 Herbaceous General	16	12	57%
3.2 Key Stands	11	5	69%
3.3 Trees and Shrubs	21	2	91%
3.4 Low Branches	14	6	70%
3.5 Adjacent Habitats	13	3	81%
<b>4. Channel Vegetation</b>			
4.1 Marginal Flora and Fringes	25	15	62.5%
4.2 Aquatic Flora	14	4	78%

["Occasions" is equivalent to the number of surveys; i.e. if on one survey both damaged and undamaged cliffs were noted this would give a score of 1 in both columns "Retained" and "Not Retained", regardless of how many cliffs there were on that stretch.]

**Summary of Reasons For Loss or Partial Loss of Identified Features**

- a) Additional work by landowners, including dredging and spoil spreading on the banks, seeding with rye-grass, tree-felling, mowing, removal of emergent vegetation.
- b) Spoil spread on shelves or areas of bank.
- c) Heavy poaching and grazing of banks and margins.
- d) Overspill of soil where ploughed close to bank.
- e) Bank scraped due to narrowness of channel.
- f) Loss of marshy bank flora due to trampling by fishermen.
- g) Marshy hollows on bank filled in at request of landowner to facilitate access for fishermen.
- h) Loss of trees and shrubs due to vandalism.

- i) Spoil spread on areas of adjacent land with richer flora due to difficult access and cost/time to remove off-site.
- j) Silt settling over exposed gravel; removal of marginal shoals effectively widened the bed and reduce flow velocity.
- k) Gravel shallow deepened to prevent flooding of adjacent land.
- l) Natural scour and movement gravels.
- m) Wide fringes not retained as extra channel width required for flood flows.
- n) Excessive removal of water-cress fringes, possibly at request of fishermen.
- o) Objection by landowner to retention of wide fringes, so width of fringe and some species lost.
- p) Total removal of wide stand of emergents for fishermen under advice from outside ecologist.
- q) Excessive removal of fringing emergent vegetation by machine driver, no reason given.
- r) Migration of fringing bur-reed into channel centre, either through slippage of retained silt/plant margin or through spreading into shallow channel and drying out on margin.
- s) Loss of water-lily bed due to use of too large a machine in a narrow channel.
- t) Not possible to locate plant or patch of vegetation on summary map, either due to season or to insufficient detail or clarity on map.

## 2. Enhancements

There has generally been a low uptake of suggested enhancements, except where it has been possible to have a greater involvement of conservation staff on site to outline and discuss proposals and potential problems. However, a variety of schemes have been undertaken throughout the region.

### 2.1 Bank Features

A good low shelf, near to normal water level, has been created by re-profiling an existing bank(LT). The shelf is some 40m long and 1m wide and has been spread with spoil from the channel, encouraging the development of a mixed riparian flora. This has already become a good wetland feature.

Creation of a low berm within the channel, to reduce channel width and provide a shelf or berm for wetland plants, has been carried out in three cases (UT, LT). One was subsequently damaged by the landowner who filled in the berm, creating a dry bank. The second is becoming colonised with willow and sedge, but as insufficient silt was available to fill to the level of the Nicospan the material and posts are exposed. The third has been spread with spoil and some wetland/riparian species are established, although the flora has been limited by the poor flora in the adjacent watercourse.

### 2.2 Channel Features

Spreading gravel or stone in the channel to reduce the depth of a previously over deepened reach (UT); insufficient ballast was available on site to raise the bed as much as would be desirable, although there has been some improvement.

Gravel was spread along the margin to narrow and over-wide channel, creating a faster flow along the centre in places, greater depth variation and more open water (UT). However, the cress margins have again encroached extensively and the gravel has been stacked high against the bank, involving some loss of rich bank flora.

There has been successful re-creation of a small island by digging out a silted channel (Lee).

Nicospan groynes were used to vary the pattern of flow and depth characteristics, but were ineffective due to insufficient flow. The choice of material is also unattractive (LT).



Good in-channel pools have been created for fish in one river by deepening the bed during dredging (Lee). Pools dug in meanders on another river (UT) were probably too small and have silted up. The machine on site for the dredging was not good for such digging work.

Construction of a weir to direct more flow around a backwater has been successful without damaging the main channel. However, the weir has allowed children access to a previously secluded island (LT).

### **2.3 Bank Vegetation**

Sedge spoil spread on impoverished areas of bank have become established (UT,LT)

Some pollarded willow on one operation (LT) were burnt due to careless burning of brash. Otherwise pollarding has been very beneficial. More pollarding was recommended than was carried out and on some schemes none of the pollarding was carried out. There is also a tendency to part pollard, cutting only the overhanging branches (UT) rather than carrying out a proper pollarding operation.

Lifting and replanting of three hawthorns was 100% successful, although one was later vandalised (LT).

Tree-planting in meanders and other areas has been carried out on a small scale, with success, although, again, more was recommended than carried out, but this is often due to the time of year when the dredging is carried out.

To avoid burning of brash, timber has been stacked in two cases (Lee, LT) as recommended.

Adjacent damp hollows have been deepened to create pools in four cases, all of which have been successful. Vegetation has been planted around the margins where necessary in two of these, providing a varied flora.

### **2.4 Channel Vegetation**

Lifting sedge from the centre of channel and replanting to form new fringe or extend an existing fringe has been carried out in three cases (UT). In two cases the fringe is already well established after some 10/11 months. In the third the sedge has formed good clumps but is as yet discontinuous.

Removal of dense emergents in the centre of the channel has increased diversity of aquatic flora or improved the beds of water-crowfoot and other smaller aquatic plants (UT).

Clearing the centre of the channel only, leaving the margins undredged, has created self-cleansing channel with exposed gravel bed (UT).

### **Enhancements Not Carried Out and Reasons**

- a) Section not dredged therefore enhancements not carried out.
- b) Creation of pools by widening and deepening in meanders not agreeable to landowner.
- c) In-channel pools not dug, no reason given.
- d) Creation of shallow bay in old stock drinking bay not carried out, no reason given.
- e) Two-stage channel not created, possibly because channel narrow and silt very soft.
- f) In-channel pool not deepened.
- g) Creation of shelves not acceptable to landowner.

- h) Shelf not created as trees planted close to bank by landowner.
- i) Planting of marginal vegetation along bare bank not acceptable to landowner.
- j) Wildflower seed mix not used as area proposed for car park.
- k) Tree planting not carried out as not agreeable to landowner.
- l) Tree planting not carried out due to limited budget.
- m) Tree planting not carried out due to time of year maintenance work carried out.
- n) Disagreement over policy with regard to NRA carrying out pollarding.
- o) Pollarding not carried out due to lack of time, but intention to return to carry out expressed.
- p) Pollarding or coppicing not carried out, no reason given.
- q) Lack of understanding of work required.

**Table 3. Summary of Enhancements**

Type of Enhancement	Enhanced	Not Enhanced	Percent Executed
<b>1. Bank Features</b>			
1.1 Shelf Creation/Lowering	2	4	33%
<b>2. Channel Features</b>			
2.1 Reduce Overdeep Channel	1	0	100%
2.2 Reduce Overwide Channel by Construction of Berm	4	0	100%
2.3 Construct 2-stage Channel	0	1	0%
2.4 Construct Weirs, Groynes	2	0	100%
2.5 Deepen/Create In-Channel Pools	2	6	25%
2.6 Recreate Island	1	0	100%
<b>3. Bank Vegetation</b>			
3.1 Spread Sedge Spoil	1	1	50%
3.2 Use Wildflower Seed Mix	0	1	0%
3.3 Pollard/Coppice Willows	8	12	40%
3.4 Tree Planting/Moving	4	3	57%
3.5 Stack Timber, Not Burn	2	0	100%
3.6 Dig New Pools on Adjacent Land	5	2	71%
<b>4. Channel Vegetation</b>			
4.1 Transplant Vegetation	3	4	43%

[These figures refer to the number of occasions when each enhancement was recommended; e.g. shelf creation or lowering was recommended in 6 river corridor survey reports, but only carried out on 2 rivers.]

## DISCUSSION

### **1. Methods**

It was intended that audit surveys should be carried out approximately one year after the river corridor survey, but this has not always been possible. Where one or both surveys were conducted in the winter the identification of certain plant species is impossible. An audit survey soon after completion of the dredging would enable the surveyor to see clearly which recommendations had been followed and how any enhancements had been carried out, although the success of those enhancements could not be fully evaluated. Audits carried out some twelve months after dredging allow a better assessment of the success of the work and the recovery of the river flora, but the extent to which the recommendations were followed can be obscured by vegetation and other changes such as flood damage, poaching by stock or work carried out by landowners. For most maintenance operations an audit twelve months later is a good compromise, but for important schemes, such as those where there are major enhancement projects, two surveys would be preferable, with the first immediately after the work is completed.

The tables of results used in audit reports have been simplified into three categories: Bank and Channel Features, Bank Vegetation and Channel Vegetation. This means that the report is concise and gives an overall picture which is easily and quickly interpreted. However, by combining such features as Bank Flora, Trees and Shrubs and Adjacent Habitats in one category, some detail is obscured. It is valuable to be able to identify which features are retained most often, which enhancements are most and least likely to be adopted. This information is very useful in targeting future work. It can be extracted from the reports to prepare summaries such as those in Tables 2 and 3, although this is a slow process. A check list of main features, habitats and the most common enhancements could be prepared. At the time of preparation of the report this list could be checked and marked according to whether retention or enhancement had occurred or not, leaving blank the items not applicable to the particular survey. (See Appendix 4.) This would simplify the analysis at the end of the year without adding great bulk to the individual reports.

The ability to locate on site the features and species marked on the river corridor survey maps is particularly important. The maps are not always detailed enough to allow another person to visit a reach and identify features highlighted in the reports, especially a non-botanist. The use of hand drawn field sheets scaled up from 1:10,000 O.S. maps introduces errors; 1:2,500 base maps would be useful, where these are available. More attention should be paid by the surveyor to marking fences, conspicuous trees or other features with greater accuracy, especially where these are related to important recommendations in the report. However, on some reaches there are few features to record and it can be a problem to know how to identify important locations. The working maps are simplified and coloured versions of the dredging recommendations maps. When read in isolation from the original report they can be too simplified to interpret easily. They should contain more detail to facilitate location of key features as above, as well as showing reach marks where these are known. In addition, important species or features, such as a rich wetland flora on a shelf or berm, may need to be either marked out on site or discussed on site with the operational staff.

The audit survey methodology provides insufficient detail to allow a quantitative evaluation or appraisal of the maintenance work. Scoring of enhancements, particularly, would be difficult, given the range of recommendations from construction of in-stream berms to stacking of cut timber. However, with constraints of time and the number of schemes which need to be surveyed, the current method allows a qualitative assessment which adequately identifies problems and describes achievements.

### **2. Records and Liaison**

Records of work carried out, timings, machines and other details have been difficult to obtain, particularly in the Lee Area where the selection of sites to audit was hampered by lack of information on whether sections had been dredged or not. Some recent improvements and

computerisation of records in the Lower Thames Area should assist future audit survey work and it is hoped similar improvements can be made in the Upper Thames and Lee Areas. Future audit surveys should aim to give a better spread of surveys across the region.

On some projects there has been insufficient discussion between Inspectors and either the river corridor surveyor or the Conservation Officer, partly due to lack of staff time. Re-scheduling of programmes is a frequent problem. This may mean a rapid response by the surveyor is required and is not always possible. Ideally each river corridor survey report should be discussed on site, except, perhaps, for the most minor watercourses or works. This situation should improve now that there are Conservation Officers to cover each Area within Thames Region. Liaison between conservation and operational staff is an essential part of the process of achieving a balance between engineering and conservation requirements. Where there are disagreements, or the river corridor survey is not clear it is essential that further discussion and, wherever possible, site visits are made. Liaison and feedback have been poorest in the Lee Area, particularly in the case where conservation advice obtained from outside differed from that inside the NRA and this was not referred back to the NRA Conservation Officer. Whenever it is not possible to follow conservation advice, for whatever reason, there should be further discussion with the Conservation Officers before the work takes place.

### **3. Results and Comparisons Between Areas**

The overall retention of features and habitats of nature conservation value has been high, but implementation of enhancement recommendations has been much lower in all areas within the Thames Region. This general trend is one which has been reported previously in different regions of the NRA. Whilst the degree to which conservation requirements are taken into account has improved in recent years, it seems that enhancements have yet to be accepted as a part of routine maintenance work.

Differences between the three areas are not marked in the rivers and reaches covered by this report. Upper Thames scores highest for both retention of existing features and enhancements overall. The Lee Area scores lowest in both cases, but particularly for enhancements. However, the scores are biased by the different number and length of surveys carried out in each area and the low number of enhancements recommended, particularly in the Lee Area. There is no clear difference between areas in relationship to the presence or absence of an Area Conservation Officer. In the Upper Thames area all the sections were surveyed and dredged before a Conservation Officer was appointed, but this is the highest scoring area. In Lower Thames all surveys except one were carried out after a Conservation Officer was in post. In the Lee Area one survey was conducted after the appointment of a Conservation Officer and one other scheme had his input between survey and dredging. Site liaison was carried out in all areas on a number of schemes by the former Conservation Officers Alastair Driver and John Hogger, making the distinction between works undertaken with and without on-site conservation advice difficult. However, the impression gained is that the greatest care has been taken in the Upper Thames Area where there are several very conservation conscious Inspectors and Supervisors. In the Lee Area feedback and liaison has been poor and the overall level of conservation work disappointing. Lower Thames Area has carried out several good schemes where there has been detailed input from the Conservation Officer or the Assistant Flood Defence Engineer.

As far as the retention of habitats is concerned there has been a considerable improvement in recent years. Gone are the days when a dredging operation might have consisted of a tidy, bank-to-bank removal of all irregularities such as vegetation! Nevertheless, the desire for tidiness would appear to be still influencing the trimming of trees and shrubs and there are cases in all areas where "siding up" has included the removal of low branches which were not causing an obstruction and could have been retained.

The retention of fringes and key marginal plants could be improved, as Table 2 shows. This is due partly to inadequate mapping or indication of the location of key species and fringes by the surveyor, as well as a variety of engineering and landowner problems. It is also felt that there is a need to

explain the difference between the rapid re-colonisation by vigorous plants such as fool's watercress, giving the appearance that the channel vegetation has recovered, and the retention of a more diverse flora of less vigorous species. Once removed, the later can be swamped by the rapid colonisers to the overall detriment of the habitat, and yet to the uninitiated eye there would seem to be full recovery. This can mean that more vegetation is removed than recommended in the belief that there will soon be a "greening over" of the dredged areas. The time needed to locate and work round particular plant can also be a limiting factor to the machine operator.

In a few cases, however, the machine operator has been so careful to retain channel vegetation that the amount of re-growth which has occurred may necessitate further dredging. This problem has been exacerbated by the present run of dry summers and low river flows. These factors have also contributed to the silting over of gravel beds and riffles where channels have been overwidened by excessive removal of marginal vegetation. Achieving the right balance between retention and removal of fringes is difficult and affected by a number of unknown factors including future weather. As some of the most invasive plants such as bur-reed and bulrush can grow in depths of 1m. and more in slack conditions, the depth/flow relationship and the amount of shade over the channel need to be considered carefully.

Damage to the bank flora occurred on small sections of 43% of the rivers surveyed. Some damage through accidental spillage or scraping is unavoidable, particularly on narrow watercourses or where access is restricted. The score is also influenced by damage caused by stock and work by the landowners, so this is not a true reflection of the impact of the dredging operation. However, there is clearly a need for the surveyor to highlight key areas of bank so that greater care can be taken when working on these sections. This has been done in most cases, but there are some general recommendations to "retain the bank flora" where more detailed and helpful specifications could be given.

Problems caused by landowners include disagreement over working practice, refusal to allow enhancements to be carried out an dredging or other works along the river corridor. Whereas the operational staff may be keen to carry out conservation works they may be prevented from doing so by the landowner or tenant and this should be born in mind when evaluating the response to river corridor survey reports. The number of occasions when this occurs could be reduced by increased contact between conservation staff and the landowners, explaining the reasons for and benefits of conservation measures. This role has been taken on to some extent by a few of the operational Inspectors, notably in Upper Thames where there has been a higher percentage success in retention and enhancement work over the period under study.

APPENDIX 1

NRA THAMES REGION: AUDIT SURVEYS 1991/92

		<u>Date of Survey :</u>			
	<u>Km.</u>	<u>River Corridor</u>	<u>Audit</u>	<u>Date Dredged</u>	
<b>A. <u>Upper Thames Area:</u></b>					
<b>Wychwood</b>					
1	River Cherwell, Somerton	1.5	15.6.90	25.7.91	Autumn 90
2	Marston Brook, Oxford	1.0	16.10.90	21.1.92	April 91
3	Filchampstead Brook	1.5	19.3.91	10.3.92	April 91
<b>Bernwood</b>					
4	Sedrup Brook, Aylesbury	2.5	6.9.89	21.1.92	Summer 91
<b>Thameshead</b>					
5	Radcot Cut	4.0	10.4.90	25.2.92	Sept- 90
6	Great Brook and Burroway Brook	2.5	6.12.90	17.1.92	Dec 90-Feb 91
<b>Kennet</b>					
7	Ginge Brook, Steventon	3.5	22.11.90	17.2.92	Spring 91
8	Reading Ditches	6.0	1.5.90	21.2.92	Winter 90
9	River Kennet, Axford	1.0	25.10.89	27.11.90	Winter 89
10	River Dun, Hungerford	0.5	28.11.90	17.1.92	May 90
11	River Lambourn, Elton Farm, Weston	0.5	21.11.89	10.10.91	Jan/Feb 90
12	River Lambourn, Boxford Mill Stream	0.5	21.11.89	10.10.91	Jan/Feb 90
13	Aldermaston Ditch and Wasing Stream	4.5	11.5.89	21.10.91	Spring 90

		<u>Date of Survey:</u>			
		<u>Km.</u>	<u>River Corridor</u>	<u>Audit</u>	<u>Date Dredged</u>
<b>B. Lower Thames Area:</b>					
<b>North</b>					
1	White Brook (1) & (2)	5.0	17.7.89	30.1.92	Summer 90
2	Colne Brook, Horton	2.0	27.3.90	5.2.92	Summer 90
3	Roundmoor Ditch	1.0	3.5.90	8.10.91	Sept-Oct 90
4	Frays River, Little Britain	0.5	18.7.90	24.10.91	18.3-1.5.91
5	River Ash, Staines (1)	1.5	5.10.90	24.10.91	Jan/Feb 91
<b>West</b>					
6	Barkham Brook (2)	0.5	2.4.90	27.9.91	April 90
<b>East</b>					
7	West Clandon Stream	1.0	5.12.89	26.9.91	Apr-Jul 90
8	Hoe Stream, Pyrford	1.0	9.10.90	26.9.91	Winter 90
9	Runtleywood Ditches	1.5	30.1.90	1.3.91	Summer 90

		<u>Date of Survey:</u>			
		<u>Km.</u>	<u>River Corridor</u>	<u>Audit</u>	<u>Date Dredged</u>
<b>C. Lee Area:</b>					
<b>North</b>					
1	Harlowbury Brook, Old Harlow	0.5	17.7.90	7.1.92	Jan 91
2	Pincey Brook, Old Harlow	0.5	17.7.90	7.1.92	Jan 91
3	Spellbrook, Three Horseshoes	0.5	14.11.90	7.1.92	?
<b>West</b>					
4	River Colne, Tolpits Lane	1.0	6.7.89	5.2.92	Oct 89 u/s end Jun 91 d/s end
<b>East</b>					
5	Turkey Brook, Enfield	1.0	19.5.90	2.1.92	?
6	Salmon's Brook, Enfield	1.0	29.5.90	2.1.92	?
7	Broxbourne Mill Stream	1.0	9.11.89	7.1.92	?



## APPENDIX 2

### EXAMPLE OF AUDIT REPORT

#### FILCHAMPSTEAD BROOK, FARMOOR RESERVOIR

##### i) Site Description

On the right bank there is a road verge and a strip of semi-improved grassland with tall hedgerows and patches of scrub. At the upstream end a narrow strip of richer grassland was noted on the road verge. The land along the left bank includes a berm which is used for disposal of spoil from Filchampstead Brook. This is generally enriched, but there is a damp patch with brooklime and hard rush at the downstream end of length 2.

The left bank is fairly high and uniform with small areas with lower and shallower slopes. The right bank is high and fairly uniform in parts of lengths 1 and 2 and low and shallow in length 3. Some sections of bank were noted for large patches of meadow-sweet and other herbs.

There is a good cover of trees and shrubs in this section, particularly at the downstream end on the right bank where there is a strip of tall willow scrub. A number of the coppiced willow bushes are splitting and require re-coppicing.

The margins are shallow, with well developed fringes of vegetation, including good stands of sedge, yellow flag and great water dock.

This section of the brook normally has little flow as there is only a small fall in land height down to the River Thames. The bed is silty and there were dense stands of branched bur-reed noted in places.

##### ii) Dates of Survey

River Corridor Survey - 19.3.91  
Audit Survey - 10.3.92

##### iii) Maintenance Summary

Work was carried out in April 1991 with a JCB 814. Silt and emergent vegetation was removed and some coppicing carried out. Prior to the dredging a block of trees and shrubs were planted near to the right bank in lengths 1 and 2 by Thames Water.

##### iv) Effects of Work

Retention of fringing vegetation has been good overall and the identified stands of water-cress, sedge and water dock have been retained. Where some sedge was growing in the middle of the channel it was lifted and planted on the margin, extending the fringe along the right bank.

No low shelves have been created on the right bank. The tree planting referred to above restricted access and spoil disposal in the area marked for the large shelf in lengths 1/2. The small shelf in length 3 was not created because of a lack of understanding about what work was required. From the comments received from the Supervisor it seems that attempts were made to

construct a shelf in the channel rather than on the bank, but the silt was too soft to support this. It was suggested that these shelves were planted up with sedge and other plants from the channel and opposite bank where vegetation would be lost due to the dredging.

The work has been carried out with care to avoid damage to the banks and the rich areas of flora have been retained. However, the strip of richer grassland adjacent to the right bank at the upstream end has been buried under spoil. It was not possible to reach over the hedge to spread the spoil alongside the road, but there was no reason given why the work was not carried out from the left bank. The small area of marshy ground on the left in length 2 has also been buried rather than used to plant up a shelf.

Care has been taken to minimise lopping and some low branches have been retained. The importance of these was evident as they were in use by fishing kingfisher on the day of the audit. Some of the willows identified for re-coppicing have been coppiced and some left. Several other trees have been coppiced instead, creating a mixture of ages of regrowth along the brook.

A strip of trees and shrubs has been planted adjacent to the right bank in lengths 1 and 2, using mostly native species. This was carried out by Thames Water and the trees had already been planted by the time the dredging work commenced. It was not in the original recommendations and resulted in the shelf creation being abandoned. Whilst it is an enhancement of the river corridor, it would have been preferable if the trees had been planted on the left bank to allow the shelf to be constructed.

FILCHAMPSTEAD BROOK

DREDGING RECOMMENDATIONS ①

⊙ but see below  
 Coppiced outer branches only  
 Coppice willows; use stakes to enhance bank planting on left → to right  
 Narrow fringe in places

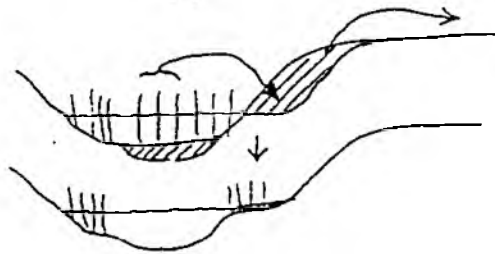
Uprick round trees & shrubs as much as possible & retain shade & some low branches  
 Yes, & in use by Kingfisher

Retain water-cross margins Yes

Leave a min. a 0.5m wide fringe on margins throughout, at least on non-working bank  
 Fringes & bank flares left.

Sods coppiced

No shelf-tree planting instead  
 Cut a low shelf at normal water-level, 0.5m wide min., 10m+ long if possible, & plant with some of sedge from channel



new pipe

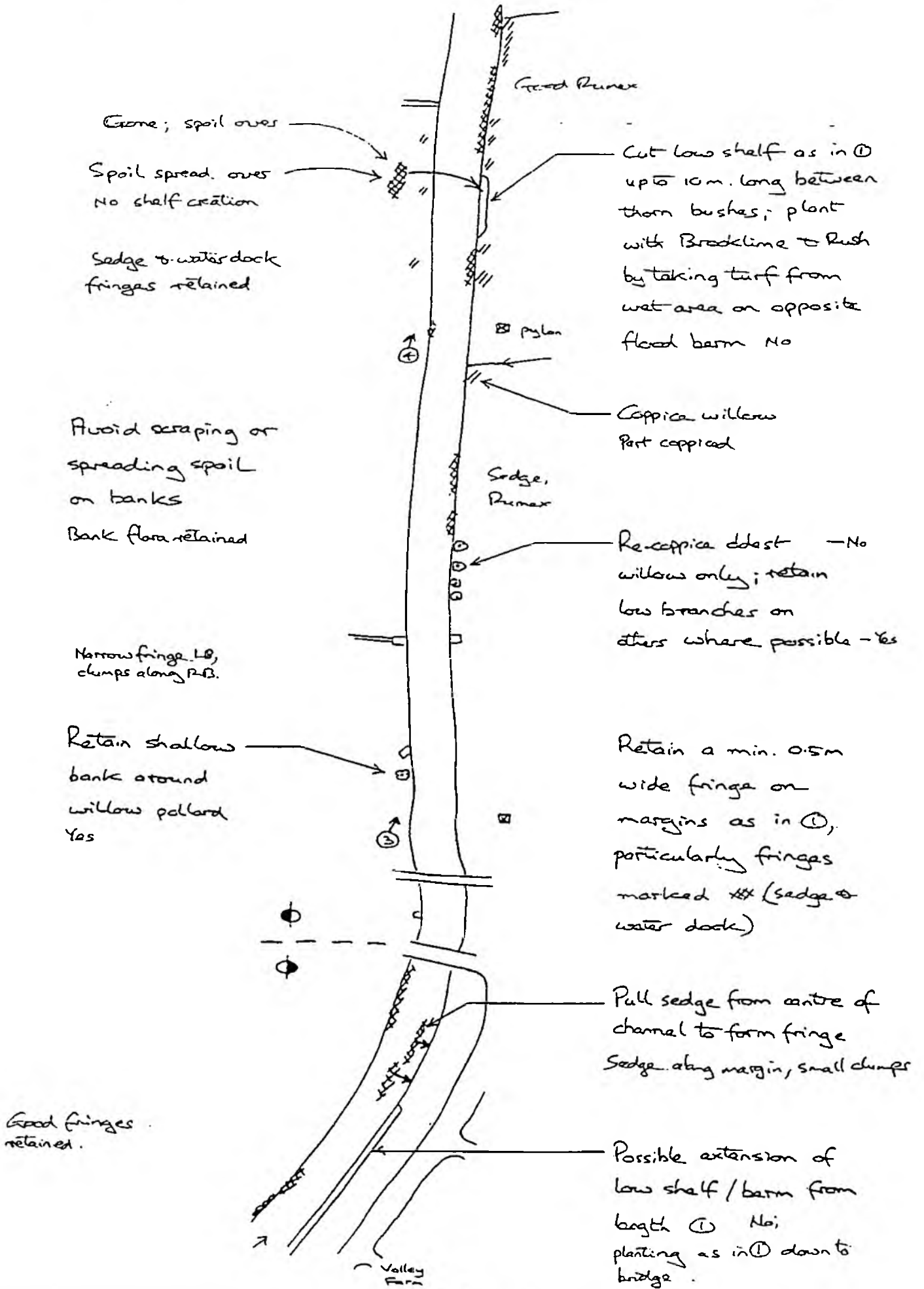
Toe of both banks scraped

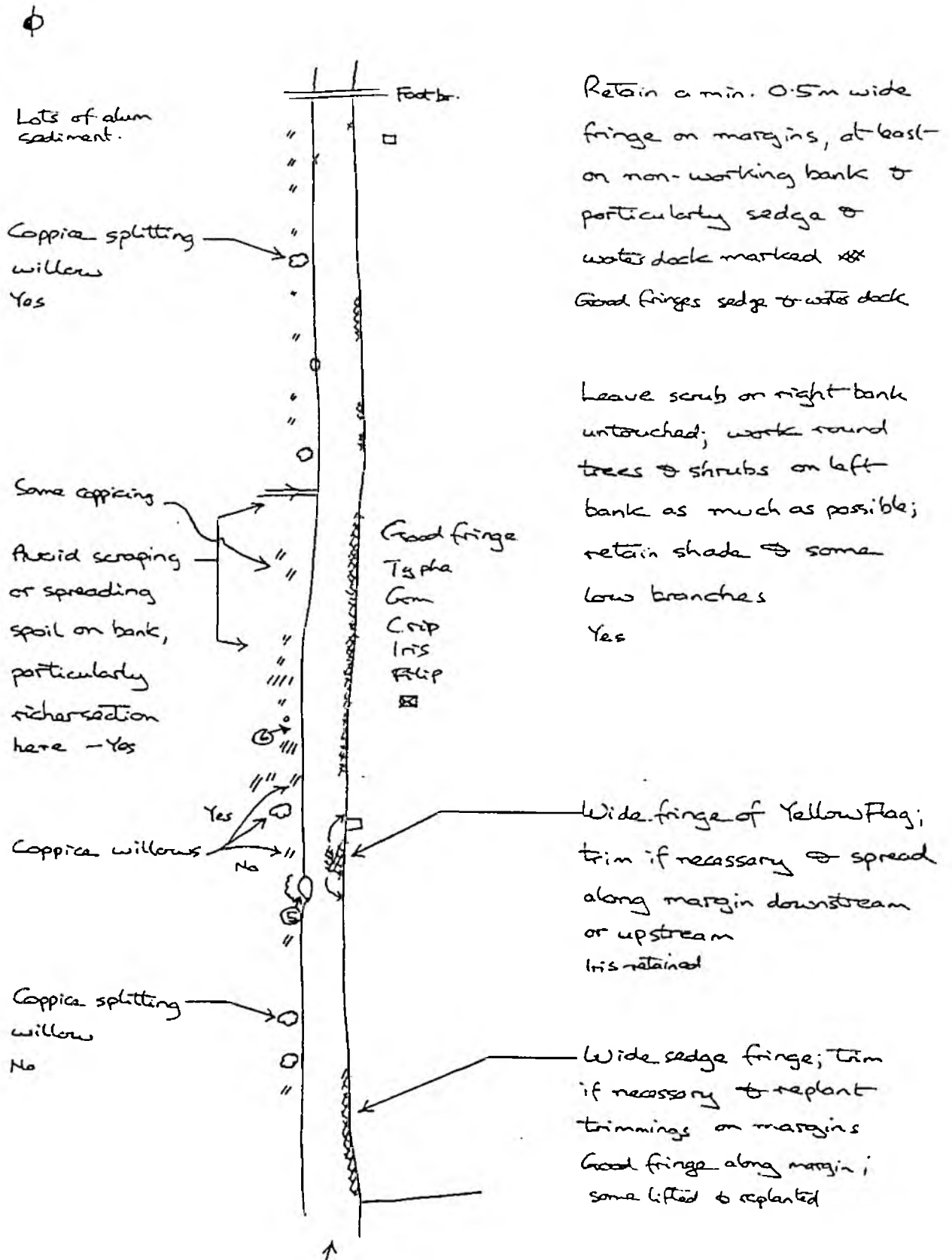
Re-coppice split willow  
 Several willows coppiced

- Spoil spread between hedge & brook  
 Avoid spreading spoil on verge between bank top & hedge, or on bank; either :-
- 1) work from left bank & spread spoil on left;
  - 2) spread spoil between hedge & road, >3m from top of bank;
  - 3) remove spoil to dispose elsewhere

FILCHAMPSTEAD BROOK

DREDGING RECOMMENDATIONS ②





FILCHAMPSTEAD Brook.

SURVEY SECTION	BANK AND CHANNEL FEATURES		BANK VEGETATION		CHANNEL VEGETATION		COMMENTS
	RET.	ENH.	RET.	ENH.	RET.	ENH.	
1	5	0	4	3	5	NA	No shelf creation or planting with sedge; shrub/ tree-planting instead; coppiced willows good; Top of bank - loss of richer area of grassland
2	5	0	5	3	5	NA	No shelf - treeplanting instead as ① Good fringes to bank flora, but loss of small marshy area due to spoil;
3	5	NA	5	5	5	5	Coppicing willows good; Good fringes to bank flora, including lifting & replanting sedge along margin

<u>KEY</u>					
RET :	Retention	0 :	No retention or enhancement carried out	3 :	41 - 60% Recommendations undertaken
ENH :	Enhancement	1 :	1 - 20% Recommendations undertaken	4 :	61 - 80% " "
N/A :	Not applicable	2 :	21 - 40% " "	5 :	81 - 100% " "

APPENDIX 3

Average Scores : Upper Thames Area

SURVEY SECTION	BANK AND CHANNEL FEATURES		BANK VEGETATION		CHANNEL VEGETATION		COMMENTS
	RET.	ENH.	RET.	ENH.	RET.	ENH.	
Km							
<u>Wyckwood</u>							
1. R. Charwell, Somerton	5	0/NA	4.67	0/NA	5	NA	1.5
2. Marston Brook, Oxford	5	0/NA	5	NA	4.5	5/NA	1.0
3. Filchampstead Brook	5	0/NA	4.67	3.67	5	5/NA	1.5
<u>Bernwood</u>							
4. Sedrup Brook, Aylesbury	5	NA	4.5	0/NA	4.75	NA	2.5
<u>Thameshead</u>							
5. Redcot Cut	4.75	0/NA	5	0/NA	5	5/NA	4.0
6. Great Brook & Borroway Brook	5	3	5	0	5	NA	2.5
<u>Kennet</u>							
7. Gringe Brook, Stawerton	4.14	0/NA	4.57	2.5/NA	4.14	NA	3.5
8. Reading Ditches	5	NA	5	5/NA	4.8	NA	6.0
9. R. Kennet, Axford	4.5	3.5	4.5	0.25	4	NA	1.0
10. R. Dun, Hungerford	5	NA(0)	5	NA	5	NA	0.5
11. R. Lambourn, Elton	5	5	4	NA	4	NA	0.5
12. R. Lambourn, Boxford	5	NA	5	0	4	NA	0.5
13. Aldermaston Ditch & Leasing Stream	5	NA	4.86	NA	4.86	NA	3.5
Average Scores	4.88	1.61	4.75	1.27	4.62	5	28.5 Km Total

KEY

RET : Retention	0 : No retention or enhancement carried out	3 : 41 - 60% Recommendations undertaken
ENH : Enhancement	1 : 1 - 20% Recommendations undertaken	4 : 61 - 80% " "
N/A : Not applicable	2 : 21 - 40% " "	5 : 81 - 100% " "

Average Scores : Lower Thames Area

SURVEY SECTION	BANK AND CHANNEL FEATURES		BANK VEGETATION		CHANNEL VEGETATION		COMMENTS	
	RET.	ENH.	RET.	ENH.	RET.	ENH.		
								km
<u>North</u>								
1. White Brook 1 & 2	5	0/NA	4.67	2.3	4.78	NA	5.0 (9 lengths)	
2. Colne Brook, Horton	5	5/NA	4.5	4/NA	4.75	0/NA	2.0	
3. Roundmoor Ditch	5	5/NA	5	4.5	5	NA	1.0	
4. Frays River, Lt. Britain	5	NA	4	4	4	NA	0.5	
5. River Ash, Staines (1)	4.33	5/NA	5	4.5/NA	4.33	NA	1.5	
<u>West:</u>								
6. Barkham Brook (2)	5	N/A	4	0	5	NA	0.5	
<u>East:</u>								
7. West Clendon Stream	5	N/A	5	0	5	NA	1.0	
8. Hoe Stream, Pyrford	5/NA	0/NA	4.5	5	5	3/NA	1.0	
9. Runtleywood Ditches	4.5	NA	4.5	1.5	5	NA	1.5	
<u>Average Scores</u>	4.87	3	4.57	2.87	4.32	1.5	6 km total	

KEY

RET : Retention	0 : No retention or enhancement carried out	3 : 41 - 60% Recommendations undertaken
ENH : Enhancement	1 : 1 - 20% Recommendations undertaken	4 : 61 - 80% " "
N/A : Not applicable	2 : 21 - 40% " "	5 : 81 - 100% " "



Average Scores : Lee Area

SURVEY SECTION	BANK AND CHANNEL FEATURES		BANK VEGETATION		CHANNEL VEGETATION		COMMENTS
	RET.	ENH.	RET.	ENH.	RET.	ENH.	
Km.							
<u>North</u>							
1. Hortlawbury Brook	5	0	4	NA	3	0	0.5
2. Pincey Brook	5	0	5	NA	5	NA	0.5
3. Spellbrook, Three Horseshoes	4	NA	5	0	5	NA	0.5
<u>West</u>							
4. River Colne, Tdpits Lane.	5	4.5	4.5	NA	5	NA	1.0
<u>East</u>							
5. Turkey Brook, Enfield	4.5	NA	5	NA	5	NA	1.0
6. Salmons Brook	5	NA	5	NA	5	NA	1.0
7. Broxbourne Mill Stream	5	NA	4.75	0/NA	3.25	NA	1.5 (400m)
Average Scores	4.79	1.5	4.04	0	4.46	0	14 Km. total

KEY

RET :	Retention	0 :	No retention or enhancement carried out	3 :	41 - 60% Recommendations undertaken
ENH :	Enhancement	1 :	1 - 20% Recommendations undertaken	4 :	61 - 80% " "
N/A :	Not applicable	2 :	21 - 40% " "	5 :	81 - 100% " "

**APPENDIX 4**

**Suggested Check-Lists for Preparation of Audit Report**

<b>Retention of Features</b>	<b>Yes</b>	<b>No</b>
<b>Bank Features</b>		
Shelves	+	
Shallow Banks	+	
Cliffs		
<b>Channel Features</b>		
Runs and Riffles	+	
Gravel Beds and Shoals	+	+
In-channel Pools		+
Islands		
<b>Bank Vegetation</b>		
Herbaceous	+	+
Key Stands	+	
Trees and Shrubs	+	
Low Branches		+
Adjacent Habitats		
<b>Channel Vegetation</b>		
Marginal Flora	+	
Aquatic Flora	+	+
<b>Enhancements</b>	<b>Yes</b>	<b>No</b>
<b>Bank Features</b>		
Construction of Shelf	+	
Construction of Cliff		+
<b>Channel Features</b>		
Deepen/Create In-channel Pools	+	
Construct In-channel Berm		
Introduce Groynes		+
Introduce Weirs	+	
Construct Two-stage Channel		+
Rifle Creation		
Introduce Large Rock/Boulders	+	
<b>Bank Vegetation</b>		
Plant Sedge/Reed/Other		+
Plant Trees/Shrubs	+	
Pollard Willows	+	+
Coppice Trees/Shrubs		+
De-silt Existing Ponds	+	
Create Off-channel Ponds		
<b>Channel Vegetation</b>		
Transplant Vegetation	+	