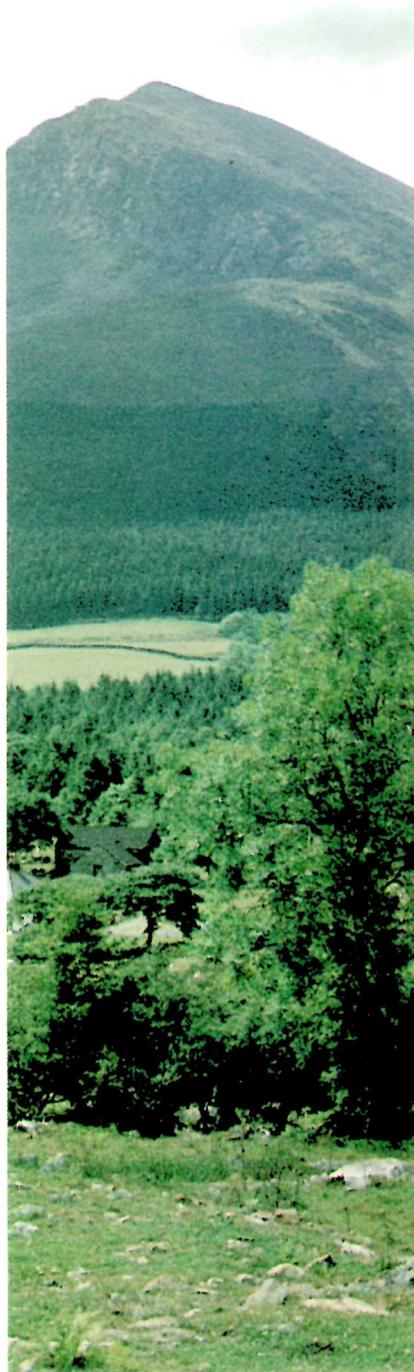


1988 - 1989

R E P O R T



Institute of
Terrestrial
Ecology

Natural Environment Research Council

Foreword

The Natural Environment Research Council produces an Annual Report summarising the activities across the organisation. Such an Annual Report can only provide selected information on the scientific activities of individual Institutes. It is therefore important for each Institute to produce its own Report which gives a full account of its research, its structure and its finances.

The Institute of Terrestrial Ecology is part of the Terrestrial and Freshwater Sciences Directorate of NERC. The Directorate's in-house capability also comprises the Institutes of Freshwater Ecology (formed in April 1989 from the staff and laboratories of the Freshwater Biological Association), Hydrology, and Virology and Environmental Microbiology (formerly the Institute of Virology but renamed in April 1989), the Unit of Comparative Plant Ecology (Sheffield University), the Water Resource Systems Research Unit (Newcastle University) and the Interdisciplinary Research Centre for Population Biology (Imperial College London).

The Institute of Terrestrial Ecology has a wide span of skills and disciplines and forms a core component of the Directorate. As noted in the Directors' report, the year has been active and eventful. In particular, it has been marked by the retirement of Dr Jack Dempster, its Director (South). I would like to take this opportunity to express my appreciation of his great contribution to the scientific reputation and management of ITE, and to welcome his successor Dr Mike Roberts with all good wishes for his future work with NERC.

P B Tinker

Director of Terrestrial and Freshwater Sciences
Natural Environment Research Council

**The Natural
Environment
Research Council**

**Report of the
Institute of Terrestrial Ecology
for 1988/89**

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Appendix 1 Staff at 31 March 1989

DIRECTORATES

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BAND 10 Mr Phillips R H E
H/KPR Miss Lindstrom I S

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Dr Boorman L A

Grade 7

Dr Davis B N K

Grade 7

Dr Dobson S

Grade 7

Mr Harding P T

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Mr Lakhani K H

Grade 7

Dr Marrs R H

Grade 7

Dr Monarty F

Grade 7

Mr Mountford M D

Grade 7

Mr Radford G L

Grade 7

Dr Sheail J

Grade 7

Dr Stebbings R E

Grade 7

Dr Welch R C

Grade 7

Mr Wells T C E

Grade 7

Dr Wyatt B K

SSO

Dr Bull K R

SSO

Dr Dawson A S

SSO

Mr French M C

SSO

Mr Frost A J

SSO

Mr Fuller R M

SSO

Mrs Greene D M

SSO

Mr Moss D

SSO

Dr Parr T W

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Mr Preston C D

SSO

Dr Village A

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Mr Arnold H R

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Mrs Hall M L

HSO

Mr Jones A R

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Mrs Leeson E A

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Mr Mountford J O

HSO

Mr Parish T

HSO

Mr Shore R F

HSO

Mr Wyllie I

HSO

Mr Yates M G

SO

Mrs Asher A

SO

Mr Greatorex-Davies J N

SO

Miss Hall J R

SO

Mr Howe P D

SO

Mr Leach D V

SO

Mr Plant R A

SO

Mrs Yates T J

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Mr Myhill D G

ASO

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Grade 7 Dr Thomas J A

Grade 7 Dr Ward L K

Grade 7 Dr Webb N R C

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 HSO Dr Sheppard L J
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 HSO Mr Munro R C

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 SO Mr Harvey F J
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 HSO Mr Scott R

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 Grade 7 Dr Booth M A
 Grade 7 Dr Fowler D
 Grade 7 Dr Leakey R R B
 Grade 7 Dr Longman K A
 (in Cameroon)
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 SSO Dr Crossley A
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 EO Mr Simms D
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 AO Mrs Holgate A (PT)
 TYP Miss Cottam S
 TYP Mrs Wilson M (PT)
 TYP Miss Benson C
 BAND 8 Mr Lethbridge R

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 Grade 7 Mr Brown A H F
 Grade 7 Dr Bunce R G H
 Grade 7 Dr Callaghan T V
 Grade 7 Dr Harrison A F
 Grade 7 Dr Horrill A D
 Grade 7 Mr Howard P J A
 Grade 7 Mr Lindley D K
 Grade 7 Mr Sykes J M

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 SSO Dr Ineson P
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 SSO Mr Parkinson J A
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 TYP Mrs Andrews P A
 BAND 8 Mr Littlejohn A D

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 Grade 7 Dr Kruuk H
 Grade 7 Dr Miller G R
 Grade 7 Dr Miles J
 Grade 7 Dr Moss R
 Grade 7 Mr Welch D

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 SSO Mr Cummins R P
 SSO Mr French D D
 SSO Dr Marquiss M
 SSO Mr Parr R A
 SSO Mr Paterson I S
 SSO Mr Picozzi N

HSO Mr Catt D C
 HSO Mr Conroy J W H
 HSO Mr Young W F

SO Mr Scott D
 SO Mr Trenholm I B

PTO Mr Morris J A

Appendix 2 Research projects at ITE stations at 31 March 1989

ITE (S) MONKS WOOD EXPERIMENTAL STATION

Programme 2 Land use, agriculture and the environment

T02052-5	EIC Remote sensing	B K Wyatt
T02052a2	Remote sensing techniques for habitat surveys	R M Fuller
T02052e1	Remote sensing in the Less Favoured Areas models for rural land use planning	B K Wyatt
T02052f2	Characterisation of grassland type and condition using remotely sensed data	B K Wyatt
T02052g5	Use of remote sensing for mapping and monitoring Sahelian rangelands	B K Wyatt

T02053-5	EIC GIS and cartography	B K Wyatt
T02053a2	Digital cartographic service	G L Radford
T02053b1	CORINE Biotopes project	D Moss
T02053c1	Scientific co-ordination of the CORINE programme	B K Wyatt
T02053e2	Ecological Data Unit	G L Radford

T02054-5	EIC Biological Records Centre	P T Harding
T02054a5	Biological Records Centre botanical recording schemes	C D Preston
T02054b5	Biological Records Centre vertebrate recording schemes	H R Arnold
T02054c2	The distribution and ecology of non-marine isopoda	P T Harding
T02054d5	Biological Records Centre terrestrial and freshwater invertebrate recording schemes	B C Eversham
T02054e5	Biological Records Centre general	P T Harding
T02054f2	Population fluctuations in annual legumes	C D Preston
T02054g5	Biological Records Centre data bank	C Appleby
T02054h5	Butterfly monitoring scheme	T J Yates

T02055-1	Environmental impact assessment	M D Hooper
T02055a1	Avalon Lakes design studies	M D Hooper
T02055b1	Channel Tunnel construction - monitoring terrestrial (and freshwater) ecology	R C Welch
T02055c1	Folkestone terminal - specialist advice	M D Hooper
T02055d1	Ecological appraisal of a potential power station site	M D Hooper

T02056-5	Grassland ecology	T C E Wells
T02056a2	Monitoring floristic changes	T C E Wells
T02056b1	Cutting of chalk grassland	T C E Wells
T02056c2	Population studies on orchids	T C E Wells

T02057-5	Historical ecology	J Sheail
T02057a5	Historical aspects of environmental perception	J Sheail

T02058-5	Vegetation dynamics	T W Parr
T02058a2	Roadside vegetation dynamics	T W Parr
T02058b2	Modelling competition in grass swards	T W Parr
T02058c1	Effects of growth retardants on the ecology of roadside vegetation in west Sussex	T W Parr
T02058d1	<i>Phragmites</i> seedlings - their use in RBTS sewage treatment	T W Parr
T02058e1	Factors affecting the establishment and performance of reeds (<i>Phragmites australis</i>) in RBTS systems a survey in the UK of reed bed treatment	T W Parr
T02058f1	Experimental studies on the management of reed beds for RBTS sewage treatment	T W Parr

T02059-5	Wetland dynamics and management	T Parish/ J O Mountford
T02059a2	Modern agriculture and wildlife	T Parish
T02059b2	Land use and ecology of Swavesey Fens - the fauna and flora in relation to both established and changing management	T Parish
T02059c5	Environmental impact of flood protection measures on the water regimes of wildlife habitats	J O Mountford

T02059d1	The effects of nitrogen on species diversity and agricultural production on the Somerset Moors	J O Mountford
T02059e5	British Rail-sponsored grassland experiments	J O Mountford

T02061-3	Agriculture and the environment (special topic programme)	J Sheail
T02061f3	Reducing residual soil fertility of abandoned agricultural land for the restoration of native vegetation	R H Marrs

Programme 4 Management of aquatic ecosystems		
T04053k1	Physical habitat simulation in rivers - model calibration (PHABSIM)	J O Mountford

Programme 7 Environmental pollution		
T07061-5	Hazard assessment	S Dobson
T07061a1	Hazard assessment on chemicals	S Dobson
T07061b1	Pesticides 'call-off' consultancy to DOE	S Dobson
T07061d1	Pesticide drift and impact	B N K Davis
T07061e2	Insecticide spray drift and bioassay	B N K Davis
T07061f5	Birds and pollution	I Newton

T07062-5	Aquatic ecology and ecotoxicology	K R Bull
T07062a1	Classification and comparison of river and lake catchments using computing techniques	K R Bull

T07062c5	Remote sensing of Eskdale and Dunnerdale	K R Bull/ B K Wyatt
T07062d2	Life history of the common frog	C P Cummins
T07062e1	Froglet production related to water chemistry and tadpole density in semi-natural pools	C P Cummins
T07062f2	Modelling of atmospheric deposition into catchments	K R Bull

T07063-5	Toxicology	D Osborn
T07063a2	Heavy metals in bats	R F Shore
T07063b1	Bats and pollution	R F Shore
T07063c2	Hedgehogs and pollution	R F Shore
T07063d2	Heavy metal metabolism in wild small mammals	R F Shore
T07063e2	The effects of liming moorland on small mammal populations (proposal)	R F Shore

T07065-3	Animal ecotoxicology (special topic programme)	A S Dawson
T07065c3	Interactive effects of pesticides on reproduction in birds	C Walker/ A S Dawson

Programme 8 Population ecology		
T08054-5	Population dynamics	I Newton
T08054a5	Population ecology of sparrowhawks (<i>Accipiter nisus</i>)	I Newton

T08055-5	Farmland birds	A Village
T08055a2	Kestrels in farmland	A Village
T08055b5	Birds on arable farmland	A Village

T08056-5	Bird physiology	A S Dawson
T08056a2	Physiological factors causing deferred sexual maturity in birds	A S Dawson
T08056c2	Reproduction in rabbits	A S Dawson

T08057g1	Sediment classification of the Rivers Stour and Orwell	M G Yates
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Programme 9 Community ecology		
T09051-5	Coastal systems	L A Boorman
T09051a2	Sand dune studies in East Anglia	L A Boorman
T09051b2	Plant establishment in woodland	L A Boorman

T09051d1	Studies on salt marsh erosion in Essex	L A Boorman	T08059-5	Plant geneecology	A J Gray
T09051e2	Invertebrates of Scottish sand dunes	R C Welch	T08059a2	Iso-enzyme studies in <i>Sphagnum</i>	R E Daniels
T09051f5	Comparative studies of salt marsh processes (proposal)	L A Boorman	T08059b2	<i>Spartina</i> population ecology	A J Gray
			T08059c5	Genetic variation in <i>Phragmites australis</i>	R E Daniels
			T08059d2	Nitrogen economy of <i>Drosera</i> species	R E Daniels
			T08059e1	<i>Spartina</i> niche model marginal vegetation in a post-barrage environment	A J Gray
T09052-2	Heath and moorland systems	R H Marrs			
T09052a2	Heathland management research	R H Marrs	T08059f1	Poole Bridge environmental enhancement	A J Gray
T09052b2	Long-term studies of vegetation change at Moor House NNR	R H Marrs	T08059g1	Poole Bridge replacement environmental impact assessment	N R Webb
T09052c2	Effects of grazing in Snowdonia	M O Hill			
T09053-2	Ecological processes in farm woodland	M O Hill	T08059h5	Culture and supply of reed plants	R E Daniels
T09053a2	Autecology of selected species on farm woodland	M O Hill	T08059i2	Population biology in peatland angiosperms	R E Daniels
T09053b2	Farm woodland - primary and secondary effects of tree planting on soil (proposal)	J M Sykes			
T09053c2	Modelling succession in farm woodland	M O Hill	T08060-5	Butterfly and ant studies	J A Thomas/ G W Elmes
T09053d2	Invertebrate fauna of native and introduced broadleaved trees in Britain	R C Welch	T08060a5	The conservation of the large blue butterfly	J A Thomas
T09053e1	Management guidelines for the conservation of invertebrates, especially butterflies, in plantation woodlands	R H Marrs	T08060b1	The ecology of woodland fritillary butterflies	J A Thomas
T09053f2	Nitrogen mineralisation in tropical forest soils	R H Marrs	T08060c2	Social biology of <i>Myrmica</i> species	G W Elmes
T09053i2	Artificial intelligence applied to ecological and distributional information systems	M O Hill	T08060d2	Large blue butterfly/ <i>Myrmica</i> ant interactions	G W Elmes/ J A Thomas
T09053j2	A survey of sand dunes in relation to grazing	L A Boorman	T08060e2	Population ecology and adaptive speciation of <i>Myrmica</i>	G W Elmes
Programme 11	Freshwater biology and chemistry		Programme 9	Community ecology	
T11053m2	The numbers of Atlantic salmon in some Scottish rivers	K H Lakhani	T09055-5	Heathland impacts	N R Webb
			T09055a1	Wytch farm development biological monitoring	R E Daniels
			T09055b1	Purbeck-Southampton pipeline biological monitoring	R E Daniels
			T09055c1	Hinkley Point public enquiry	R E Daniels
			T09055d1	Rehabilitation of oil well sites	R E Daniels
			T09055e2	Heathland invertebrates	N R Webb
			T09055f1	Restoration of heathland	N R Webb
			T09055g1	Restoration experiments for New Forest gas pipeline	N R Webb
			T09055h2	Dorset heathland survey	N R Webb
			T09055m1	Survey at Sandford Heath	N R Webb
Programme 13	Scientific services		T09056-5	Grassland and scrub dynamics	M G Morris
T13060-2	Statistical services in ITE South	K H Lakhani/ M D Mountford	T09056a2	Grassland management - invertebrates	M G Morris
T13060a2	Estimation of population parameters	K H Lakhani	T09056b2	Study of scrub succession on chalk at Aston Rowant NNR	L K Ward
T13060b2	Statistical consultancy	K H Lakhani	T09056c2	Rotational management of scrub at Castor Hanglands NNR	L K Ward
T13060c2	Population regulation and estimation	M D Mountford	T09056d5	Demography and conservation of scrub	L K Ward
T13060d2	Statistical consultancy in ITE	M D Mountford	T09056f2	Weevil studies	M G Morris
			T09056g5	National survey of natural ecosystems in Korea (proposal)	M G Morris
T13061-1	ITE South consultancies	T M Roberts	T09056h2	Invertebrate geographical ranges and climate	L K Ward
T13061a1	Small consultancies at ITE Monks Wood	M D Hooper			
ITE (S) FURZEBROOK RESEARCH STATION			T09057-5	Heathland vegetation dynamics	S B Chapman
Programme 8	Population ecology		T09057a2	Nutrient cycles in lowland heath	S B Chapman
T08057-5	Migratory wader ecology	J D Goss-Custard	T09057b2	Autecology of the marsh gentian	S B Chapman
T08057a2	Predator/prey interactions between the oystercatcher, <i>Haematopus ostralegus</i> , and its prey, particularly the mussel, <i>Mytilus edulis</i> , on the Exe estuary and adjacent coastal areas	J D Goss-Custard			
T08057b2	Winter feeding ecology of juvenile oystercatchers on the Exe estuary	J D Goss-Custard	Programme 13	Scientific services	
T08057c2	Habitat contraction, breeding density and reproductive output in waders. a feasibility study	J D Goss-Custard	T13060e2	Statistical and computing services at Furzebrook	R T Clarke
T08057d1	Wash birds and invertebrates	J D Goss-Custard	T13060f2	Statistical and computing services for the River Laboratory	R T Clarke
T08057e1	Predicting post-barrage densities of invertebrates and shorebirds	J D Goss-Custard	T13060g2	Statistical research	R T Clarke
T08057f1	Cardiff Bay barrage feasibility study- Rhymney alternative feeding grounds	C J Reading			
			T13061-1	ITE South consultancies	T M Roberts
			T13061b1	Small consultancies at ITE Furzebrook	M G Morris
T08058-5	Resident vertebrate ecology	R E Kenward			
T08058a2	Grey squirrel damage and management	R E Kenward	ITE (S) BANGOR RESEARCH STATION		
T08058b1	Goshawk population dynamics	R E Kenward	Programme 2	Land use, agriculture and the environment	
T08058c2	Foraging and reserve storage in red and grey squirrels	R E Kenward	T02060-5	Biogeochemistry and land use	J E G Good
T08058d1	Raptor ecology of Kluane Valley	R E Kenward	T02060a1	Nature conservation in upland conifer forests	J E G Good
T08058e2	Breeding success and survival in the common toad	C J Reading	T02060b2	Clonal selection in <i>Betula</i> and <i>Salix</i>	J E G Good
T08058f2	Ecology and population dynamics of the grass-snake (<i>Natrix natrix helvetica</i>)	C J Reading	T02060c1	Ecological survey of Capel Cynon	G L Radford

T07059e2	Effects of acid mist on mature trees	A Crossley	T01053e5	The scientific management of renewable natural resources in China	D K Lindley
T07059f5	Accumulation and effects of atmospheric particulates on forests	A Crossley	T01053f1	Effect of forest management on soil (proposal)	M Hornung
T07059g5	Early diagnosis of forest decline	J N Cape			
T07059h1	Throughfall, stemflow and 3S5 experiment	J N Cape			
Programme 12 Atmospheric science and hydrological extremes					
T12056-3	Atmospheric chemistry (special topic programme)	J N Cape			
T12056a3	Atmospheric chemistry Phase 1 (special topic programme)	J N Cape	T01054a2	Effects of pure and mixed stands on soils and vegetation	A H F Brown
T12056f3	Atmospheric chemistry Phase 11	J N Cape	T01054b2	The effects of management in lowland coppices	A H F Brown
T12056m3	The surface/atmosphere exchange of gaseous ammonia (Phase 2)	J Moncrieff	T01054d2	Soil and water acidity under different trees	A H F Brown
			T01054e2	Effects of clearfelling in pure and mixed stands on soil water chemistry (proposal)	S M C Robertson
			T01054f2	Effects of afforestation on fauna and flora	J M Sykes
			T01054g2	Long-term dynamics of semi-natural forest ecosystems	J M Sykes
Programme 13 Scientific services					
T13054a2	Utilisation of STATUS in ITE libraries cataloguing	S M Adair	T01054h2	Floristics of secondary woodlands and their manipulation (proposal)	J M Sykes
			T01054i2	Rehabilitation of riparian zones in coniferous forests (proposal)	J K Adamson
T13059-5	Edinburgh scientific support services	M G R Cannell			
T13059a2	Glasshouses and nursery support and development	R F Ottley	Programme 2 Land use, agriculture and the environment		
T13059b1	Plant culture for Inveresk Research International - winter wheat II	R F Ottley	T02051-5	Land use change and ecological impacts	R G H Bunce
T13059c1	Glasshouse consultancy to IRI (proposal)	R F Ottley	T02051a2	An ecological survey of Britain	R G H Bunce
T13059d1	Apple culture for IRI	R F Ottley	T02051b1	The environmental and socio-economic effects of the CAP	M Bell
T13059e5	Controlled environmental facilities at ITE Edinburgh	R Milne	T02051c1	Countryside implications of changes in CAP	R G H Bunce
T13059f2	Operation of the Rivox field site	R Milne	T02051d1	Environmental issues, agriculture and forestry land use options in Devon	R G H Bunce
T13059g2	Biometrics research and consultancy at ITE Edinburgh	R I Smith	T02051e1	Ecological consequences of land use change	R G H Bunce
T13059h2	Graphics, photography and scientific illustrations (proposal)	R H F Wilson	T02051g1	Mapping heather in England and Wales (proposal)	R G H Bunce
T13059i1	Plant culture for IRI - potatoes II	R F Ottley	T02051i2	Data base of research sites	M A Booth/ P A Ward
T13059j1	Plant culture for IRI - onions	R F Ottley			
			T02060e5	Review of catchment work in the COST countries (proposal)	M Hornung
ITE (N) MERLEWOOD RESEARCH STATION					
Programme 1 Forest science					
T01051-2	Ecology of woodland soil fungi	J Dighton			
T01051a2	Role of fungi in nutrient cycling with special reference to <i>Mycena galopus</i> in forest soil	J C Frankland	T02061h3	The future environmental implications of a possibly less intensive agricultural industry in England and Wales	R G H Bunce
T01051b2	An assessment of the status of mycorrhizas in the soil ecosystem	J Dighton			
T01051c2	Faunal/microbial interactions related to nutrient cycling and agricultural stocking of the uplands	J C Frankland	T02064-5	Environmental impact assessment - ITE(N) Merlewood	J M Sykes
			T02064a1	Botanical survey - British Gas Barrow onshore terminal (proposal)	J M Sykes
T01052-5	Soil nutrient dynamics	A F Harrison	Programme 7 Environmental pollution		
T01052a5	A comparison of biological and chemical assessments of the fertility of soils	A F Harrison	T07050-5	Radionuclides in vegetation and soil	A D Horrill
T01052b2	Cycling of key nutrients in forest soils and their inter-relationships	A F Harrison	T07050a1	The distribution and dynamics of radionuclides in relation to land use in west Cumbria	A D Horrill
T01052c5	Field methods in terrestrial nutrient cycling studies (proposal)	A F Harrison	T07050b2	The concentrations and movement of americium in a coastal ecosystem in Cumbria	A D Horrill
T01052d1	Effects of vitamin addition on nutrient mineralisation	J Dighton	T07050c1	Post-Chernobyl radiation levels in soils and vegetation	G R Miller/ A D Horrill
T01052e5	Assessment of P & K fertiliser responses of Sitka spruce (proposal)	A F Harrison	T07050d1	Radioactivity and wildlife a desk study	A D Horrill/ V H Kennedy
T01052f5	Assessment of P-deficiency in Sitka spruce, Pen-y-bont, Wales (proposal)	A F Harrison	T07050e1	Evaluation of data on the transfer of radionuclides in the foodchain (proposal)	A D Horrill
T01052g1	Application of nutrient bioassays to <i>Eucalyptus</i> forest management	J Dighton	T07050f1	The influence of mycorrhizas, potassium nutrition and microbial activity on radiocaesium cycling in heather-dominated ecosystems	A F Harrison
T01052h1	Investigation of nutrient deficiency of citrus plantations in Cheju, Korea (proposal)	J Dighton	T07050g2	Selenium inputs, distribution and cycling in upland grassland ecosystems (proposal)	A F Harrison
T01053-5	Forest nutrient dynamics	P Ineson			
T01053a2	A comparison of denitrification in felled and unfelled plots of Sitka spruce	P Ineson	T07051-5	Radionuclide/animal transfers	B J Howard
T01053b5	Nutrient cycling in European forests (proposal)	P Ineson	T07051a1	Sheep feeding trials	B J Howard
T01053c2	Biological manipulation of coniferous forest soils	C H Robinson	T07051b1	Recycling of radiocaesium	B J Howard
T01053d5	Rehabilitation of <i>Acacia</i> fallow systems and nutrient dynamics in the Blue Nile region, eastern Sudan	D K Lindley	T07051c2	Comparative radioecology of Ag-110m and Cs-137	N A Beresford
			T07051d1	The dynamics of radionuclide uptake by sheep	B J Howard

T07052-5	Geochemistry of radionuclides	F R Livens	T09056g5	National survey of natural ecosystems in Korea (proposal)	M G Morns
T07052a5	Relationships between soil organic matter and the actinide elements (actinides in soil organic matter)	F R Livens			
T07052b2	Terrestrial geochemistry of transuranic elements	A S Hursthouse	Programme 10 Environmental microbiology		
T07052c1	Radionuclides in freshwater systems	F R Livens	T10055g3	Modelling intra- and interspecific competition of ectomycorrhizal fungi on tree root systems	F Sanders/ J Dighton
T07052d2	Radiochemical development	F R Livens			
T07053-5	Soil microbial response to pollutants	P Ineson	Programme 13 Scientific services		
T07053a1	Effects of forest fumigation with SO ₂ and O ₃ on roots and mycorrhizas of trees	J Dighton	T13054-2 ITE library services		J Beckett
T07053b1	Effects of air pollution (proposal)	P Ineson			
T07053c2	Effects of atmospheric pollution on mycorrhizas (proposal)	J Dighton	T13055-5 ITE chemical research and development		J A Parkinson
T07053d2	Effects of sulphur dioxide on litter-decomposing fungi in deciduous woodland	J C Frankland/ P Ineson	T13055a2	Chemical support studies	J A Parkinson
T07053e5	Liming and faunal inoculation of forest soils: protection from acidification (proposal)	P Ineson	T13055b5	Analyses for certification of EEC international tree leaf reference materials	J A Parkinson
			T13055c1	Chemical analyses for Nature Conservancy Council 1 Orkney waters 2 Speyside lochwater	J D Roberts
			T13055d1	Chemical analyses for universities	J A Parkinson
T07054-5	Acid deposition and its effects	M Hornung	T13055e5	Standardisation scheme for chemical analysis of plant material for TSBF programme (proposal)	A P Rowland
T07054a1	Acidification of waters in Wales	M Hornung			
T07054c1	Subcontract to Aberdeen University	M Hornung/ M Cresser	T13055f1	Chemical analyses for private organisations	J A Parkinson
T07054d1	Subcontract to Lancaster University	M Hornung/ T A Mansfield			
T07054e1	Subcontract to Nottingham University	M Hornung/ J Colls	T13056-4 NERC mass spectrometer service		C Quarmby
T07054f5	Solutes beneath larch and Sitka spruce at three sites (proposal)	J K Adamson	T13056a2	NERC mass spectrometer service	C Quarmby
			T13057-5 Merlewood scientific support services		D K Lindley
T07055h3	Effects of elevated inputs of nitrogen on the uptake metabolism, retention and allocation of nitrogen in tree crops	G R Stewart/ A F Harrison	T13057a2	Graphics and publications	C B Benefield
T07055k3	Interaction of enhanced N loading on soil nutrient dynamics and forest growth	M Hornung	T13057b2	Biometrics and modelling support services at Merlewood	D K Lindley
			T13057c1	ITE advice and services to NCC	J M Sykes
T07056f2	Phenology in the spring of 1989 (proposal)	J M Sykes			
T07056g2	Modelling the impact of climatic change on the productivity, species composition, and decomposition in a UK mixed deciduous forest (proposal)	P Ineson/ A F Harrison			
T07056h2	Evaluating the response of upland organic soils to CO ₂ -induced climatic change (proposal)	P Ineson	ITE (N) BANCHORY RESEARCH STATION		
T07056i2	Evaluating the response of soils to increases in the CO ₂ content of the atmosphere (proposal)	P Ineson	Programme 2 Land use, agriculture and the environment		
T07056j2	Determination of the impact of CO ₂ -induced climatic change on forest decomposition processes (proposal)	P Ineson	T02050-5 Human impact, erosion rehabilitation		A Watson
			T02050a1	Human impact in the Cairngorms	A Watson
			T02050b1	Revegetation after disturbance	J Miles
			T02050c2	Ecological impact of downhill sking developments in north-east Scotland	G R Miller
			T02050d1	Aonach Moor development plan	N G Bayfield
			T02050e1	Footpath rehabilitation studies for the Yorkshire Dales National Park Committee	N G Bayfield
			T02050f2	Soil erosion on north-east Scottish farmland	A Watson
T07066-3	Environmental radioactivity (special topic programme)	V H Kennedy	T02050g1	Effects of past management on the potential of upland soils to support plant growth (proposal)	G R Miller
T07066b3	Uptake of radiocaesium by plants and the role of mycorrhizal fungi in mediating uptake	J Dighton	T02050h1	Restoration of upland vegetation	N G Bayfield
T07066c3	Effects of sward conditions on radiocaesium cycling in hill and upland sheep systems	R Mayes/ B J Howard	T02050i1	Path revegetation trials on the Pennine Way	N G Bayfield/ G R Miller
T07066d3	Dynamic modelling of pathways for radionuclides from the atmosphere to grazing animals	M H Unsworth/ B J Howard	T02050j1	Environmental impact assessment of Intake 8 (proposal)	N G Bayfield
T07066g3	Migration and retention of radionuclides in soils	A G O Donnell/ D Rummer/ P Ineson	T02050m2	Manipulation of plant successions on disturbed ground (proposal)	N G Bayfield
			T02050n1	Erosion control on the North/South Highway, Malaysia (proposal)	N G Bayfield
Programme 8 Population ecology			Programme 7 Environmental pollution		
T08050g2	Population genetics of mute swans	P J Bacon	T07050c1	Post-Chernobyl radiation levels in soils and vegetation	G R Miller/ A D Horrill
T08052-5	Plant strategies: response to environmental stress	T V Callaghan	T07056c5	Summer and autumn snow patches on Scottish mountains in relation to climate	A Watson
T08052a2	Plant responses to environmental stress at high latitudes	T V Callaghan			
T08052b5	Strategies of growth and population dynamics of tundra plants related to climatic change	T V Callaghan	Programme 8 Population ecology		
			T08050-5 Vertebrate population dynamics and upland habitat geometry		R Moss
Programme 9 Community ecology			T08050a2	Population dynamics of red grouse	R Moss
T09053b2	Farm woodland - primary and secondary effects of tree planting on soil (proposal)	J M Sykes	T08050b5	Demographic effects of nest predation on golden plovers and other moorland waders	R A Parr

T08050c5	Population ecology of capercaillie	R Moss	T09050c2	Development of subalpine scrub at northern Corries, Cairngorms SSSI	G R Miller
T08050d1	Effects of afforestation on moorland birds and their predators	R A Parr	T09050d1	Response of <i>Gentiana nivalis</i> population to withdrawal of sheep grazing	G R Miller
T08050e1	Park Hall grazing survey (proposal)	R Moss	T09050e1	Modelling the agricultural and environmental consequences of sheep and red deer grazing heather moorland (proposal)	B W Staines/ D Welch
T08050f5	Adaptation of capercaillie to novel environments (proposal)	R Moss			
T08051-5	Population ecology of predators	H Kruuk			
T08051a2	Hérons and pollutants in aquatic ecosystems	M Marquiss	T09050f2	Vegetation dynamics and soils	J Miles
T08051b2	Occurrence of some heavy metals and PCBs in otters in Shetland	H Kruuk	T09050g2	The effects of birch on moorland soils and vegetation	J Miles
T08051c5	The effects of environmental factors on populations of otters and fish in the north of Scotland	H Kruuk	T09050h2	Early changes in soils under birch and heather	A J Ramsay
T08051d5	Piscivorous birds in Scottish salmon rivers	M Marquiss	T09050i2	Dynamics of <i>Macchia</i> (proposal)	J Miles
T08051e5	Ecology of the pine marten	D Balharry	T09050j5	Effects of sheep withdrawal on upland vegetation and wildlife (flora and fauna) and landscape	R Moss
T08051f5	Effect of water temperature on the behaviour and ecology of the European otter (<i>Lutra lutra</i>)	P S Taylor	T09050k2	Deer in production forests	B W Staines/ D Welch
T08051h5	Monitoring of seabird populations and performance in the North Sea	M P Harns	T09050l2	Response of Sitka spruce to browsing and bark-stripping damage	D Welch/ B W Staines
T08051i2	Feeding ecology and energetics of high- and low-latitude shags	M P Harns			
Programme 9 Community ecology			Programme 13 Scientific services		
T09050-5	Dynamics of upland and montane plant communities	G R Miller	T13053-5	Services at ITE Banchory	B W Staines
T09050a2	Quantity and quality of seeds produced by montane plants	G R Miller	T13053a1	Ecological advisory appointment with SDD	J Miles
T09050b5	Effects of grazing on <i>Nardus</i> and <i>Calluna</i> moorland	D Welch	T13053b5	Caring for the high mountains - conservation of the Cairngorms	J W H Conroy
			T13053c1	Brathens consultancies	B W Staines
			T13053d2	Computing and statistical advice	D D French
			T13053e1	Scottish Office consultancy	J Miles

Appendix 3 Publications by ITE staff in 1988-89

- Ashenden, T W & Bell, S A.** 1988 Growth responses of birch and Sitka spruce exposed to acidified rain *Environ Pollut*, **51**, 153-162
- Ashenden, T W & Williams, J H.** 1988 Differences in the spectral characteristic of birch canopies exposed to simulated acid rain *New Phytol*, **109**, 79-84
- Bailey-Watts, A E.** 1987 Fluctuations in the population density of *Aphanizomenon* in a small eutrophic lake (Coldingham Loch, Scotland) before and after de-stratification by aeration *Schweiz Z. Hydrol*, **49**, 387-388
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- Bailey-Watts, A E.** 1988 Studies on the control of the early spring diatom maximum in Loch Leven 1981 In *Essays in phycology algae and the aquatic environment*, edited by F E Round, 53-87 Bristol Biopress
- Bailey-Watts, A E & (Komarek, J).** 1987 Size assessment and variation in size of phytoplankton *Schweiz Z. Hydrol*, **49**, 390-392
- Bell, M.** 1988 Forestry always on the land left to Cain? In *Farming and forestry*, edited by G R Hatfield, 15-36 (Forestry Commission occasional paper 17) Edinburgh Forestry Commission.
- Bell, M.** 1988 Integration and evaluation of rural policy in a period of rapid change In *Rural information for forward planning*, edited by R G H Bunce & C J Barr, 33-39 (ITE symposium no 21) Grange-over-Sands Institute of Terrestrial Ecology
- Bell, M.** 1988 Methods for the identification of priorities in rural planning (Workshop report) In *Rural information for forward planning*, edited by R G H Bunce & C J Barr, 108 (ITE symposium no 21) Grange-over-Sands Institute of Terrestrial Ecology
- Boorman, L A.** 1989 The influence of grazing on British sand dunes In *Perspectives in coastal dune management*, edited by F van der Meulen, P D Jongenius & J H Visser, 121-124 The Hague SPB Academic Publishing
- Boyd, I L, Myhill, D G & (Mitchell-Jones, A J).** 1988 Uptake of gamma-HCH (lindane) by pipistrelle bats and its effect on survival *Environ Pollut*, **51**, 95-111
- (Briggs, D) & Wyatt, B K.** 1988 Rural land-use change in Europe In *Land-use and the European environment*, edited by M Whitby & J Ollerenshaw, 7-25 London Belhaven
- Brown, A H F.** 1988 Discrimination between the effect on soils of 4 tree species in pure and mixed stands using cotton strip assay In *Cotton strip assay an index of decomposition in soils*, edited by A F Harrison, P M Latter & D W H Walton, 80-85 (ITE symposium no 24) Grange-over-Sands Institute of Terrestrial Ecology
- Brown, A H F & Howson, G.** 1988 Changes in tensile strength loss of cotton strips with season and soil depths under 4 tree species In *Cotton strip assay an index of decomposition in soils*, edited by A F Harrison, P M Latter & D W H Walton, 86-89 (ITE symposium no 24) Grange-over-Sands Institute of Terrestrial Ecology
- Brown, N J & Norris, D A.** 1988 Early applications of geographical information systems at the Institute of Terrestrial Ecology *Int J Geogr Inf Systems*, **2**, 153-160
- Bull, K R.** 1988 Classification models and water resource planning In *Rural information for forward planning*, edited by R G H Bunce & C J Barr, 82-84 (ITE symposium no 21) Grange-over-Sands Institute of Terrestrial Ecology
- Bull, K R, Hall, J R & Bunce, R G H.** 1988 The use of physical parameters for selecting representative samples of river catchments *J Environ Manage*, **27**, 405-420
- Bunce, R G H.** 1988 The application of the site classification to the nutritional consequences of forestry in Britain In *Predicting consequences of intensive forest harvesting on long-term productivity by site classification*, edited by T H Williams & C A Gresham, 93-102 (IEA/BE project A3, report no 6) Georgetown Baruch Forest Science Institute of Clemson University
- Bunce, R G H.** 1989 *A field key for classifying British woodland vegetation Part 2* London HMSO
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- Callaghan, T V.** 1987 Plant population processes in arctic and boreal regions In *Research in Arctic life and earth sciences present knowledge and future perspectives*, edited by M. Sonesson, 58-68 (Ecological bulletins 38) Copenhagen Munksgaard.
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- Cannell, M G R, Sheppard, L J & (Cahalan, C M).** 1988 C effects and second generation clone performance in *Picea sitchensis* and *Pinus contorta* *Silvae genet*, **37**, 15-19
- Cannell, M G R, Sheppard, L J & Milne, R.** 1988 Light use efficiency and woody biomass production of poplar and willow *Forestry*, **61**, 125-136
- Cape, J N.** 1988 Air pollutant effects on conifer leaf surfaces In *Scientific basis of forest decline symptomatology*, edited by J N Cape & P Mathy, 149-159 Brussels Commission of the European Communities
- Cape, J N.** 1988 Chemical interactions between cloud droplets and trees In *Acid deposition at high elevation sites*, edited by M H Unsworth & D Fowler, 639-649 Dordrecht Kluwer
- Cape, J N.** 1988 Recent developments in the diagnosis and quantification of forest decline In *Air pollution and ecosystems*, edited by P Mathy, 292-305 Dordrecht Reidel.
- Cape, J N & Unsworth, M H.** 1988 Deposition, uptake and residence of pollutants In *Air pollution and plant metabolism*, edited by S Schulte-Hostede, N M Darrall, L W Blank & A R Wellburn, 1-18 London Elsevier Applied Science
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