ANALYSIS OF 1995 SURVEY DATA AND RIVPACS UPDATE

R&D Progress Report E1/EMA 008/2 for the period 1st September to 30th November 1996

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ENVIRONMENT AGENCY

RESEARCH AND DEVELOPMENT
PROGRESS REPORT

1 TECHNICAL PROGRESS

The commencement date of the project was 3rd June 1996. This progress report covers the second three months of the work programme.

1.1 Objectives

The overall objective of the full research programme (Phases 1 and 2) is to:

- conduct a post-survey appraisal of the 1995 GQA biological survey data, both in terms of its assessment of biological quality, and as a tool for refining the methodology for future surveys.

The overall objective of the current phase, Phase 1 is to:

- undertake a scoping study for Phase 2 and prepare the principal tool to be used in the data analysis in order that Phase 2, comprising the data analysis and appraisal, will be undertaken most efficiently.

The specific objectives of the current phase are to:

- produce an enhanced version of RIVPACS III and its associated user manual incorporating the error terms detailed in R&D Note 412, for use in the Phase 2 data analysis and for Agency Operational purposes.

- identify and rank the options for further analysis of the 1995 GQA biological survey data and to select those most likely to meet business needs, in consultation with the Project Board and other specialists within and outside the Agency.

- produce a detailed PID and work specification for Phase 2 describing the analyses to be undertaken and the resulting products.

1.2 Work programme for the reporting period

The work programme outlined here is based on the "Month Completed" column of the "Target and Timscales" table in the Project Initiation Document of 12th June 1996.

1.2.1 Incorporation of error terms into RIVPACS III

The following agreed tasks were initiated:

- Develop and test software to derive confidence limits for EQIs using the outputs from R&D Note 412 in accordance with plan.

- Develop and test software to place sites in quality bands with attached probabilities of band membership, using the GQA banding scheme as default but with option for alternative banding schemes.

- Develop and test software to test for significance and magnitude of change in quality between sites or over time.

- Modify the RIVPACS III user manual to incorporate the error modules developed in the previous tasks.

These tasks are scheduled for completion by the 15th December 1996. The other task scheduled for completion by that same date is:

- Revise the RIVPACS III user manual to incorporate the new procedures in the core RIVPACS program.

1.2.2 Scoping study for Phase 2

The following items were scheduled to be completed during the reporting period, including some tasks which were carried over from the previous quarter:

- Agree circulation list for discussion document with Project Board (list to include Project Board members, Regional Biologists and other relevant persons both within and outside the Agency).

- Circulate discussion document requesting comments and alternative options and a ranking of all options in order of their relevance to Agency business needs.

- Collate returns from discussion document and prepare final list of priority items in conjunction with the three following steps:

- Identify availability of other data-sets required by priority options, and costs involved in their acquisition, manipulation and use.

- Examine compatibility between 1990 and 1995 data if consultation indicates that this is a priority option.

- Ensure that the selected options will meet Agency business needs by discussion with Project Board and other relevant Agency staff and that the work required is feasible within the projected timescale and budget.

1.3 Outputs produced

1.3.1 Incorporation of error terms into RIVPACS III

No specific outputs were produced during the reporting periods.

1.3.2 Scoping study for Phase 2

A discussion document listing options for additional uses of the 1995 GQA biological survey data was produced and circulated to the consultation group.

2 INTERIM RESULTS

2.1 Incorporation of error terms into RIVPACS III

The software development plan was circulated to selected Environment Agency staff by the Agency Project Leader, Dr R A Dines.

Detailed and helpful replies and comments were received from Brian Hemsley-Flint (The Agency Project Leader for RIVPACS R&D programme) and John Murray-Bligh (The Agency Project Leader for macro-invertebrate sampling audit programme). Following their comments, a series of revisions were made to the software plan.

Programming of the revised software, in FORTRAN, is well advanced and most routines have now been forwarded to Ruth Cox (ITE, Monks' Wood) for incorporation in a PANEL framework. PANEL is a software package designed to handle menu-driven enquiries and was used in the construction of RIVPACS III. It has been selected for the current revision, including the new "errors" module, in order to make the additional facilities "seamless" with the existing RIVPACS III package which is familiar to existing users.

Work on the incorporation of the PANEL structure will begin in early December and will take between 10 - 15 days to complete.

Production of the new sections of the RIVPACS manual is progressing in parallel with the programming. Principal attention has currently been given to new documentation of output file structures.

2.2 Scoping study for Phase 2

2.2.1 Production of a circulation list for the discussion document

The final circulation list was extended from that outlined in the progress report for the previous quarter (Table 2.1). The circulation list for the discussion document contained 15 options for comment and prioritisation (Table 2.2).

2.2.2 Circulation of the discussion document

The discussion document was circulated in the latter half of September. A total of 19 replies were received (Table 2.1), the majority of which included helpful comments and/or prioritisation of options (Table 2.3).

2.2.3 Collation of returns from the discussion document

The prioritisation of options provided by the respondents was tabulated in summary form (Table 2.3) for consideration at a Project Board meeting which has been arranged for Wednesday, 11th December.

Table 2.1 **An alphabetic list of the people consulted about options for further use of the 1995 GQA biological data. Asterisked replies contained no preferences. Bold replies explicitly state that they result from internal regional consultations.**

NAME	CODE	AFFILIATION	REPLY
Suzanna Allen	SA	Environment and Heritage Service (DoE, NI)	No
Patrick Armitage	PA	Institute of Freshwater Ecology	Yes
Sarah Chadd	SC	Environment Agency - Anglian	Yes
Elizabeth Chalk	EC	Environment Agency - North East	Yes
Bob Dines	RD	Environment Agency - Southern	**Yes**
Ron Edwards	RE	Environment Agency Board Member - Welsh	Yes *
Alastair Ferguson	AF	Environment Agency - Head Office	**Yes**
Elaine Fisher	EF	Environment Agency - North West	No
George Green	GG	Environment Agency - South West	No
Peter Hale	PH	Industrial Research Technology Unit (DoE, NI)	Yes
Brian Hemsley-Flint	HF	Environment Agency - North East	Yes
Shelley Howard	SH	Environment Agency - Midlands	**Yes**
Frank Jones	FJ	Environment Agency - Welsh	Yes
Ann Lewis	AL	Environment Agency - North East	Yes
Paul Logan	PL	Environment Agency - Thames	Yes
Dave Lowson	DL	Scottish Environment Protection Agency	**Yes**
John Murray-Bligh	MB	Environment Agency - Thames	Yes
Tim Pickering	TP	Environment Agency - North West	No
Roy Ramsay	RR	Environment and Heritage Service (DoE, NI)	Yes *
Graham Rutt	GR	Environment Agency - Welsh	No
John Steel	JS	Environment Agency - Thames	No
Roger Sweeting	RS	Environment Agency - Thames	No
Bill Walley	BW	Staffordshire University	Yes
Tony Warn	TW	Environment Agency - Anglian	Yes
Neil Weatherley	NW	Environment Agency - Head Office	Yes
John Wright	JW	Institute of Freshwater Ecology	Yes

Table 2.2 **The descriptive titles of the fifteen options set out in the document circulated for discussion.**

OPTION	TITLE
1	Distribution of taxa in relation to other factors
2	Impact of low flows
3	Distribution of the ecological quality of sites in relation to other factors
4	Statistical comparison of change in the ecological quality of individual sites sampled in both the 1990 River Quality Survey and the 1995 GQA
5	The relationship between temporal changes in ecological quality and losses, gains and changing abundance of individual taxa
6	Incorporation of data into the Countryside Information System (CIS)
7	Development of theoretical taxon distribution maps within CIS
8	Supply of data for IFE studies of the urban environment
9	Relationship between headwater quality and that of the rivers they feed
10	Evaluation of the performance of the 1995 banding system
11	Relationship between environmental factors and family richness
12	Substrate/habitat diversity in relation to family richness
13	Identification of national reference sites
14	Longitudinal patterns of zonation/community structure
15	Definitions of environmental niches of individual taxa and faunal assemblages

Table 2.3 **The order of preferences listed by the consultees. Numerical rankings are 1 (highest) to 15 (lowest). Alphabetic rankings are H (high), M (medium), L (low) and X (inappropriate). Italicised codes were interpreted by the IFE and not explicitly stated by the respondent. Lower case codes are conditional. Person codes are as given in Table 2.1. Option numbers are as given in Table 2.2.**

PERSON CODE	OPTION NUMBER														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
PA	L	M	H	H	?	?	?	H	?	?	*m*	*m*	*M*	*M*	*L*
SC	H	h	M	M	H	L	L	M	h	H	ML	ML	M	MH	M
EC	1	2	7	8	10	13	14	3	11	4	5	12	6	15	9
RD	H	*L*	*?*	*?*	H	h	h	L	h	H	H	L	L	L	L
RE	No preferences expressed														
AF	*M*	*M*	H (linked)			X	X	*L*	m	X	H	H	H	H	H
PH	?	?	H (linked)			?	?	?	H	?	?	?	?	?	?
HF	MH	H	M	MH	H	H	ML	MH	M	H	H	H	ML	L	L
SH	1	4	5	11=	2	11=	7	3	8=	6	11=	15	11=	8=	10
FJ	H	H	?	H	ML	ML	ML	L	L	H	H	L	L	MH	L
AL	?	?	?	h	?	H	?	?	?	?	L	?	?	?	?
PL	H	*L*	*M*	*M*	H	*m*	*m*	*?*	h	H	*l*	*l*	H	h	l
DL	*L*	M	H	H	*L*	*L*	H	*L*	*L*	H	*M*	M	H	H	*L*
MB	6	12	10	3	11	4	5	1	2	8	9	13	14	7	15
RR	No preferences expressed														
BW	Views incorporated in John Murray-Bligh's (MB's) reply														
TW	?	H	?	H	?	?	?	H	?	H	?	?	?	?	?
NW	?	?	H	H	?	X	X	H	?	H	?	?	H	?	?
JW	H	M	H	H	M	H	L	H	L	M	M	M	L	M	L

In addition to the options set out in the discussion document a further set of suggestions were supplied by the respondents and these are summarised in Table 2.4. Further details of the additional options will be made available to Project Board members prior to their December meeting.

Table 2.4 Brief titles and numbers of additional options for further use of the 1995 biological survey data, as suggested by the selected panel of consultees.

OPTION	
No.	**TITLE**
16	The effects of particular pollutants
17	Assessment of the extent of eutrophication and other chemical impacts
18	Assessment of the extent of acidification
19	The reasons for differences between biological and chemical site evaluations
20	Comparison of 1995 with 1990 results
21	Use of GIS in RIVPACS
22	Benefits of collecting additional information in 1995
23	Analysis of the 1995 quality audit data
24	Publish the results of the biological and chemical 1995 survey
25	Correction of the GQA database
26	Determination of analytical quality targets
27	Determination of downstream limits for the evaluation of ecological quality using freshwater macro-invertebrate assemblages

2.2.4 Availability of other data-sets

This issue will be addressed, if necessary, following discussions and short-listing of options at the December Project Board meeting. The major issue is likely to be the requirement or otherwise to lease or purchase geological, soils and terrain data for use in a Geographic Information System (GIS).

2.2.5 Compatibility between 1990 and 1995 data

This issue will be addressed, if necessary, following discussions and short-listing of options at the December Project Board meeting.

2.2.6 Relevance of selected options to the Environment Agency business needs

This issue will be addressed, if necessary, following discussions and short-listing of options at the December Project Board meeting.

3 PLANS FOR THE NEXT REPORTING PERIOD

The next reporting period is from 1st December 1996 to 28th February 1997.

Progress to date and options for the future will be discussed at a Project Board meeting to be held at Reading on Wednesday 11th December.

3.1 Incorporation of error terms into RIVPACS III

During the next reporting period all outstanding tasks from the previous quarter will be completed. These include to:

- Develop and test software to derive confidence limits for EQIs using the outputs from R&D Note 412 in accordance with plan.
- Develop and test software to place sites in quality bands with attached probabilities of band membership, using the GQA banding scheme as default but with option for alternative banding schemes.
- Develop and test software to test for significance and magnitude of change in quality between sites or over time.
- Modify the RIVPACS III user manual to incorporate to integrate the error modules developed in the previous tasks
- Revise the RIVPACS III user manual to incorporate the new procedures in the core RIVPACS program.

The following additional tasks will be initiated:

- Test the enhanced software using normal RIVPACS development procedures within IFE, and then in selected Agency regions.
- Carry out any necessary modifications identified by testing.

3.2 Scoping study for Phase 2

During the next reporting period any outstanding tasks from the previous quarter will be completed.

In addition the following tasks will be completed:

- Prepare a PID for Phase 2 including a detailed work specification.
- Prepare a draft R&D Note (now Technical Report) and a draft Project Record.

4 FACTORS WHICH MAY AFFECT THE ATTAINMENT OF ANY TARGETS OR TIMESCALES.

The work on software development and testing is approximately three weeks behind schedule.

It is currently hoped to make-up lost time and meet the agreed completion times for this element of the work programme.

The work on the scoping study is one month behind schedule and this delay is unlikely to alter. However, all scheduled tasks will be completed within the current financial year.

5 FINANCE

At the time of writing the contract between NERC and the Agency was awaiting signing. However, the work conducted to date has been within the budget outlined in the draft contract.

A financial summary for the reporting period will be available from the IFE Finance Office approximately two months after the end of the in question.

6 REASONS FOR ANY LIKELY UNDER OR OVERSPEND OF BUDGET

No under or overspend of the budget is currently anticipated.

The most realistic risk of an overspend is likely to arise from problems in software programming. Estimating the time needed to get a fully tested new piece of software to the operational stage is notoriously difficult. In the current instance the need to use the complex software package PANEL to make the new error module compatible with RIVPACS III exacerbates this risk.

7 OTHER MATTERS

No other issues have arisen which require reporting upon here.

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