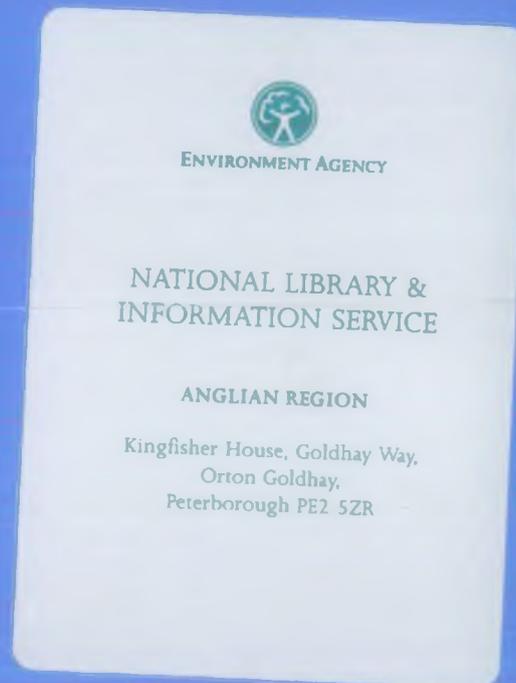


Demand for Irrigation Water

**Progress Report for the period
August 1992 to January 1993**



Silsoe College

February 1993

Progress Report 413/1/A



1. INTRODUCTION

This progress report is submitted in accordance with the terms of reference for NRA National R&D Project B 03 (92)2: Demand for irrigation water between NRA and Silsoe College

2. TECHNICAL PROGRESS

2.1 Specific objectives I and II

- (I) *To review and quantify past trends in irrigation, -(licensed and actual) in each of the ten Regions of the Authority; and*
- (II) *To identify relevant sources of information and any inadequacy in the collection of data on irrigation, either by NRA or by others and recommend improvements.*

MAFF Irrigation Census data have been obtained on a county basis for the years 1965, '67, '70, '72, '74, '77, '82 and '84. Because of changes in the questionnaire and county boundaries, data up till 1977 is not easily comparable with later data. This data has been converted to an NRA regional basis. For 1987 and 1990 MAFF has not published data on a county basis; this had to be obtained separately and has only just been provided (February 9th). This had delayed further analysis, but work is now able to proceed.

NRA licensed and abstraction data have been sought from each NRA region from 1974 onwards. The data that are readily available have been supplied from each region. Methods of classifying, storing, retrieving and supplying data vary between NRA regions, and sometimes within NRA regions for historical data. This creates problems in interpretation and analysis. Early data is patchy (much was held on paper records and cannot practically be accessed). NRA abstraction returns to DoE are complete for 1980 and 1984 to 1990 on an NRA region basis, but are often incompatible from region to region and do not always agree with other abstraction data supplied by NRA. Data on licensed quantities is much less complete. Usable data acquired to date are being brought to a common basis.

Data on total cropped areas for each of the main irrigated crops have been obtained on a county basis from MAFF published census reports, and converted to a NRA regional basis for 1974, '77, '82, '84, '87 and '90 for comparison with MAFF irrigation survey data.

The Potato Marketing Board and British Sugar collate limited data on irrigated areas. Data of relevance have been obtained.

A list of inadequacies in data collection is being prepared, together with recommendations.

2.2 Specific objective III

To review previous forecasts of irrigation demand made by NRA, its predecessors, by ACAH ("Water for Agriculture: Future Needs", February 1980) and any others.

The review is well underway but has yet to be written up. The following references have been examined:

- ADAS, MAFF, 1977, Economics of irrigation. Report of ADAS Working Party 1977.

ENVIRONMENT AGENCY



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- Advisory Council for Agriculture and Horticulture in England and Wales, 1980, Water for Irrigation: Future needs.
- Anglian Water Authority, 1978, Survey of demand for irrigation water.
- Anglian Water Authority, 1982, Forecast of abstraction demand for water.
- Anglian Water operations directorate, 1988, Anglian Water forecasts of demand for direct water use and for in-river needs.
- Bailey, R. J. and Minhinick, R., 1989, The agricultural requirements for water with particular reference to irrigation. *Irrigation News*, 15: 19-30.
- Cowton, M. T., 1981, A technique for the assessment of irrigation needs: case study for potatoes in Kent. MSc Thesis, Volumes 1 and 2. National College of Agricultural Engineering, Cranfield Institute, Silsoe, UK.
- Dutta, Sunil C. H., 1989, Irrigation demand forecasting: A methodology and case studies in eastern England. PhD Thesis, Silsoe College, Cranfield Institute, Silsoe.
- Ejikeme, E., 1989, Spray irrigation in Severn Basin. BSc thesis. (Cited by R Sainsbury)
- Gallagher, R. A., 1984, Water for irrigation in the UK: Demand, availability, and the growth of on-farm storage. Silsoe College, Cranfield Institute, Silsoe, UK.
- Kay, M. G., 1992, A review of trickle irrigation use in England and Wales for the NRA.
- Leeds-Harrison, P. B., 1991, Agricultural water demand. A report for the European Commission.
- National Water Council Working Group on Records of Agricultural Use, 1981, Spray irrigation - direct abstractions in the Southern Water Authority. (Cited in Gallagher 1984)
- NOP/Anglian Water Authority, 1978/79, Demand for irrigation water in the AWA area, volumes I & II
- NRA Anglian Region, 1990, Forecasts of abstraction demands for water. 1990 series. Public water supply and direct abstraction.
- NRA/University of Newcastle upon Tyne, 1990, Water resources and demands in the middle level. Main report, Annexe 1 Water resources, Annexe 2 Agro-hydrology, Annexe 3 Agro-economics.
- Sainsbury, R., 1992, Non mains agricultural demand. Stage 1: Regional geographic overview of agricultural and non agricultural demand for spray irrigation. South West Region, NRA.
- Sir William Halcrow and Partners, (undated, section only), Forecast of future demand for spray irrigation in the South West Region - a report for NRA (South West Region).

2.3 Specific objective IV

To quantify the potential theoretical needs for irrigation in each Region, based on climate, soil type, likely cropping patterns and other technical factors.

The Silsoe College 'Irrigation Water Requirements' model enables irrigation requirements to be calculated using historical weather data. Soil type and irrigation plans can be varied to calculate irrigation requirements under different scenarios for each of the main irrigated crops. Initial runs have been undertaken for the major climatic area, which covers much of Anglian Region and hence a large proportion of existing irrigation. The results are being checked before continuing the analysis.

2.4 Specific objectives V and VI

(V) To examine market forces and other influences on individual farmers and deduce their likely irrigation demands, in aggregate for each Region; and

(VI) To examine the overall agro-economic situation, nationally and internationally, and its potential evolution over the next 20 to 30 years, identify likely scenarios of required food production in England and Wales and alternative ways of achieving such production, and, deduce a range of future irrigation requirements and the principal factors which may determine them.

An economic model has been created on a spreadsheet using secondary data sources (including farm management and irrigation systems data). Within the model, gross margin data have been produced for twenty crops including potatoes, root crops, cereal, top fruit, soft fruit and vegetables. The gross margins have been created for wet, mean and dry weather years 'without' irrigation and for 'with' irrigation. The model also takes account of various irrigation systems and their associated costs.

The model enables cost benefit analysis to be carried out for a variety of future scenarios which include anticipated changes in prices of crops (incorporating price information currently being generated by the Manchester Model), non-irrigation costs, physical yields in response to irrigation applications, and changes in the costs of irrigation.

The UKIA has been approached to assist in defining a range of representative UK irrigation systems. A questionnaire on equipment and irrigation practices currently in use is being disseminated by the UKIA to farming members. Aggregated results will be made available to this study. The costs of these systems will be compared to the anticipated benefits over the next twenty to thirty years to assess the feasibility of irrigation under different scenarios, and hence likely farmer responses.

2.5 Specific objective IX

To advise on NRA's options for response to likely future irrigation demands.

The views of the consultative panel (see Appendix I) and the UKIA Executive Council have been sought with regard to the NRA's options (as listed in the contract) to obtain wider views and raise issues to be addressed.

3. INTERIM RESULTS

Due to the delays in obtaining recent MAFF irrigation data at county level, the analysis of irrigation and abstraction records has not yet been completed.

Our research confirmed a need for co-ordinating the collection and processing of licensing and abstraction data between NRA regions to ensure systems and data are compatible. The confidentiality restrictions on MAFF irrigation data severely limit the use of this data at local level.

It has become increasingly clear through the study that factors external to the irrigation industry will have a major effect on longer-term future irrigation demand (e.g. EC farm policy, GATT), and that NRA policy will have to contend with a wide degree of uncertainty on future demand.

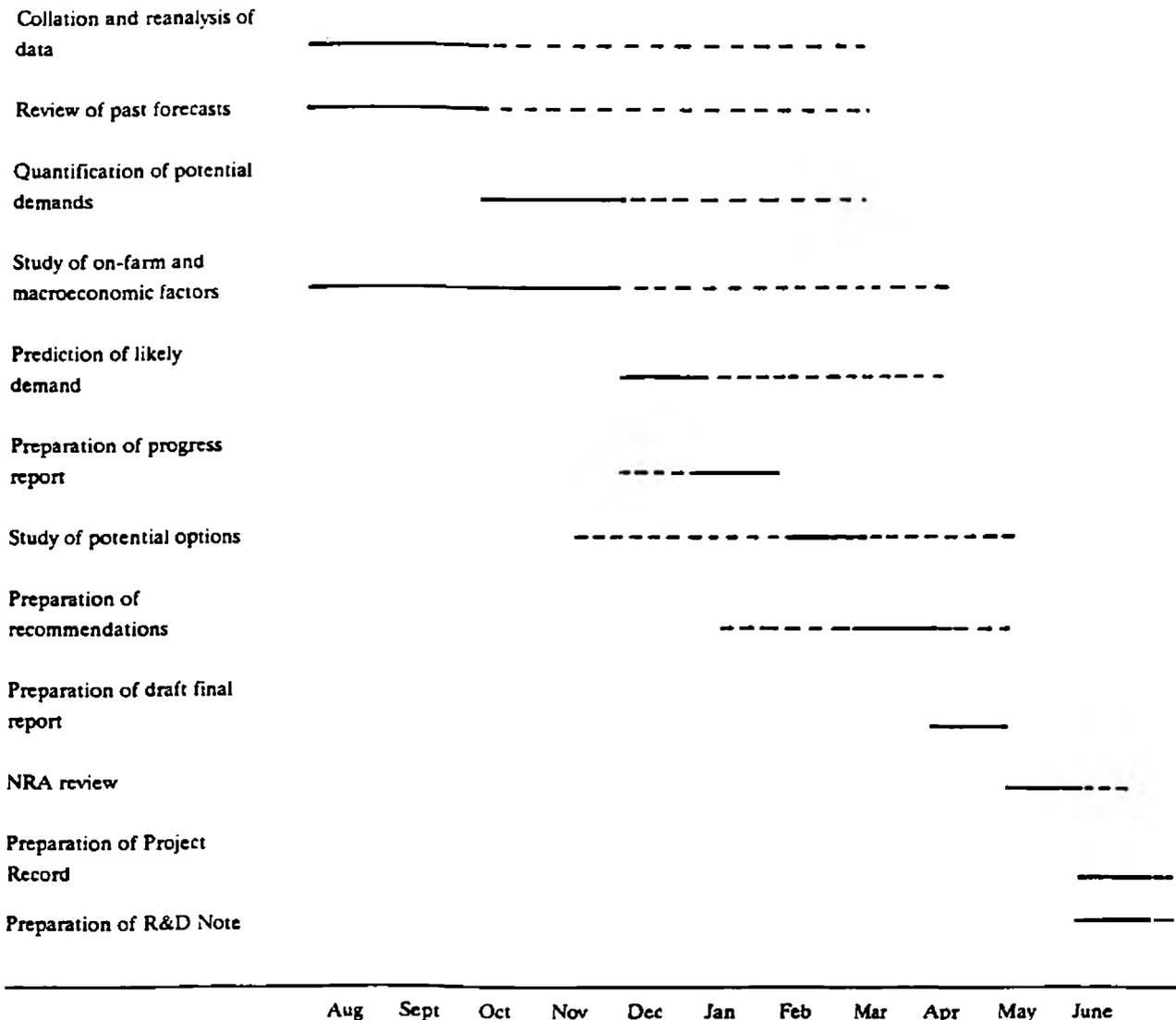
There is a strong preference amongst irrigators consulted so far for decisions on how best to use irrigation water (after allocation by NRA) to be left to individual farmers and/or farmer managed catchment committees.

4. PROGRAMME TO BE FOLLOWED

The proposed activity schedule is shown below. It is intended to complete specific objective I to IV within the next month provided the remaining data required (MAFF) becomes available.

There will be a second meeting of the consultative panel on February 23rd 1993. Discussions will be held with selected farmer over the next two months (in accordance with specific objectives II, IV, IX & X).

5. REVISED ACTIVITY SCHEDULE



6. BUDGET

	Revised budget					Original budget		
	To 31-12-92	31-12-92 to 31-3-93	Sub total to 31-3 93	31-3-93 to 30-6-93	Total	To 31-3-93	31-3-93 to 30-6-93	Total
Staff	16,943	11,584	28,527	8,663	37,190	34,126	3,014	37,140
Travel and subsistence	597	1,200	1,797	1,453	3,250	2,970	330	3,300
Consumables	1,594	900	2,494	506	3,000	2,700	300	3,000
Reports	0	150	150	1,350	1,500	150	1,350	1,500
			0					
TOTAL	19,134	13,834	32,968	11,972	44,940	39,946	4,994	44,940

APPENDIX 1

Consultative panel

- Ashburn, Martin, Levington Agriculture Ltd
- Dandy, Chris, MAFF, Horticulture and Potatoes Division
- Lloyd, Jiggy, NFU
- Munson, Katy, Henley Centre for Forecasting
- Paske, Michael, Honinton
- Pearce, David, Access Irrigation Ltd
- Upton, Robin, Upton Suffolk Farms
- Woods, Alan, Country Landowners Association
- Wright, Richard, English Nature
- Wright, Colin, Dept of the Environment
- (Silsoe Team: Carr, Mike; Kay, Melvyn; Morris, Joe; Weatherhead, Keith; Place, Alison)

One full meeting of the panel was held on 9th December 1992.
Discussions have also been held with individual members.