LEE DONALDSON ASSOCIATES

NATIONAL RIVERS AUTHORITY ANGLIAN REGION

AUDIT OF 1995 EASTERN AREA RCS PROGRAMME

March 1996

LDA

Lee Donaldson Associates
Environmental Consultants
8 Angell's Meadow
Ashwell
Baldock

Tel 0146274 3026

Fax 0146274 2049

CONTENTS

1. Methodology 2

2. Results 6

3. Discussion 11

4. Recommendations 34

Table 1 Audited reaches 5

Table 2 Check list summary 6

Table 3 Comparison of survey map quality 10

Partners: Philip Collins BSc, A.L.I., A.M.A., MIBiol, CBiol, Barry Tranter PhD

8 Angell's Meadow, Ashwell, Baldock, Herts SG7 5QS
Tel 01462 743026 Fax 01462 742049

1. METHODOLOGY

A selection of 79 500m RCS sections were re-surveyed by LDA following NRA Anglian Region's standard methodology. The audit survey data and the original survey data were compared in a desk exercise. The audit methodology used followed that produced by Environmental Management Consultants on behalf of NRA Severn Trent Region. This was designed for auditing the original survey in the field, rather than for a desk based comparison between surveys.

To ensure that the assessment was as fair as possible the auditors spent no more time on the survey of each section than was allowed for in the original RCS brief.

The Severn Trent audit methodology was designed to audit standard RCS not the augmented RCS employed in the Anglian Region. It does not cover the standard flora recording forms, the Physical and Habitat Data sheets or the RHS survey that formed part of the RCS contract in the region in 1995.

An attempt has been made to audit some of these additional elements. However there are a number of problems with these elements of the Anglian Survey.

1.1 FLORA FORMS

We have not attempted to audit the flora recording for a number of reasons:

a. Seasonal differences in the species and number of species recorded are likely. The original surveys were carried out in June - July whilst all the audit was conducted in September - November.

b. LDA follow the original flora recording methodology produced by N.T Holmes and record only the actual river and banks, or adjacent areas directly dependent on the river regime. No other guidance has ever been issued by NRA. The RCS surveyors recorded the flora of the corridor, with no consistent definition of its extent.

1.2. PHYSICAL AND HABITAT DATA SHEETS

The audit physical and habitat data sheets were not always supplied by NRA, so it was not possible to assess their accuracy. It is clear from a comparison of the audit survey maps to the original surveys that there is frequently little similarity in the recording of channel features. In addition the descriptions often differ from the data recorded on the survey maps. There are frequent errors in land-use / habitat and tree and shrub cover. As a result the recording of the physical and habitat data must often be inaccurate.

1.3 AUDIT METHODOLOGY

There are a number of further problems with the NRA Severn Trent audit methodology itself and its application to the Anglian situation.

1.3.1 The methodology is often inconsistent with the guidance given in the Conservation Technical Handbook No 1 River Corridor Surveys. Frequently it is the latter that is at fault. The audit methodology penalises surveyors for omitting certain information or recording it erroneously, but the Handbook does not make it clear what is required.

1.3.2 EXAMPLE PROBLEMS

TECHNICAL HANDBOOK

In the Handbook's minimum acceptable standard example survey map, the cross section includes neither adjacent land information nor channel depth, although the audit methodology states these are necessary.

One of the Handbook example maps (figure 3) does not have flow and substrate information on the map, the others do.

The standard symbol card and Handbook do not differentiate between the tall herb / ruderal symbols:

The former should be used for open communities with exposed soil the latter for well vegetated communities. The surveyor needs to go back to N Holmes' original draft methodology to ascertain this! The examples in the Handbook get it wrong.

The same applies to the tall grass with herbs symbols as above.

AUDIT SURVEY METHODOLOGY

The audit form does not have a section to assess the recording of channel vegetation, either on the maps or in the description. The form only covers marginal vegetation. We have included comments under marginal vegetation.

The form does not have sections for recording channel and bank morphology in the descriptions. We have assessed these in the typical features section.

The assessment scoring system stated in the methodology is for 4 sections combined on any river. The maximum scores and adequacy levels given are not correct for any other number of sections. We have revised the procedure. (See below).

It is only clear in the check list summary that the cross section should be scored qualitatively as good, poor or adequate, not quantitatively.

1.3.3 Comparing two sets of survey data in the office is not as effective as auditing the surveys in the field. In a desk based assessment it is not possible to assess whether differences in the surveys are the result of changes in the field subsequent to the first survey, errors on behalf of the first survey, or errors on behalf of the auditors. In general where it is clear that changes have taken place on the ground, we have given the benefit of the doubt to the original surveyor and have disregarded other errors that appear not to have resulted from such changes. However we have generally assumed that the audit surveys are more accurate than the original surveys as they were undertaken specifically for the audits. The original surveys were done as part of a wider RCS programme and were selected at random for audit. The original surveyor was not aware that these specific reaches would be audited. It is therefore more likely that errors occur in the original survey rather than the audit survey.

1.3.4 The methodology places a great deal of weight on the provision of basic data. If all the general information is completed on the maps and the cross section and if items in the summary description e.g., fauna, recreation are completed by stating "None" a poorly surveyed section can still be given an adequate rating. Some 37% of the overall score is allocated to this information. As a result we have provided a second assessment that simply compares the standard of the survey maps - the key to good quality RCS.

1.4 SCORING

We have only scored the surveys on the basis of the RCS maps and descriptions. No attempt has been made to incorporate the flora survey forms, physical habitat surveys or RHS. The assessment is of necessity subjective and should only be viewed in conjunction with the remainder of this report. The scoring system follows that given in the methodology i.e.

Quantitative check list

Omission scores 0
Presence scores 1

Qualitative check list

Sections assessed as poor score	0
Sections assessed as adequate score	1
Sections assessed as good score	2

The total possible score per reach of 5 RCS sections is 270. If all the quantitative sections are completed properly and the qualitative data categories all score adequate, the total score would be 170 or **63%**. This represents the **Minimum Acceptable Standard**.

We have allocated full marks where a particular section is not applicable or where for example a value of 'none recorded' has been entered for 'Fauna' or 'Threats'. One or the rivers has been dredged since the time of the original survey. In this case we have given an assessment of 'good' for the assessments dealing with in-channel features and vegetation.

A further breakdown is provided showing the scores for the survey maps and cross section. The maximum score here is 110 and the **Minimum Acceptable Standard 55%**.

1.5 AUDIT REACHES

Table 1

Reach	Surveyor	Notes	Date	Audit	Date
EBLA 001-005 EBLA 006-007	C Bates T Cheadle		7/95	SH	11/95
ECHE 001-003, 009-011 ECHE 008, 014-018, 020 & 025-026	S Allen S Nickson		7/95	SH	9/95
EDON 004-009 EDON 010-011 & 013	C Jones R Johnson		7/95	SH	10/95
ESTO 033, 039, 041, 043, 046, 048, 049, 067 & 068 ESTO 051, 058 & 060	C Dyke C Borges	no survey for section no. 49 supplied	6-7/95	SH	10/95
ETHU 001-004, 008-009, 011, 013 & 015 ETHU 005, 007, 012 & 014	P Hatch S Penning		7/95	SH	9/95
FINB 001-008	D Johnson		7/95	SH	10/95
RBOX 025-032 & 035-036	C Dines		7/95	SH	10/95
STOU 007-012	C Borges		7/95	SH	10/95

2. RESULTS

2.1 CHECK LIST SUMMARY

Table 2

RIVER	EBLA 1-7	ECHE 1-3, 8-11, 14-18, 20, 25-26
1. GENERAL INFORMATION		
Name of river	YYYYYYY	YYYYYYYYYYYYYYY
Date of survey	YYYYYYY	YYYYYYYYYYYYYYY
Reach ref. no.	YYYYYYY	YYYYYYYYYYYYYYY
Grid north	YYYYYYY	YYYNYNYYYYYYYYY
Surveyor's name	YYYYYYY	YYYYYYYYYYYYYYY
Scale base width	YYYYYYY	YYYYYYNYYYYYYYY
Length	YYYYYYY	YYYYYYNYYYYYYYY
Grid ref upstream	YYYYYYY	YNNYYYNYYYYYYYY
Grid ref downstream	YYYYYYY	YNNYYYNYYYYYYYY
Flow direction	YYYYYYY	YYYYYYYYYYYYYYY
2. SURVEY MAP		
AQUATIC ZONE		
Plant communities	GGGGGPP	GGGPGAGGGGGGGGG
Flow and current features	PGGGGGA	AGAPAGGGGGGGGGG
Substrate & physical features	PPPPPAA	GAPPAAAAAAAAAAA
MARGINAL ZONE		
Plant communities	GGGAAPP	GGGAGGGGAPGGGPA
Substrate and physical features	PPPPPAA	AAAAAAAAAAAAAAA
BANK ZONE		
Trees	GGPGGGG	APPPPAPGGAAGAGG
Other plant communities	PAAAPPP	PPPAPAPGGPPGPGG
Physical features	GGGGGPG	AGPPPPGPAPPPAAA
ADJACENT LAND USE		
Land use	PGGAGGG	PAPAGAPAAGPPPPP
Habitat types	GGGPGGG	PPPPPPPPPPPPPPP
3. CROSS SECTIONS	AAPPAPP	AAAPPGPAAAAPPPP
4. SUMMARY DESCRIPTION		
Conditions	GGAGGGG	GGGAGGGGGGGGGGG
Typical features	AAPAPPP	PPPPPPPPPAAAPPP
Marginal vegetation	AGAGGPP	AGPPAAPPPPPAPAG
Banks	GGGGGGG	AGPPPPPPPPPPPPP
Adjacent land use	PGPPGGG	PPGGAGPPAPPPPPP
Fauna	PPPGPPG	PPPPPPPPPPPPPPP
Recreation	PPPPPPP	PPPPPPPPPGPPPAA
Existing management	PPPPPPP	PPPPAGPPPPPGAGG
Threats	PPPPPPP	PPPPPPPPGAGAGGA
Suggested habitat improvements	PPPPPPP	PPPGPPPPPPPPPAP
Total	**56%**	**48%**

RIVER	EDON 4-11 & 13	ESTO 33, 39, 41, 43, 46, 48, 51, 58, 60, 67 & 68
1. GENERAL INFORMATION		
Name of river	YYYYYYYYY	YYYYYYYYYYY
Date of survey	YYYYYYYYY	YYYYYYYYYYY
Reach ref. no.	YYYYYYYYY	YYYYYYYYYYY
Grid north	YYYYYYYYY	YYYYYYYYYYY
Surveyor's name	YYYYYYYYY	YYYYYYYYYYY
Scale base width	YYYYYYYYY	YYYYYYYYYYY
Length	YYYYYYYYY	YYYYYYYYYYY
Grid ref upstream	YYYYYYNNN	YYYYYYYYYYY
Grid ref downstream	YYYYYYNNN	YYYYYYYYYYY
Flow direction	YYYYYYYYY	YYYYYYYYYYY
2. SURVEY MAP		
AQUATIC ZONE		
Plant communities	GGGGGGGGP	GGGAAAAGGGG
Flow and current features	PPPPGPAGG	GGPGGGAGGGG
Substrate & physical features	PPPPAAAAP	AAAAAAPAAAA
MARGINAL ZONE		
Plant communities	AAAGGAGGG	AGAGGGGAGGG
Substrate and physical features	PPAAAAAGG	AAPAAAAAAAA
BANK ZONE		
Trees	PPPPPPPPP	APPPPPAGPGG
Other plant communities	PPPPPPPPP	GAAAPPPAPGA
Physical features	AGGGAAPPP	GAAPGGGPGGG
ADJACENT LAND USE		
Land use	AGGGGPAAP	GAAAGPGAAGG
Habitat types	GPAGPPPPP	APPPAAGGAGG
3. CROSS SECTIONS	GGGGGAAAA	GGAAAPAAAPP
4. SUMMARY DESCRIPTION		
Conditions	GGGGGGGGG	GGGGGGGGGGG
Typical features	AAAAAAAAA	GGGGPPAPAPP
Marginal vegetation	GAAGGAAGA	GAPGGGGAAGG
Banks	AAAAGAAPP	AAAPPAGPPAA
Adjacent land use	PAAAAPPAP	GPAPGGGAGGG
Fauna	PPPPGGPGP	PGGGPPPPPPP
Recreation	PPPPPPPPP	APPAPPPGPPP
Existing management	GGGGGGPGG	GGPAGGGGGGG
Threats	AGGAAAPAP	GPPPPPPPPPA
Suggested habitat improvements	GGGGGGPPA	GGGPGGPPAPA
Total	**57%**	**51%**

RIVER	ETHU 1-5, 7-9 & 11-15	FINB 1-8
1. GENERAL INFORMATION		
Name of river	YYYYYYYYYYYYY	YYYYYYYY
Date of survey	YYYYYYYYYYYYY	YYYYYYYY
Reach ref. no.	YYYYYYYYYYYYY	YYYYYYYY
Grid north	YYYYYYYYYYYYY	YYYNYYYY
Surveyor's name	YYYYYYYYYYYYY	YYYYYYYY
Scale base width	YYYYYYYYYYYYY	YYYYYYYY
Length	YYYYYYYYYYYYY	YYYYYYYY
Grid ref upstream	YYYYYYYYYYYYY	YYYYYYYY
Grid ref downstream	YYYYYYYYYYYYY	YYYYYYYY
Flow direction	YYYYYYYYYYYYY	YYYYYYYY
2. SURVEY MAP		
AQUATIC ZONE		
Plant communities	GPGGGGGGGGGGG	AAGGGGGG
Flow and current features	GGGGGGGGGGGGG	PPPAAAPA
Substrate & physical features	AAAAAAAAAAAAA	PPPPPPPA
MARGINAL ZONE		
Plant communities	GGGGGGAGGGGGG	AAGGAGGG
Substrate and physical features	AAAAAAAAAAAAA	PPPAPAAA
BANK ZONE		
Trees	GPGGGAGGPAAGG	AAPPAAAG
Other plant communities	AAGGGAAGPAAGG	AAPPAAAA
Physical features	APPPAPAAAAPAA	GGGPGAAA
ADJACENT LAND USE		
Land use	GGGGGGPAPPAGA	PPGAGGGG
Habitat types	GGGGGAAAAAAAA	PPPPAGGG
3. CROSS SECTIONS	GAAAGAAAPPGGA	PPPPPPPP
4. SUMMARY DESCRIPTION		
Conditions	GGGGGGGGGGGG	GGGGGGGG
Typical features	PPPAPPPAPPAP	PPPPPAPA
Marginal vegetation	GGAGGAAGGAAG	AAGPAGGP
Banks	GAAGAAAGGGAG	PPAPPPPP
Adjacent land use	GGAGPGAGAGPA	PGGGAPGA
Fauna	GPGGPGPPPPPP	PPPPPGGP
Recreation	AAGGPAAAAAAA	PPPPPPPP
Existing management	GPGPPPPGPPPP	GPPPPPPP
Threats	PPGPGPPAPPGG	GGGGAGGG
Suggested habitat improvements	PPPPPPPPPPPP	GGGGGGPG
Total	**65%**	**55%**

LDA

RIVER	RBOX 25-32 & 35-36	STOU 7-12
1. GENERAL INFORMATION		
Name of river	YYYYYYYYYY	YYYYYY
Date of survey	YYYYYYYYYY	YYYYYY
Reach ref. no.	YYYYYYYYYY	YYYYYY
Grid north	YYYYYYYYYY	YYYYYY
Surveyor's name	YYYYYYYYYY	YYYYYY
Scale base width	YYYYYYYYYY	YYYYYY
Length	YYYYYYYYYY	YYYYYY
Grid ref upstream	YYYYYYYYYY	YYYYYY
Grid ref downstream	YYYYYYYYYY	YYYYYY
Flow direction	YYYYYYYYYY	YYYYYY
2. SURVEY MAP		
AQUATIC ZONE		
Plant communities	GGGGGAGGGG	GGGGG
Flow and current features	AAGGGGAGAG	GGGPA
Substrate & physical features	AAAAAPGAGA	AAAPA
MARGINAL ZONE		
Plant communities	GGGGGGGGGG	GGGGG
Substrate and physical features	AAAAAAAAAA	AAAGG
BANK ZONE		
Trees	GAGGAGGGGA	GAPAA
Other plant communities	AAAGAGGGAA	AAPAP
Physical features	AGGGGGGGGG	GPAGG
ADJACENT LAND USE		
Land use	GGGGGGGGAA	APAGG
Habitat types	GGGGAGAGAP	AAAGG
3. CROSS SECTIONS	GGGAAGGAAA	PPAPP
4. SUMMARY DESCRIPTION		
Conditions	GGGGGGGGGG	GGGGG
Typical features	PAPPPPAPPP	PPPPP
Marginal vegetation	GGGGGAGGGG	PGGGG
Banks	GPPPGGGAAG	APPGA
Adjacent land use	GAAPGGGGGA	AGPGA
Fauna	GGGGPGGGGG	PPPPP
Recreation	PPPPPGAPPP	PPPPA
Existing management	PGPGPAGGPP	GGGGG
Threats	PGPPPPPPPP	PPPPP
Suggested habitat improvements	PGPPPPGPPP	PPPPG
Total	**73%**	**61%**

Key N = information not recorded
Y = information recorded

P = poor
A = adequate
G = good

Table 3 Comparison of survey map quality including the cross-section.

Reach	Surveyor	Score
EBLA 001-005	C Bates	57%
EBLA 006-007	T Cheadle	48%
ECHE 001-003 & 009-011	S Allen	46%
ECHE 008, 014-018, 020 & 025-026	S Nickson	49%
EDON 004-009	C Jones	46%
EDON 010-011 & 013	R Johnson	41%
ESTO 033,039, 041, 043, 046, 048, 067 & 068	C Dyke	60%
ESTO 051, 058 & 060	C Borges	61%
ETHU 001-004, 008-009, 011, 013 & 015	P Hatch	67%
ETHU 005, 007, 012 & 014	S Penning	77%
FINB 001-008	D Johnson	44%
RBOX 025-032 & 035-036	C Dines	79%
STOU 007-012	C Borges	73%

The cross-sections are very rarely complete and sometimes inaccurate, in particular the Chet River, Finborough Brook and Stour Brook.

No maps give details of substrate, flow, level or clarity although this is a requirement in the Handbook.

b. The descriptions do not incorporate a 'habitat to be retained' section. This is clearly stated as a requirement in the Handbook.

c. Nor do the descriptions incorporate a "recreation features" section also required by the Handbook.

d. Few enhancements have ever been suggested.

3.2 OTHER PROBLEMS

A number of other problems are less fundamental but are of concern and should not have occurred given proper training and auditing of surveyors.

3.2.1 SURVEY MAPS

a. Physical features and flow

Physical features and flow characteristics of the channel are not mapped or described in adequate detail:-

i. No variation in bank height or slope is shown along any of the sections (and is also absent from the descriptions). The only reference to bank height is on the cross-section. Even these have often been omitted. The bank heights at site of cross-section are frequently over-estimated on the Finborough Brook and Stour Brook

ii. No variation in depth is recorded either on the maps or in the descriptions. The only indication of depth is on the cross-section. Even these have often been omitted. It is apparent from the description that the Finborough Brook is frequently dry but this is not shown on the map or the cross-section.

iii. No variation in channel width is recorded along many sections or described in the descriptions. There is also no consistency in the extent of channel widening used by different surveyors surveying the same river. The Blackwater, Chet and Dognash Rivers, Finborough Brook and frequently the Stour Brook are drawn too wide. The only reference to width is at the site of the cross-section. Channel widths are often over-estimated e.g. the Finborough Brook frequently and the Chet and Dognash River occasionally.

iv. The substrate is never stated on the survey maps for any of the reaches and is often omitted from the description for the Chet River. The substrate on the Blackwater River (001-005) and the Finborough Brook surveys has been drawn in (wrongly in the case of the Finborough) throughout the sections. This makes it impossible to distinguish between physical channel features such as bars etc. and the substrate and is not part of the standard methodology.

v. Channel features are sometimes omitted, in particular pools and riffles are not recorded on the Dognash River maps.

b. Tall herb symbols

The symbols for an open sward of tall herb/ruderal vegetation and open tall herb/tall grass is used instead of the symbol for a closed sward throughout the surveys. C. Bates (Blackwater River), S. Nickson (River Chet), C. Jones (River Dognash) and D. Johnson (Finborough Brook) use the two symbols interchangeably

c. Emergent vegetation

Emergent vegetation is rarely marked as occurring on the banks. It does often.

d. Trees and scrub

i. Trees and scrub are not mapped very accurately along the banks and are frequently omitted as is species annotation. (in particular Stour 039-048). Community management information is not often recorded.

ii. No attempt has been made to show the position of trees on the banks. So trees growing at the toe are depicted in the same way as trees overhanging but growing on the top.

iii. Continuous and discontinuous scrub are frequently mapped using the wrong symbols. The hedgerow symbol is frequently used for continuous scrub and sometimes the continuous scrub symbol and the hedgerow symbol are both used on the same map for similar vegetation. Scrub is also drawn using the tree symbol.

e. Run symbol

The symbol for rapids is used instead of the symbol for a run on the Boxford surveys.

f. Map quality

The survey maps drawn by S. Allen (River Chet) and R Johnson (River Dognash) are not only of very poor quality but also very scrappy.

3.2.2 DESCRIPTIONS

The descriptions reflect the failings of the survey mapping. There are a number of general problems:

a. The description of the typical features is generally inadequate. Bank height, slope, material and features; channel width and features; water depth and clarity; and flow characteristics are very rarely detailed, (if mentioned at all). This is probably because the descriptions of the morphology of the whole section have been based on the cross section taken at one point.

b. The bank communities are not described in enough detail. In particular the Chet, and Finborough are very poor and the Stour, Thurne, Boxford and Stour Brook vary between poor and adequate. Tree and scrub species are frequently omitted altogether even where they are frequent.

c. In many cases the descriptions of the channel vegetation are poor. No information is given on the relative abundancy of the channel communities and species and no widths of emergent stands have ever been given to indicate the extent of the marginal vegetation. Only rarely has an attempt been made to relate the distribution of plant communities to morphological features such as bars, channel shading etc. The descriptions for the Stour make no distinction between aquatic and marginal vegetation. The descriptions for marginal vegetation of the River Chet are poor.

d. No species information is ever given for adjacent habitats, so it is impossible to tell whether or not these are water level dependent communities such as *Deschampsia* or *Juncus* grasslands.

e. Information on recreation, fauna, existing management, threats and suggested habitat improvements have, on the whole, been omitted. The surveyor for the Thurne reach appeared to use the existing management category as a catch all. As a result it is frequently filled in wrongly.

The only conclusions that can be drawn are that the surveying staff, whilst competent botanists, are not trained in field mapping. An in-depth understanding of the morphological processes of river systems and their interaction with river ecology also appears lacking from the descriptions. Nor are they aware of the maintenance and engineering activities likely to affect rivers. This is further emphasised by the general lack of enhancement suggestions in nearly all the surveys.

3.3 SECTION PROBLEMS

EBLA 001-007

001-007

a. No variation in bank height or slope is shown along the sections or accounted for in the descriptions.
b. No variation in depth is recorded either on the maps or in the descriptions.
c. The channel is drawn too wide with no variation in channel width recorded.
d. The symbols for sparsely and densely vegetated tall herb/ruderal vegetation are used interchangeably along the banks, when the vegetation consisted of dense tall herbs or dense tall herbs and grass.
e. The adjacent land habitats are not noted.
f. The descriptions of typical features lack quantitative data on bank height, slope and material; water depth; channel width and physical channel features and flow characteristics.
g. Fauna of special interest, Existing management, Observed or potential threats to conservation and conservation recommendations categories are generally disregarded.

001-005

a. The substrate is drawn in throughout the sections which makes it impossible to distinguish between physical channel features such as bars etc.
b. There is no indication as to whether the adjacent grassland is grazed or mown.

001 The field survey showed no access to the downstream end of the section. This was however accessible for the audit. The adjacent land-use here was omitted from the survey map, even though the farm buildings must have been obvious in the field (noted as a reason for inaccessibility in the report). The hedgerow symbol is used in error for continuous scrub.

002 A row of trees are identified as *Tilia europaea* on the survey but recorded as *Populus* spp. on the audit.

003 As 002. *Quercus robur, Crataegus monogyna, Cornus sanguinea, Prunus spinosa* and *Rubus fruticosus* trees and scrub also occur along the RB. They were not recorded on the survey map or in the description.

004 The stands of reeds are drawn confined to the channel when they extend up the bank. The scrub symbol is mis-used. A ditch which is marked on the original base map and on the survey appears to have been infilled and does not occur on the audit. Adjacent land was recorded as neutral grassland along the RB. It is recorded as arable on the audit and so was either recorded in error, or has recently been ploughed up and planted. A footpath with hedges along both sides and ditches along the downstream side crosses the section via a farm bridge at the downstream end of the section. It has been omitted.

005 A footpath with hedges along both sides and ditches along the downstream side crosses the section via a farm bridge at the upstream end of the section. It has been omitted. The farm bridge at the downstream end of the section is shown in isolation and not adjacent to the dirt track which also forms a field boundary.

006 Very poor standard of mapping. Uniform stands of emergent vegetation have been drawn down the centre of the channel! No bank features are shown. A footbridge is also omitted from the downstream end of the section. The descriptions are poor. Typical features are very poor and there is no indication of abundance or extent of channel vegetation, or whether it occurs in the aquatic or marginal zone.

007 Very poor standard of mapping. No channel or marginal vegetation is mapped or mentioned in the description. Scrub occurring along the banks (mentioned in the description) is not actually mapped on the survey. The farm bridge which occurs mid-section is shown in isolation and not with the adjacent dirt track, which also forms a field boundary. The farm bridge and track at the downstream end of the section is omitted completely. The descriptions are poor. Typical features are very poorly recorded and there is no indication of abundance or extent of channel vegetation, or whether it occurs in the aquatic or marginal zone.

ECHE 001-003, 008-011, 014-018, 020 & 025-026

001-003, 008-011, 014-018, 020 & 025-026

a. No variation in bank height or slope is shown on the maps (absent from the descriptions) - the only reference is on the cross-section.
b. No variation in depth is recorded either on the maps (absent from the descriptions) - the only indication of depth is on the cross-section.
c. Drawn too wide. No variation in width of channel is mapped or accounted for in the descriptions.
d. The substrate is never stated on the map and often omitted from the description.
e. The symbols for sparsely and densely vegetated tall herb/ruderal vegetation are used interchangeably along the banks. The vegetation consisted of dense tall herbs or dense tall herbs and grass.
f. There is no indication as to whether the adjacent grassland is grazed or mown.
g. The adjacent land habitats have not been noted.
h. The cross-sections are very rarely complete.
i. The descriptions of typical features lack quantitative data on bank height, slope and material; water depth; channel width; and frequently lack details on physical channel features and flow characteristics.
j. The bank communities are rarely adequately described. Only 001, 002, 009 and 015 are adequate.
k. Fauna of special interest, existing management, observed or potential threats to conservation and conservation recommendations categories are generally disregarded.

001 Both the scrub and tree symbols have been used inaccurately. Road and farm bridges occur in isolation and are not annotated. Adjacent land has been identified as improved when it is actually marshy and relatively species rich. What does average depth mean?

002 Wooded banks / bank tops are not adequately mapped. The track and farm bridge which crosses the upstream end of the section has been omitted and the farm bridge towards the downstream end is shown in isolation and not in association with a track. Semi-improved and improved marshy grassland has been recorded as improved. A mixture of phase 1 notations and other abbreviations have been used for adjacent land.

003 The Mapping of bank vegetation is very poor - wooded banks / bank tops are not adequately mapped. Two weirs have been omitted. A mixture of phase 1 notations and other abbreviations have been used for adjacent land. The description is inadequate - the fact that the section is tree-lined is totally ignored.

008 The channel is drawn too wide. Habitat / field boundaries have been omitted and a fence along the bank top is also frequently absent. Poached cattle drinks and rare bank slumping has not been recorded. Tree species have been omitted from the map e.g. *Alnus glutinosa,* (abundant on the species list?) and *Crataegus monogyna* has been drawn as a tree. The description is very poor and refers to a previous section for information without indicating whether this section is up or downstream. The upstream LB has also been cut, but this may have occurred within the period between the original survey and the audit.

009 The channel is drawn too wide and a 1m+ deep pool below the weir has been omitted. No bank tops are drawn and bank features such as poaching have been omitted. The length scale is frequently wrong. The bank is shown as being sparsely vegetated by a tall herb community (the open symbol has been used) when it is densely vegetated by a tall herb and grass community and is frequently grazed. The tree symbol is used throughout with no differentiation for scrub. The species are poorly labelled. Hedges along ditches / field boundaries are omitted. An isolated un-labelled road bridge occurs across the upstream end of the section. The description is very poor with trees and scrub omitted.

010 Trees and scrub are mis-identified and frequently not mapped. Bank features are not mapped. The description is very poor with bank structure and vegetation omitted completely.

011 Trees and scrub are not mapped along the bank and bank top. It is not easy to identify where woodland or plantation occurs as an adjacent land-use. A ford occurs at the upstream end but is not mapped and the farm bridge, which occurs mid-section, is shown in isolation and not in association with a track and habitat boundary. The description is inadequate.

014 Adjacent land-use has been omitted from the map and identified as semi-improved grassland in the description, instead of improved grassland. The broad-leaved woodland along the downstream LB has been omitted altogether. The description is very poor. It omits bank vegetation, referring to previous sections surveyed without identifying which sections these are.

015 The channel is drawn too wide. Stands of *Sparganium erectum* and *Carex acutiformis* have been mis-identified as *Phalaris arundinacea*. Clumps of scrub have been drawn using the single shrub symbol. Land-use has been correctly identified using phase 1 nomenclature, i.e. A1.1 for semi-natural woodland, but the habitat, i.e. the dominant tree and scrub species have been omitted from both the map and description. Again the land on the downstream LB has been labelled J1.3 but not expanded upon, (it actually consists of gardens and allotments). The improved grassland which occurs beyond a strip of scrub on the downstream RB has been omitted from both the map and description. The (un-labelled) road bridge at the downstream end occurs in isolation and not in association with the road which also forms a habitat boundary. The description is inadequate and describes the LB as supporting the most diverse flora - of what? and how about the RB? The build up of detritus is suggested as a potential conservation threat in the description but it is not recommended that it should be cleared under conservation recommendations, nor is it highlighted on the survey map.

016 Artificial banks are shown throughout the section, on the audit they are shown as not occurring along the downstream RB. (This may be due to the fact that they are submerged due to a higher water level). Obvious boundaries are absent from the LS and the bridge and road at the upstream end of the section is omitted. The land-use is not further defined than the phase 1 groups, so that there is no distinction between the gardens, boatyards, car-park and between improved grazing and improved amenity grassland. The description is inadequate. The fact that the downstream RB is not re-inforced and supports tall grasses and herbs and rare trees is omitted.

017 A floodbank is shown along the upstream LB where one does not occur, but is omitted along the downstream RB where one does actually occur. The RS is very poorly mapped - no land-use or habitat, no boundaries (hedges, ditches, fences) and no floodbank. This is mainly because it was originally surveyed from the LB and the RS was not visible. It should have therefore been surveyed from both banks. Boundaries, mainly ditches and broad-leaved woodland occurring downstream)are also omitted from the LS - the bank it was surveyed from! The description is inadequate. The LB rather than the RB slopes into the river, and actually has a gentle gradient.

018 Drawn too wide. The RS is very poorly mapped. No floodbank or ditch which occur along the whole section, no land-use or habitat, no boundary ditches have been mapped. This is mainly because it was originally surveyed from the LB and the RS was not visible. It should have therefore been surveyed from both banks. Land-use, habitats and habitat boundaries have also however been omitted from the LS and are inadequate in the description. A footpath is shown along the LB top on the map but there is no mention of recreation in the description or of the use of the channel for pleasure cruisers (the cause of the erosion to the LB?).

020 Drawn too wide. The RS is very poorly mapped - the floodbank is not mapped accurately (taken off the base map?) and a ditch which occurs along the landward side of the floodbank is omitted, as are inflowing ditches. Land-use / habitat is also omitted. This is mainly because it was originally surveyed from the LB and the RS was not visible. It should have therefore been surveyed from both banks. Scrub occurring along the downstream LB and along the RB floodbanks is also un-recorded. Description is inadequate - the downstream LB is not re-inforced but no vegetation is recorded.

025 Drawn too wide. An extensive stand of tall emergent vegetation occurs along the downstream margin and lower slopes of the LB has been omitted. The RS is very poorly mapped. The embankment is shown as a floodbank (this also occurs along the LB) and a ditch which occurs along the landward side of the embankment is omitted, as are inflowing ditches. Land-use / habitat is also omitted. This is mainly because it was originally surveyed from the LB and the RS was not visible. It should have therefore been surveyed from both banks. Inadequate description. A footpath is shown along the LB top on the map but there is no mention of recreation in the description. The conservation recommendation is to leave banks to develop - we are left to assume that the surveyor means the embankment along the RB.

026 Drawn too wide. The embankments are inaccurately mapped. They are shown as floodbanks. Land-use / habitat is omitted from the RS. The description is inadequate. A footpath is shown along the LB top on the map but there is no mention of recreation in the description.

a. No variation in bank height or slope is shown on the maps - the only reference is on the cross-section.
b. No variation in depth is recorded either on the maps (absent from the descriptions) - the only indication of depth is on the cross-section.
c. Drawn too wide. No variation in width of channel is mapped or accounted for in the descriptions.
d. The substrate is never stated on the map.
e. The symbols for sparsely and densely vegetated tall herb/ruderal vegetation are used interchangeably along the banks when in fact the vegetation consisted of dense tall herbs or dense tall herbs and grass.
f. The substrate is drawn in throughout the sections which makes it impossible to distinguish between physical channel features such as bars etc.
g. The descriptions of typical features lack quantitative data on bank height, slope and material; water depth; channel width; and frequently lack details on physical channel features and flow characteristics.
h. Marginal vegetation is often referred to as emergent and although emergent vegetation is frequently marginal it can also occur within the centre of the channel.
i. Bank communities although adequate are frequently not described in enough detail.

004 Trees and scrub are not annotated in enough detail and scrub is not mentioned as occurring along the LB in the description. Channel and flow features (riffles and pools) are not mapped. Recreation is omitted from the description despite a footpath and footbridge crossing the section.

005 Trees and scrub are not annotated in enough detail. Channel and flow features (riffles and pools) are not mapped. Some indication of the species composition of the land classified as B5 would have been useful. Recreation is omitted from the description despite a footpath and footbridge crossing the section.

006 Trees and scrub are not annotated in enough detail. It would appear that a hedge with standards, species unknown, occurs along the downstream RB top when in fact the bank top is lined by *Prunus spinosa, Crataegus monogyna, Ulmus* spp., *Sambucus nigra* and *Corylus avellana* scrub, with rare *Fraxinus excelsior* and *Alnus glutinosa* trees. Some indication of the species composition of the land classified as B5 would have been useful. Recreation is omitted from the description despite a footpath and footbridge crossing the section.

007 Trees appear very uniformly along the section and the downstream LB is shown as predominantly open when it is actually almost continuously lined with trees and scrub. Recreation is omitted from the description despite a footpath and footbridge crossing the section.

008 The channel is drawn much too wide so that the sinuous nature of the upstream channel is lost, (it will be very difficult to relate the map to the field). Trees have been mapped symbolically rather than accurately and scrub is omitted. Some indication of the species composition of the land classified as B5 or F1 would have been useful. Recreation is omitted from the description despite a footpath and footbridge crossing the section.

009 The channel is drawn much too wide so that the sinuous nature of the channel is completely lost, (it will be very difficult to relate the map to the field). Trees have been mapped symbolically rather than accurately and scrub is omitted. Some indication of the species composition of the land classified as B5 or F1 occurring along the RB would have been useful and the fact that scattered *Salix* spp. occur throughout this habitat has been omitted. A farm bridge occurring across the downstream end of the section has been omitted.

010 Very poor survey map. The estimated width is way out, 4m as against an actual width of 1-2.5m! It was also drawn too wide, even assuming a width of 4m. The bank top has not been drawn and so it is not possible to tell where the trees are situated in relation to the bank. No scrub has been shown and the bank vegetation lacks any annotation. Therefore it is not possible to tell that there is frequent *Alnus glutinosa*, *Salix alba* and *Sambucus nigra* with rare *Populus* sp. on the LB and with *Quercus robur, Crataegus monogyna* and pollarded *S. fragilis* on the RB. The farm bridge occurring across the upstream end of the section has been omitted and a road bridge (un-labelled) occurs in isolation across the downstream end of the section.

011 Poor survey map. The bank top is incomplete downstream. Scrub has often been omitted and the bank vegetation lacks any annotation. It is therefore impossible to tell, for example, that there are frequent, often overhanging *Alnus glutinosa* (often deceased), *Salix fragilis, Prunus spinosa,* and rare *Fraxinus excelsior* and pollarded *Salix alba* along the LB. The emergent monocots are also un-identified. The habitat type is not defined either on the map or in the description, for example, the broad-leaved plantation is not further defined as *Salix alba*. The occasional trees and scrub that occur along the banks are omitted from the description. A footpath occurring along the upstream LB and crossing to the downstream RB is absent from the survey map and the description.

013 Poor survey map. Bank vegetation has been poorly mapped and lacks any annotation, it is therefore impossible to tell, for example, that the LB is dominated by *Urtica dioica, Rubus fruticosus* and *Epilobium hirsutum* with *Dipsacus pilosus, Filipendula ulmaria* and *Scrophularia auriculata* also D/S and that there are frequent, often overhanging and diseased *Alnus glutinosa* with rare pollarded *Salix alba* and *Fraxinus excelsior*. Habitat boundaries (hedges and ditches) have also been omitted along both banks and the land-use on both sides has been classified as A2.1 (described in the description as willow carr (LB) and willow carr over marshy grassland (RB) where-as although a strip of willow scrub may well occur along the bank top the land-use along the upstream LS is grazed improved grassland, the downstream LS is marshy grassland (*Carex* sp., *E. hirsutum* and *Iris pseudacorus)* with scrub and the RS is improved grassland with rushes and some scrub. A footpath also occurs along the RB which has been omitted from the map and description.

ESTO 033, 039, 041, 043, 046, 048, 051, 058, 060, 067 & 068

a. No variation in bank height or slope is shown on the maps (bank heights are also absent from the descriptions) - the only reference is on the cross-section.
b. No variation in depth is recorded either on the maps or in the descriptions - the only indication of depth is on the cross-section.
c. Drawn too wide. No variation in width of channel is mapped or accounted for in the descriptions.
d. The substrate is never stated on the map.
e. The symbols for sparsely vegetated tall herb/ruderal vegetation and tall herb and grass are used when in fact the vegetation consisted of dense tall herb or dense tall herb and grass.
f. No distinction is made between aquatic and marginal vegetation in the descriptions.
g. Generally scruffy.

039-048

a. Trees and scrub are not mapped very accurately along the banks and are frequently omitted as is species annotation.

b. Land-use / habitat needs to be defined in greater detail than simply the phase 1 nomenclature.

033 A meander is mapped downstream of the sluice-gate to the reservoir on the survey, when it would appear from the audit that this section has been straightened. Boundaries are missed off, in particular along the RS, (the opposite side to survey?). Electric cables are also omitted. The STW on the RS is actually a reservoir. *Sparganium emersum* is apparently frequent, but is does not occur on the map.

039 Boundaries are missed off along the RS, (the opposite side to survey?). A footbridge at the upstream end of the section is omitted.

041 The channel has been drawn a uniform width (too wide) and the only indication of width is the cross-section and scale bar which suggest the channel is 12m wide whereas the channel upstream of the bridge is only 3m wide and the channel downstream of the bridge varies between 6 and 10m. Channel features such as a pool downstream of the bridge and silt and gravel side bars have been omitted. The bank height has also been estimated to be 2-3m high when they are only 1.2-1.7m high. A hedge boundary is missed off from the downstream RS.

043 The section was started 150m too late and the positioning of boundaries and the mid-section footbridge are inaccurate. The bank height has also been estimated to be 2m high when they are only 1-1.3m high. Erosion features along the banks are omitted. *Myriophyllum spicatum, Sagittaria sagittifolia* and algae are not recorded. A strip of scrub occurring along the upstream RB top has been omitted.

046 A hedge boundary is missing from the downstream end. *Sagittaria sagittifolia* is not recorded. A footpath along the RB top is omitted.

048 Finished 150m too soon. *Sagittaria sagittifolia* is not recorded. Electric cables which cross the channel mid-section are omitted.

051 The hedge symbol is used instead of the scrub symbol. Individual scrub species along the RB are omitted. A hedge boundary occurring along the LB is omitted and the coarse grass track along the RB ends at the farm bridge and does not continue on.

058 The hedge symbol is used instead of the scrub symbol. Reinforcement of the upstream LB has not been mapped or recorded.

060 The mapped outline of the channel i.e. the width, bares little resemblance to the description (or actuality) and should have been corrected. The symbol for a hedge is used to indicate both trees and scrub. The comment about dredging and the requirement for a floodbank is probably more of a threat than a conservation recommendation.

067 The banks are only 1-2.5m high and not 4-5m high as shown in the cross-section or stated in the description.

068 The area of woodland / scrub is shown as extensive when it really only infills the meander loop. Bars are called berms. The banks are only 1.5-2m high and not 2-4m high as shown in the cross-section.

ETHU 001-005 007-009& 011-015

a. No variation in bank height or slope is shown on the maps (bank heights are also absent from the descriptions) - the only reference is on the cross-section.
b. No variation in depth is recorded either on the maps or in the descriptions - the only indication of depth is on the cross-section
c. No variation in width of channel is mapped or accounted for in the descriptions.
d. The substrate is never stated on the map.
e. The symbols for sparsely vegetated tall herb/ruderal vegetation and tall herb and grass are used when in fact the vegetation consisted of dense tall herb or dense tall herb and grass.
f. The descriptions of typical features lack quantitative data on bank height and slope; water depth; channel width and frequently lack details on physical channel features and flow characteristics.
g. Footpaths should be mentioned as recreation and not as existing management. The embankment is also placed under existing management.

001 The embankment along the upstream LB and along the RB has not been mapped or described. The fact that the artificial bank consists of iron piling is omitted. *Crataegus monogyna* has been drawn using the tree symbol and not the shrub symbol. Boat moorings should be mentioned as recreation and not as existing management. *Callitriche* spp. has been missed.

002 The bank tops have not been mapped. Aquatic vegetation has been omitted and scrub and a tree which occurs along the upstream RB and scrub occurring along the floodbank along the LB have been missed.

003 The bank tops have not been mapped and no bank heights are given either on the map or in the description; the floodbanks having been confused with the bank top in the description. Fishing pegs have not been mentioned as recreation.

004 The bank tops have not been mapped and no bank heights are given either on the map or in the description. The swing bridge and road at the downstream end of the section has not been mapped.

005 The RB top has not been mapped. Boundaries have not been mapped along the LS. Holiday chalets are a land-use, boat-moorings are recreation and the National Trust is ownership - none of which should really be classified as existing management.

007 The section appears to occur in isolation, the fact that the LB and downstream RB are embanked is not mapped or the scrub occurring along the LB top. An insignificant number of boundaries are also shown. The hedges and fences between the houses / holiday chalets are omitted and the ditches dividing the improved rough pasture behind the houses / chalets and on the LB are also omitted. An ETL which runs parallel to the RB is also omitted. Existing management is incorrectly filled in.

008 The section appears to occur in isolation, the fact that both banks are embanked is not mapped. The boundaries (fences, scrubby hedges and drains) that occur along the banks are omitted and so the division of land-use / habitats is not adequately shown. ETL's which run parallel to both banks and footpaths which also run parallel to both banks are not shown. Existing management is incorrectly filled in.

009 No division of adjacent land-use / habitat, (drains, hedges), footpaths or ETL are mapped along the RB. The embankment of the banks is not shown. Where no artificial bank occurs the bank top has not been mapped. Other information than existing management has been recorded as existing management.

011 The section appears to occur in isolation - no division of adjacent land-use / habitat, (drains, hedges, fences), footpaths or ETL are mapped along either banks. The embankment of the banks is not shown. Other information than existing management has been recorded as existing management.

012 The section appears to occur in isolation - no division of adjacent land-use / habitat, (drains, fences), footpaths or ETL are mapped along either banks. The embankment of the banks is not shown. Existing management is incorrectly filled in.

013 Adjacent land-use / habitats not fully mapped. No bank tops are shown along the earth banks.

014 No bank tops are shown along either bank and *Salix cinerea* scrub is shown as individual trees. Existing management is incorrectly filled in.

015 No bank tops are shown along either bank. Existing management is incorrectly filled in.

FINB 001-008

a. No variation in bank height or slope is shown on the maps or occurs in the description - the only reference is on the cross-section. The bank height at the site of the cross-section is also over-estimated.
b. Depth is not recorded either on the maps or the cross-section. It is apparent from the description that the channel is frequently dry but this is not shown on the maps.
c. Drawn too wide and frequently over-estimated. No variation in width of channel is mapped or accounted for in the descriptions. For example on section 001 the only indication of width is from the cross-section (1.5m) taken from upstream end where the width varies between 0.5 and 2.25m wide. The channel generally varies between 0.3 and 1m wide.
d. The substrate is never stated on the map and is drawn in (wrongly) throughout the sections making it impossible to distinguish between physical channel features such as bars etc. The bedrock symbol is used for some reason. (to show clay? pebbles and cobbles? or to show that the channel is dry?). The substrate is not described in adequate terms - stony is used to describe pebbles and cobbles and dry sun-baked silt is mistakenly identified as clay.
e. The symbols for sparsely and densely vegetated tall herb/ruderal vegetation are used interchangeably along the banks and in the channel when the bank vegetation actually consisted of dense tall herbs or dense tall herbs and grass. Emergent vegetation also occurred in the channel, not tall herbs.
f. The cross-sections lack depth, and bank width measurements.
g. The land-use / habitat is frequently not defined fully e.g. replanted *Betula pendulous*, *Salix* spp. and *Larix decidua* woodland is simply annotated as A.1.1.2.
h. The descriptions of typical features lack quantitative data on bank height and slope; water depth; channel width and frequently lack details on physical channel features and flow characteristics.
i. The description of the bank communities is poor. The detail of species composition is inadequate and appears arbitrary, frequent tree and scrub species are often omitted in favour of less abundant ones, both banks are frequently described as one when they are obviously different in species composition and open areas and ground-flora is frequently omitted.
j. Marginal vegetation is often referred to as emergent and although emergent vegetation is frequently marginal it can also occur within the centre of the channel.

001 A boundary (hedge and stream) is omitted from the LB (mid-section) and so the land-use of the LS is shown as predominantly arable when downstream of this boundary the land-use is a young *Populus* spp. plantation over improved grassland. The block of land bordering the far downstream LB has not been annotated on the map. From the description it would appear that the channel is frequently dry and frequently choked by tall herbs, grasses and emergents, but this is not evident from the map. Individual trees and scrub are frequently omitted. *Callitriche* spp. has not been recorded.

002 The downstream end of the section is grossly exaggerated. Boundaries (fences, new hedges) are omitted from the LB and an inflowing stream is omitted from the end of the downstream RB.

003 Continuous scrub is mapped using both the scrub and hedge symbol and individual shrubs of *Sambucus nigra* are mapped using the tree symbol. The species annotation is also not particularly accurate. A fence boundary and a hedge and stream boundary are omitted from the downstream end of the section.

004 The map is drawn inaccurately and meandering sections are exaggerated. Continuous scrub is mapped using both the scrub and hedge symbol and individual shrubs of *Sambucus nigra* are mapped using the tree symbol. The species annotation is also not particularly accurate. The re-enforcement along the RB has not been mapped or recorded. The road is mapped too far away from the bank top. The downstream end of the channel should flow under the road. A fence should occur on the LB at the upstream end and a footbridge has been omitted - crosses the upstream channel.

005 The map is drawn inaccurately. Are eroding banks necessarily a potential threat to conservation?.

006 The upstream fence boundary on the LB is in the wrong place.

007 A footpath which follows the bank top is omitted from the map and description.

008 A footpath which follows the RB top is omitted from the map and description. The STW is recorded as existing management rather than land-use.

RBOX 025-032 & 035-036

a. No variation in bank height or slope is shown on the maps or occurs in the description - the only reference is on the cross-section.
b. Depth is only recorded on the cross-section.
c. The symbol for rapids is used instead of the symbol for a run.
d. Width is only recorded on the cross-section and no account for variation is given.
e. The substrate is never stated on the map.
f. The symbols for sparsely vegetated tall herb/ruderal vegetation are used throughout instead of the symbol for densely vegetated.
g. The description of the typical features and the bank communities is poor.
h. It is assumed that the dotted lines surrounding vegetation in the channel refer the extent of emergent growth rather than the occurrence of vegetated bars.
i. The descriptions of typical features lack quantitative data on bank height and slope; water depth; channel width; and lack details on physical channel features and flow characteristics.

025 The symbol for sparsely vegetated tall herb/ruderal vegetation has been used when the vegetation is dominated by a closed sward of grasses or by grasses and tall herbs. *Ranunculus penicillatus* has been missed.

026 a-g above.

027 Boundaries are occasionally omitted - a fence occurs at the upstream end of the RB and a hedge and fence occur at the downstream end of the LB. The boundary on the LB midsection is also shown as a continuous hedge when it is a disjunct fence and hedge.

028 The bank height is over-estimated. A footpath which occurs along the downstream RB top has been omitted.

029 The hedge symbol is used instead of the scrub symbol. Crop boundaries along both banks and a hedge boundary at the end of the section (downstream LB) are omitted.

030 A hedge boundary at the end of the section (upstream RB) is omitted as are two weirs (formed by tree trunks) that occur mid-section.

031 ETL are missed off the map.

032 Bank heights are over-estimated.

035 Bank heights are over-estimated. Drains are shown on the map which no longer occur.

036 Bank heights are over-estimated. A pond occurring on the downstream RB is omitted.

STOU 007-012

007 - 012

a. No variation in bank height or slope is shown on the maps (bank heights are also absent from the descriptions) - the only reference is on the cross-section and here the heights are over-estimated. (in particular in section 008 they should be 1-2.25m high and not 4m).
b. No variation in depth is recorded either on the maps or in the descriptions - the only indication of depth is on the cross-section.
c. No variation in width of channel is mapped or accounted for in the descriptions.
d. The substrate is not stated on the map.
e. The symbols for sparsely vegetated tall herb/ruderal vegetation and tall herb and grass are used when in fact the vegetation consisted of dense tall herb or dense tall herb and grass.
f. The cross-sections are incomplete and not very accurate.
g. The description of the typical features is poor lacking quantitative data on bank height and slope; water depth; channel width; and lack details on physical channel features and flow characteristics.

007 The fact that the stream is culverted upstream is not apparent either from the map or the description. The RB is shown as 5m high in the cross-section when it is only 1-2m high. The channel width is also over-estimated.

008 The extent of artificial banking is not mapped accurately. Land-use is not always annotated. Scrub and trees are absent from the downstream LB. The dominant tree and scrub species are not identified in the description.

009 Trees and scrub are not mapped very accurately. *Fallopia japonica* is not mapped or mentioned in the description - as an invasive alien plant it should be.

010 Hedge symbol used for scrub. Pools have not been mapped. Amenity grassland and footpaths along the downstream banks not recorded as recreation.

011 The hedge or tree symbols are used for scrub. A ditch which occurs on the LB at the downstream end is omitted. Pools have not been mapped.

012 Ditches at both the upstream and downstream ends (LB) have been omitted. Continuous scrub occurring along the LB upstream of the footbridge has also been missed. Tree and scrub species are not identified in the description.

3.4 FLORA RECORDING

No attempt has been made to audit the flora survey for the reasons given in section 1. However some aspects of the survey need to be commented on:-

a Throughout the flora forms have not been used as instructed by the methodology guidance i.e. the species name is never circled, only the generic name.

b. LDA frequently score less species than RCS contractors. This is due to two factors.

Firstly LDA follow the original methodology produced by N.T Holmes and record only the actual river and banks, or adjacent areas directly dependent on the river regime. The RCS contractors record the whole corridor i.e. if the river is embanked the RCS contractors have recorded the embankment and the land parcel to the adjacent soak drain. As a result they have, for example, recorded scrub species growing on the fence line 30m from the channel below a 2m high flood bank. Occasionally LDA score more then the RCS contractors reflecting under-recording of the channel vegetation by the RCS contractors.

Secondly the audit was carried out late in the season when marked changes in the vegetation have occurred in comparison to the spring and early summer. Species such as *Papaver*, *Hyacanthoides* etc. would have died back by the time of the audit.

3.5 PHYSICAL AND HABITAT DATA

We have not made any assessment of the accuracy of recording of these features as it is not possible for a number of reasons. There are bound to be differences in the recording of physical features affected by flow levels e.g. riffles, pools and berms/bars. In addition there are differences in interpretation of the field data. However these differences of interpretation are emphasised by lack of guidance on the assessment and recording of features. For example:

The data is only as good as survey maps. Where features e.g. cliffs are omitted or errors made such as in recording the adjacent land use then values vary

The adjacent land section doesn't include any codes for unimproved habitats, marsh etc.!

3.6 HABITAT SURVEY

Only four of the nineteen habitat surveys were supplied for the audit. It was not possible to directly compare the habitat surveys as the corresponding LDA audit habitat surveys were not supplied by Anglian Region. However there appear to be a number of problems:

a. Substrate should rarely be recorded as not visible. With a ranging pole it is usually possible to ascertain the substrate at least at the edge of a deep channel.

c. The final column of section G is not completed.

d. The grid reference is frequently omitted

e. There appears to be a certain amount of confusion over interpretation of the terminology.

SECTIONAL PROBLEMS

Several sections do not appear to have been filled in accurately. These inaccuracies vary between surveyors and between surveys so it is evident that a lot depends on the original standard of training:-

ETHU 008 (S PENNING)

a Physical Attributes.

A straight section with re-inforced banks and no bank top vegetation has surely been resectioned. The fact that the section is embanked has been disregarded.

b. Bank top Land-use and Vegetation Structure.

Scrub has been recorded as broad-leaved woodland

c. Channel Vegetation Types.

The emergent reeds have not been recorded as present. Even if they do not occur in the spot check they should have been noted in the catchall box.

d. Land-use within 50m of the Bank top.

Suburban and scrub should also be recorded as present.

e. Bank Profiles.

Vertical undercutting along the LB should be recorded as present and not extensive.

f. Extent of Trees and Associated Features.

There are no trees occurring along the RB.
There is no indication of the associated features from the rest of the river survey.

g. **Channel Dimensions.**

The water width is stated as 10m when on the corridor survey it is 20m and on the audit corridor survey it is 20-25m.

FINB 004 (D JOHNSON)

a. **Physical Attributes.**

The banks are recorded as clay and not earth. The banks are erroneously recorded as embanked. If the banks are in fact embanked (which they are not) then why do the bank profile or channel dimension categories not show this?. Exposed boulders and bedrock is recorded when the substrate consists of exposed silt, gravel and cobbles.

b. **Extent of Trees and Associated Features.**

Trees are not continuous along the LB or semi-continuous along the RB. Scrub is.

FINB 008 (D JOHNSON)

a. **Physical Attributes.**

The banks are recorded as clay and not earth.

b. **Land-use within 50m of the Bank top.**

Adjacent land-use of tilled land is recorded as present when it is extensive.

c. **Bank Profiles.**

$>45^{o}$ bank slope should have been recorded as extensive.

RBOX 036 (C DINES)

a. **Channel Dimensions.**

Embanked height is given in the channel dimensions, but no embankment occurs (or is mentioned in the bank modification section) therefore what does this measurement relate to.?

4. RECOMMENDATIONS

The major faults appear to be due to the use of staff who are not trained in field mapping and do not have a knowledge of geomorphological process or river management i.e. well trained, experienced staff.

NRA can take a number of steps to ensure that such improvements are made. These are identical to those recommended last year.

The current tendering procedure favours tenders who ignore training, quality control and the preparation of enhancement maps.

It is clear from the audit that survey staff need further training and more experience. This will only be given when NRA move away from a least cost tendering position. Consulting companies simply cannot afford to train staff. The short term nature of RCS surveyors' contracts mean that experienced surveyors soon seek more permanent employment elsewhere.

a. NRA tender procedure should require the cost of training and internal audit to be broken down and the number of days to be spent on internal audits to be identified.

b. We would recommend that an internal audit of 10% of the survey sections is adequate, provided that at least 2 audits per staff member are carried out within the first month and at least a further 2 audits are carried out during the season. This should take around 60 minutes per section plus travel time and costs and should involve the surveyors being taken over the section to see their mistakes. The actual audit should be undertaken by experienced surveyors, so staff costs should be more than for ordinary surveying staff.

c. NRA should request to see evidence of these audits having been completed and acted upon.

d. A further 10% of survey sections should be audited by NRA or on NRA's behalf. This should be done during the season using the field survey maps, rather than at the end of the season as in this case. If field survey maps are not adequately completed for audit purposes they will certainly not be adequate for use in the final reports or for preparing redrawn survey maps and writing the descriptions.

e. Very few enhancements have been suggested. It is impossible for a contractor to estimate how many enhancements will need to be identified, or where and when enhancement maps will be needed. At present tendering is unfair. An organisation that allows for the production of enhancement maps is priced out of contracts by those that do not supply enhancement details. NRA needs to clarify what is required in terms of enhancement. Asking for a rate per enhancement map and providing an estimate of the maximum number of maps required against which to prepare a tender price, would provide a more equitable basis for comparing tender costings. The contractor would then reduce the overall contract fee for every section for which an enhancement map was not required.

f. NRA should request details of, or be present at contractor staff training days.

g. NRA should request sight of additional guidance given by the contractor to staff on surveying and description writing and of the quality control measures that are undertaken. The Handbook guidelines are by no means adequate to ensure that a standardised approach is taken by all surveyors working for a contractor.

h. NRA needs to clarify the guidance given in the Handbook as there are too many contradictions. Issuing a copy of the audit procedure at tender stage would be useful in indicating the required standard. Clarification of the use of some symbols is required.

i. It is very difficult to tenderers to price work when the location and extent of the surveys of any particular river are not known at tender stage. This may result in a contractor finding themselves under staffed for a particular distribution pattern of rivers. As a result surveyors may be forced to work too fast with consequent effects on quality. NRA needs to give an indication of the location and extent of surveys on each river at tender stage.

   Clearly there is no point in surveying small, open rivers from both banks. The basis of the tenders and contracts needs to be made fairer, so companies who are unaware that a sizeable proportion of the rivers do not require surveying from both banks take this into account in their costings.

   This could be done by simply asking for a cost for single bank surveying and a separate cost for double bank surveying as in other regions. Either the length of double and single bank should then be specified at the tender stage, or the contractor required to provide a schedule of which rivers required double bank surveying and the payments would be adjusted accordingly after completion of the field element of the contract.