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ANNUAL CLIMATOLOGICAL BULLETIN NO. 6, 1984

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THE WEATHER OF 1984

Looking at 1984 convinces me that the powers in control of our weather are professional statisticians; the warmth of the summer more than compensated for the cold of the winter and autumn's rainfall filled the reservoirs which summer had emptied. The first half of the year moved us from the blizzards of January to the baking heat of July, the second half from brown lawns to the floods of November.

January. Very cold and wet. A great deal of snow.

Weather patterns were dominated for much of the month by strong high pressure to the south-west and west of Britain extending N.W. to Greenland. Heavy snow fell in cold polar air. A number of deep depressions brought very strong winds. The first few days were relatively mild and the first light snow was not recorded until the 9th. Between the 11th and 13th severe storms brought considerable structural damage and local rivers overtopped their banks. Heavy snow began late on the 13th and by the 15th had accumulated even on the lowest ground to 30 cms. More snow fell intermittently over the next week and on the 20th, as an anticyclone lay over Britain, temperatures fell to the year's lowest, e.g. −20°C was recorded at Braemar. Strong winds and snow on 21st and 22nd brought blizzard conditions and many main roads were blocked for the next few days. By the 27th there were signs of a thaw but by the end of the month extensive and by now rather dirty snow patches were still lying on low ground, with a thick cover remaining on the hills.

February. Unsettled and wet, becoming dull.

While pressure remained high to the south a strong westerly airstream affected Scotland for the first seven days. Pressure then increased from the south-west to dominate the weather for the remainder of the month with the exception of 20th and 21st when a deep depression moved in from the west. There were intermittent snow showers during the first week but not until the 6th were there any significant accumulations. Thunder was heard during heavy snow on the 6th and by the 7th 30 main roads were blocked in north-east Scotland. Black ice early on the 8th caused a number of road accidents. The pressure rose very quickly on the 9th and remained high for the next week. The weather was exceptionally dull and the visibility very poor. The wind strengthened late on the 20th and heavy snow fell overnight which eventually turned to rain. As pressure rose again on the 22nd, dull weather returned for

most of the remainder of the month.

March. Cold and rather raw.

High pressure lay across Britain until the 10th. This then moved to the north bringing Britain into a cold easterly airstream from the Continent. Atlantic weather systems moved slowly across the country after the 22nd. The first two days were cold and dull but the 3rd was bright and sunny and the first spring flowers appeared. The weather became exceptionally mild on the 4th and remained so until the 10th, topping 12°C on three days at the University. Temperatures fell sharply on the 11th and the weather remained dull and cold until the 23rd with only one or two brighter days. Official 'Summer Time' on the 25th brought a raw easterly wind and snow at 150m above sea-level. These last few days generated the month's heaviest rain, which occasionally turned to sleet.

April. cold at first, exceptionally dry.

High pressure lay over the British Isles for most of the month although weak fronts occasionally crossed Scotland bringing a little rain. Clear skies resulted in night frosts but daytime temperatures began to soar by the end of the month, exceeding 20°C on the 24th and 25th. Daily temperature range frequently exceeded 15°C. The month's total rainfall of 8mm at Parkhead was only 24% of the average for what is normally a dry month.

May. Mainly dry; variable and unsettled at times.

Pressure increased during the first week and remained high until the 13th. A broad low then became established over western Europe and the weather became cyclonic variable. The first five days were relatively mild although visibility deteriorated, culminating in fog on the 5th. The sky cleared on the 6th and the weather until the 9th was bright, but frosty at night. The weather was extremely variable for the remainder of the month and heavy showers fell on some days. The greatest daily total rainfall came from an intense thunderstorm on the 24th during which hailstones of diameter 1cm fell. Further heavy storms, with hail, fell on the 26th. The last spring frost was recorded in some sheltered locations on the 27th in a cold, clear, northerly airstream.

June. Mainly dull but with some bright interludes. Warm.

A broad area of low pressure lay over Britain for the first week but this gave way to an area of high pressure moving in from the south-west on the 8th which remained over England until the 20th. However, frontal troughs crossed Scotland during this period bringing occasionally dull wet weather. The anticyclone drifted westwards after the 20th bringing Britain into a cold clear north-westerly airstream. Cloud amounts

were generally small during this period, which gave pleasantly fresh weather until the 30th when pressure increased from the west.

The first six days were cloudy with occasional rain but as pressure rose daytime temperatures improved in a dry easterly breeze. A weak front lingered over Scotland between the 10th and 13th bringing cloud and occasional rain. The 14th and 15th were again sunny and warm. The heavy thunderstorms which affected England and the Borders on the 16th didn't reach the Stirling area although the weather was oppressive (cloud 8/8, temperature 23°C). Winds became fresh west to north-west on the 21st with rain falling on the 21st and 27th.

July. Warm and very dry.

The weather was dominated by broad areas of high pressure which covered Britain from 1st to the 7th and 15th to 27th. The intervening period, during which the pressure fell only slowly, was cloudy and warm but very little rain fell from the weak fronts which travelled eastwards across Scotland. Pressure began to fall again on the 26th and for the remaining five days a broad slow-moving area of low pressure and its associated fronts lay over Britain. The first five days were warm and sunny, and were marked by the first official declarations of drought in western England. The weather became very hot on the 7th after overnight showers and remained very warm for the next week. Heavy showers fell on the 12th. After a brief cooler spell on the 14th and 15th, maximum temperatures soared back into the mid-twenties, topping 25°C on 5 of the next ten days. By the 26th the weather began to break and heavy continuous rain fell on the 27th which was welcome but short-lived relief from the drought.

August. Warm and dry becoming cooler later.

A slow-moving low moved in from the south-west to fill over Britain by the 4th. A ridge of high pressure then extended north-eastwards to dominate the weather until the 20th. A thundery low lay briefly over the country until the 24th, to be replaced by high pressure for a further three days. As the high slipped south, Scotland came into a cool Atlantic airstream from the 28th.

The first few days were cool and damp but the weather became sunny and warm by the 5th. The next 14 days were pleasantly warm although dull at times. Pressure was falling steadily by the 16th, and the 18th was dull and wet. The next four days were oppressively hot, reaching 30°C in many areas, but the thunderstorms in southern England stayed down there! Things began to cool down on the 28th and rain fell on three of the remaining days.

September. Cool and wet.

Pressure remained relatively low for the first three days and active fronts moved across Scotland. Pressure began to increase from the west

on the 4th but retreated again by the 8th to be replaced by Atlantic weather systems until the 21st. A strong ridge of high pressure lay to the west of Britain bringing in a cool northerly airstream between the 23rd and 25th but a vigorous depression breached the ridge on the 26th.

The 1st came as a sharp shock after the summer as daytime temperatures fell to 12·9°C at Parkhead and 28mm of rain were registered. Amounts of rain on the following three days were slight and by the 5th temperatures had recovered in warm sunny weather. Between the 8th and 30th the weather was variable but generally wet, with occasionally fresh westerly winds. Fog occurred on the 29th, clearing to give a last warm day.

October. Mild but very wet.

A shallow area of low pressure drifted slowly north-eastwards across Scotland over the first four days. Pressure rose briefly on the 5th and 6th but as high pressure became established to the south of the British Isles Scotland experienced a fresh westerly airstream until the 13th. High pressure moved north-westwards between the 14th and 16th but was replaced by vigorous Atlantic weather systems which dominated the weather for the remainder of the month. As a very deep depression crossed northern Scotland on the 18th pressure fell by 20mb in less than eight hours. The resulting gales caused considerable structural damage and blocked many roads. The hourly *average* wind speed at Carim weather station reached 22·6 $msec^{-1}$ just before noon (see Figure 1) when the rate of pressure fall was at its maximum. Another deep depression on the 24th and 25th brought heavy overnight rain (38·3mm) and widespread floods. These floods had hardly subsided before yet another storm occurred on the 29th (29.7mm) which caused widespread severe flooding. With the winds mainly in the west, temperatures remained above average and no air frosts were registered during the month.

November. Mild and exceptionally wet.

Interludes of more stable anticyclonic weather were all too brief in a month dominated by cyclonic weather systems. Heavy rain fell on the first day of the month and, as a depression became slow-moving over Scotland, heavy continuous rain fell on the 3rd (68·3mm) bringing severe flooding and initiating several mudslides on the slopes of the Ochil Hills. As the pressure rose in cold clear air on the 5th and 6th the first frosts occurred, night time temperatures falling to −4·3°C at Parkhead on the 6th – bonfire smoke on the 5th was seen to be carried down the Forth valley in a well developed katabatic airflow. The remainder of the month was exceptionally mild, daytime temperatures exceeding 10°C on no fewer than 12 days. An area of low pressure moving eastwards to fill over the Low Countries on the 16th and 17th brought two very dull days, lights remaining on all day on the 16th. A series of deep depressions to the north of Scotland after the 20th brought

heavy rain and strong blustery winds. Conditions were particularly severe on the 26th and 27th when TV programmes were interrupted to issue storm warnings. Many roads were blocked by either trees or floods. Above 2000 ft. much of the rain fell as snow.

December. Generally mild and wet but some cold interludes.

While pressure remained high over central Europe, Scotland came into a mild south-westerly airstream and associated frontal activity until the 11th. The weak low which moved into the Celtic Sea on the 12th drifted slowly eastwards and filled, to be replaced by a strong south-westerly airstream on the 16th. This persisted until the 23rd and its associated active fronts brought some quite heavy rainfall, with snow on high ground. As a warm front crossed the British Isles on the 22nd daytime temperatures soared to a remarkable 13·0°C. A weak ridge of high pressure on the 24th and 25th resulted in two pleasantly sunny days but as pressure increased over eastern Scandinavia, temperatures fell very quickly in a cold easterly airstream, and light snow fell on the 26th. The high extended to the British Isles by the 27th which was by far the coldest day of the month. Although pressure remained very high, active fronts crossed the country bringing snow to western Britain but only light rain to the Stirling area.

The worst weather of the month occurred between the 7th and 16th when fog blanketed much of Britain. There were several road accidents including that on the M25 in Surrey on the 10th. Although visibility was generally poor, fog was not a problem in the Stirling area only reaching here on the 13th.

Climatological Averages

Climatological averages are usually calculated for periods of 30 years (temperature) or 35 years (rainfall). This is because, in Britain, there is built-in year to year variation in all the parameters which we use to define climate. If we use too small a number of years our averages may be biased by one extreme value. As there are only 14 years of records for Parkhead, and 4 for Carim there is considerable room for error in the averages listed in Tables 5 and 6.

DATA SOURCES

Stirling (Parkhead) Grid Reference: NS 815969

Height above sea-level: 35 metres Established: 1970
Location: University gardens at the north-east corner of the campus. Monthly returns of daily observations are submitted to the Meteorological Office and the Climatological Observers' Link.

Ochil Hills (Carim) Grid Reference: NN 864049

Height above sea level: 332 metres Established: 1980
Location: The upper catchment of the Burn of Ogilvie, near the ruined Carim Lodge. Surrounded by open moorland. Autographic recording. The site is visited on Mondays. Instrument failure and the weather again claimed 48% of the daily rainfall record but only 5% of the temperature record. The missing temperature data can now be obtained from the Automatic Weather Station which became operational in February (see below). Missing rainfall data are estimated by cross-reference to Parkhead.

RESEARCH NOTES

Automatic Weather Station

The Didcot Automatic Weather Station was installed at the Ochil Hills Station in February and began to produce data later that month. However, both the net radiation and temperature/humidity sensors developed faults and had to be replaced. Net radiation data became available in June and temperature in August.

The data are stored in a solid-state memory unit which is drained directly into the University DEC/VAX computer every two weeks. The hourly data are passed through checking filters and stored on magnetic tape. Potential evapotranspiration is derived using a Penman-Monteith model which assumes a surface roughness length of 0.001m. Hard copies of the data are stored in the Microclimatology Laboratory or can be accessed on the University computer.

Register of Weather Stations

Nearly 400 copies of the Register have now been sold. The first supplement to the Register was published in October, 1984, and contains corrections and details of a further 30 stations. This is available from the Department of Environmental Science for 75p (+25p p&p). Copies of the Register are still available at £3.00 per copy (plus 50p p&p).

Weather Watchers' Network

A reporting/inquiry service is now operational under the direction of Mr. Roland Chaplain at Laurieston, Castle Douglas. Volunteer weather watchers all over Scotland report to the Centre at Laurieston, and are 'on call' to the staff there. So this 'Nowcasting' system is able 'within the hour' to provide information to organisations (e.g. police, rescue services) who have an immediate need to know specific conditions at a particular place.

Climatic Hazards

The climate of Scotland presents us with a variety of particularly hazardous events the impact of which can be measured in social or directly financial terms. Extreme wind speeds, heavy rainfall, blizzards and low temperatures are among the obvious examples. The Royal Geographical and Meteorological Societies jointly sponsored a one-day symposium 'Climatic Hazards in Scotland' on Friday 1st June 1984 at Stirling University. Issues discussed were floods, wind damage in upland areas, weather hazards in urban areas, engineering problems of winter road maintenance, and insuring against the weather. The proceedings have been published by Geobooks of Norwich. This should be of general interest to the public and to schools.

Effects of Elevation

During 1984 the average difference in maximum temperature between Carim and Parkhead was 3·3°C which represents a lapse rate of 11·1°C/1000m which is greater than the dry adiabatic lapse rate of 9·8°C/1000m. Lapse rates were particularly steep in summer when they exceeded 12·1°C/1000m. The average difference in minimum temperature was 1·6°C which represents a lapse-rate of 5·4°C/1000m. Difference in annual mean temperature was 2·5°C which represents a rate of decrease of 8·4°C per 1000m. The difference in precipitation between the two stations in 1984 was 287·6mm, a gradient of 0·96mm/m. The 4-year average gradient is 1·65mm/m.

Precipitation Gradients

In recent years climatological journals and texts have made reference to evaluations of the ''precipitation gradient'' in Britain (Taylor 1976, Ballantyne 1983), which should more correctly be referred to as the orographic enhancement of precipitation. Two long records (1894 to 1938) for Gargunnock House (26m) and Earlsburn Reservoir (336m) have been analysed in order to establish the nature of the precipitation-elevation relationship in the Stirling area. The long-term average gradient in annual precipitation between the two stations is 1·34 mm/m which is reasonably close to the gradient between Stirling (Parkhead) and Ochil Hills (Carim) (See previous note).

Over the course of a year the absolute difference between the two stations (Figure 3) is greatest in October and least in April. However, there is a high correlation with rainfall total. This contribution of total has been removed using simple linear regression and the residual variation examined for evidence of seasonal change. Both gradients and ratios (Earlsburn: Gargunnock) have been treated in this manner and have revealed very clear evidence of a seasonal change in precipitation gradients, which are steepest in October and shallowest in February. The reasons why there should be such a seasonal pattern are complex

but relate to the synoptic origins of precipitation.

An analysis of precipitation gradients over 45 years, when corrected for correlation with precipitation total, reveals not only considerable year-to-year variation but also clear underlying trends. Most of the change in the gradient of annual precipitation in Figure 4 is accounted for by change in winter gradients. The explanation for this pattern is still being sought but it is most likely to lie in changing circulation patterns over Scotland.

BALLANTYNE, C. K. 1983 Precipitation gradients in Wester Ross, North-West Scotland. *Weather* 38 379-387.

TAYLOR, J. A. 1976. Upland Climates in: The Climate of the British Isles. Edited by T. J. Chandler and S. Gregory, Longman.

The Drought of 1984

Perhaps the most notable feature of 1984 was the long dry summer and the resulting water shortages. During the months of June, July and August the rainfall at Stirling (Parkhead) was only 54% of average. This compares with 62% during 1976 the well documented drought year. In 1984 the potential severity of the water shortages was reduced by the antecedent winter rainfall which was well above average. In Figure 5 the accumulated rainfall for 1984 is above average until June and fell to only 87% of normal. The wet autumn arrested the fall and by the end of the year it was back above average again. One can well imagine many years hence, 1984 being referred to as being a wetter than average year.

Is the Climate Becoming More Extreme?

In Annual Bulletin No. 5 (1983) attention was drawn to the problem of assessing trends from climatic records of only a few years' duration. However, much has been made in the news media of an apparent increase in frequency of severe winters and warm dry summers. The essential question is, therefore, whether our climate is becoming more extreme, which is a "continental" as opposed to "maritime" characteristic. There are many methods of assessing severity other than by using simple mean temperatures. In this case winter cold is indicated by the number of air frosts in January and February and summer warmth by the number of days exceeding 20°C in July and August. In Figure 7 both of these appear to indicate a general increase in the fourteen years of records at Stirling (Parkhead). The addition of these two provides (Figure 7) an indication of overall extremeness, and again shows an upwards trend. Over the last fourteen years there has, therefore, been a tendency for wider seasonal extremes. What this does *not* tell us is that we should expect more of the same in 1985!!

Undergraduate Dissertation

ROBIN FREW ''The microclimate of a tarmac surface''.

Postgraduate Research

The Department of Environmental Science has this year welcomed Mr Aston Chipanshi from the University of Zambia. Aston is working towards his MSc and is researching into the aerodynamic properties of a growing barley crop.

Publication by the Department

WHITE, I. D., MOTTERSHEAD, D. N., HARRISON, S. J. 1984. Environmental Systems: an Introductory Text. Allen & Unwin.

Corrigendum

1985 in line one of DATA SOURCES on page 10 of the last bulletin (No. 5 1983) should read 1982.

	Mean Maximum °C	Difference from Average	Highest Maximum	Lowest Maximum	Mean Minimum °C	Difference from Average	Highest Minimum	Lowest Minimum	Mean °C	No. of days < 0°C	Mean Soil Temp.°C
January	4·3	−1·7	10·7	− 2·0	− 1·5	−1·8	5·6	−13·1	1·4	20	2·9
February	6·2	−0·5	10·2	3.2	1·1	+0·5	5·1	− 3·6	3·6	10	2·5
March	7·7	−1·0	12·9	4·6	1·6	−0·1	6·6	− 3·2	4·7	6	4·6
April	12·7	+1·0	22·7	6·3	3·2	+0·1	9·2	− 2·1	7·9	5	7·5
May	15·8	+0·8	22·8	9·3	5·0	−0·4	10·9	− 1·0	10·4	2	12·2
June	18·4	+1·0	23·8	13·7	10·1	+1·8	15·5	5·8	14·3	0	15·5
July	22·1	+2·1	27·1	17·6	12·1	+1·3	14·0	8·4	17·1	0	17·4
August	21·4	+2·0	28·2	15·6	10·4	+0·3	14·9	6·4	15·9	0	16·7
September	15·4	−0·6	19·6	12·4	8·5	+0·1	12·4	4·8	12·0	0	13·6
October	13·1	+0·5	16·4	9·3	5·9	+0·4	11·8	1·8	9·5	0	9·9
November	9·4	+0·5	12·3	5·6	4·8	+2·1	9·4	− 4·3	7·1	3	7·0
December	7·1	+0·2	12·5	2·0	2·5	+1·2	8·2	− 5·6	4·8	7	5·3
YEAR	12·8	+0·4	28·2	− 2·0	5·3	+0·5	15·5	−13·1	9·1	53	9·6

Table 1 Monthly Temperatures (Stirling, Parkhead) 1984

	Mean Maximum °C	Difference from Average	Highest Maximum	Lowest Maximum	Mean Minimum °C	Difference from Average	Highest Minimum	Lowest Minimum	Mean °C	No. of days < 0°C
January *	1·3	−1·9	5·7	− 4·0	− 2·2	−1·4	3·7	−10·0	− 0·4	24
February	2·7	−0·1	6·3	− 0·8	−0·8	−0·2	4·1	− 6·8	0·9	16
March	4·3	−1·1	9·5	0·3	0·3	−1·0	5·8	− 5·0	2·0	16
April	9·3	+0·5	19·2	0·8	1·3	+0·1	6·0	− 4·2	5·3	12
May	12·5	−0·9	19·6	6·0	3·1	−1·0	11·0	− 3·0	7·8	3
June	14·6	+0·6	20·2	9·5	7·4	−0·2	13·2	2·3	11·0	0
July	18·3	+1·0	22·8	13·6	9·0	−0·4	13·0	3·7	13·6	0
August	17·8	+0·9	25·0	11·8	9·2	−0·5	13·7	5·0	13·5	0
September	12·3	−0·3	15·3	9·2	7·2	−0·3	10·8	4·6	9·8	0
October	9·9	+1·1	14·0	6·4	5·4	+1·2	8·2	2·1	7·7	0
November	6·4	−0·2	10·0	0·9	3·5	+0·9	7·7	− 3·0	4·9	3
December	5·0	+1·4	9·6	0·6	1·5	+1·8	6·0	− 5·0	3·2	8
YEAR	9·5	+0·2	25·0	4·0	3·7	+0·1	13·7	−10·0	6·6	82

Table 2 Monthly Temperatures (Ochil, Carim) 1984

* Estimated – station snowbound for part of month.

	Total Precipitation	Percentage of Average	Percentage of Average Accumulated	Greatest fall in 24 hours		Number of Days			
				Amount (mm)	Date	Precipitation Recorded	0·2mm or more	1·0mm or more	5·0mm or more
January	172·0	162	162	25·5	12th	26	26	22	12
February	64·8	109	143	14·2	1st	19	18	14	4
March	70·6	87	125	25·9	24th	16	14	9	4
April	8·0	24	113	3·3	17th	8	6	3	0
May	35·4	59	103	26·8	24th	8	7	5	1
June	47·3	88	101	14·5	1st	9	9	7	3
July	15·6	32	94	5·6	27th	10	9	4	2
August	22·4	40	88	5·3	28th + 31st	9	9	8	2
September	111·0	112	92	28·1	1st	21	21	17	9
October	161·0	172	103	38·3	24th	25	25	13	7
November	262·0	235	121	68·3	3rd	24	23	20	12
December	87·8	94	118	15·5	19th	25	25	19	5
Year	1057·9	118	–	68·3	3/11	200	192	141	61

Table 3. Monthly Precipitation (Stirling: Parkhead) 1984

	Total Precipitation mm	Percent. of Average	Percent. of Accum. Average	Total Potential Evapo-Transpiration mm	Percentage Wind Direction											
					350 010	020 040	050 070	080 100	110 130	140 160	170 190	200 220	230 250	260 280	290 310	320 340
January *	264·6	163	163	–	–	–	–	–	–	–	–	–	–	–	–	–
February	89·0	119	149	–	1·6	5·3	4·3	7·7	11·7	11·3	20·8	18·6	9·0	6·0	2·7	0·9
March	119·8	77	120	–	3·9	12·6	16·3	7·9	18·3	8·4	7·6	8·6	6·6	3·1	2·8	3·9
April	42·0	110	120	–	4·5	9·9	8·8	8·6	20·4	9·0	14·2	9·7	5·4	4·1	2·5	2·7
May	39·8	39	104	–	8·9	14·6	8·0	10·6	17·7	9·4	8·5	7·8	4·5	1·6	2·2	6·1
June	32·5	44	97	–	6·2	10·3	9·8	4·1	6·4	4·5	9·0	17·8	11·7	7·8	5·5	6·9
July	39·9	102	97	145·6	5·7	2·7	3·2	2·8	9·0	8·6	17·1	18·7	12·0	6·8	5·3	8·0
August	35·5	54	93	120·6	3·8	8·9	11·6	6·4	12·7	7·5	15·2	17·0	9·8	3·2	2·1	1·8
September	103·4	56	86	72·2	5·7	6·0	2·8	1·9	5·8	9·5	17·9	18·3	9·4	5·4	7·7	11·6
October	205·1	110	90	58·7	0·8	2·0	2·4	2·3	2·6	10·8	24·8	32·6	14·0	4·7	2·2	0·8
November	224·4	161	98	36·1	6·4	11·6	10·3	13·8	12·6	16·3	12·3	7·6	2·5	2·0	0·8	3·7
December	149·5	92	97	–	–	–	–	–	–	–	–	–	–	–	–	–
Year	1345·5	97	–	–	–	–	–	–	–	–	–	–	–	–	–	–

* estimated

Table 4. Montly Precipitation, Potential Evapotranspiration, and Wind Direction at Ochil Hills (Carim) Station.

	Maximum Temperature °C	Minimum Temperature °C	Soil Temperature (0·3m) (0900 GMT)	Total Precipitation (mm)	Number of days with Precipitation
January	6·0	0·3	3·0	106·0	20
February	6·4	0·6	2·7	59·6	17
March	8·7	1·7	4·4	80·9	18
April	11·7	3·1	7·6	33·7	11
May	15·0	5·4	11·4	59·5	15
June	17·4	8·3	14·6	54·0	14
July	20·0	10·8	16·6	48·4	13
August	19·4	10·1	16·4	55·8	15
September	16·0	8·4	13·7	98·9	16
October	12·6	5·5	10·0	93·6	17
November	8·9	2·7	6·2	111·4	19
December	6·9	1·3	3·7	92·8	19
Year	12·4	4·8	9·2	894·6	194

Table 5. Climatological Averages for Stirling (Parkhead) University of Stirling (1971-1984).

	Maximum Temperature °C	Minimum Temperature °C	Total Precipitation mm
January	3·2	−0·8	162·2
February	2·8	−1·0	75·0
March	5·4	0·7	155·7
April	8·8	1·2	38·1
May	11·6	4·1	100·8
June	14·0	7·6	73·6
July	17·3	9·4	39·2
August	16·9	9·7	66·2
September	12·6	7·5	184·9
October	8·8	4·2	186·1
November	6·6	2·6	139·7
December	3·6	0·3	163·2
Year	9·3	3·8	1384·5

Table 6. Climatological Averages for Ochil Hills (Carim) 1981-84

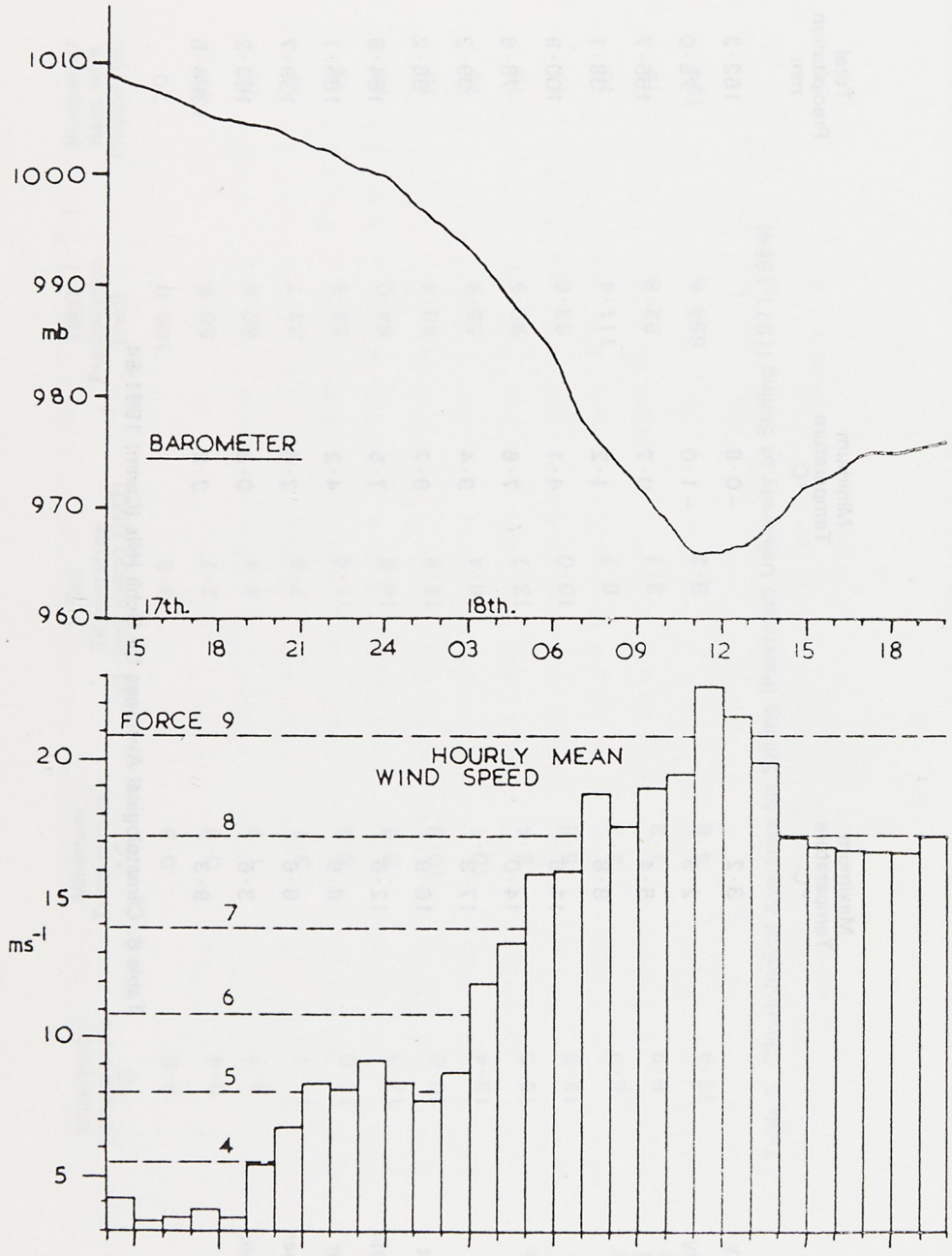

Figure 1 Barometric pressure and wind speed at Ochil Hills (Carim) weather station during the gale of 18th October 1984

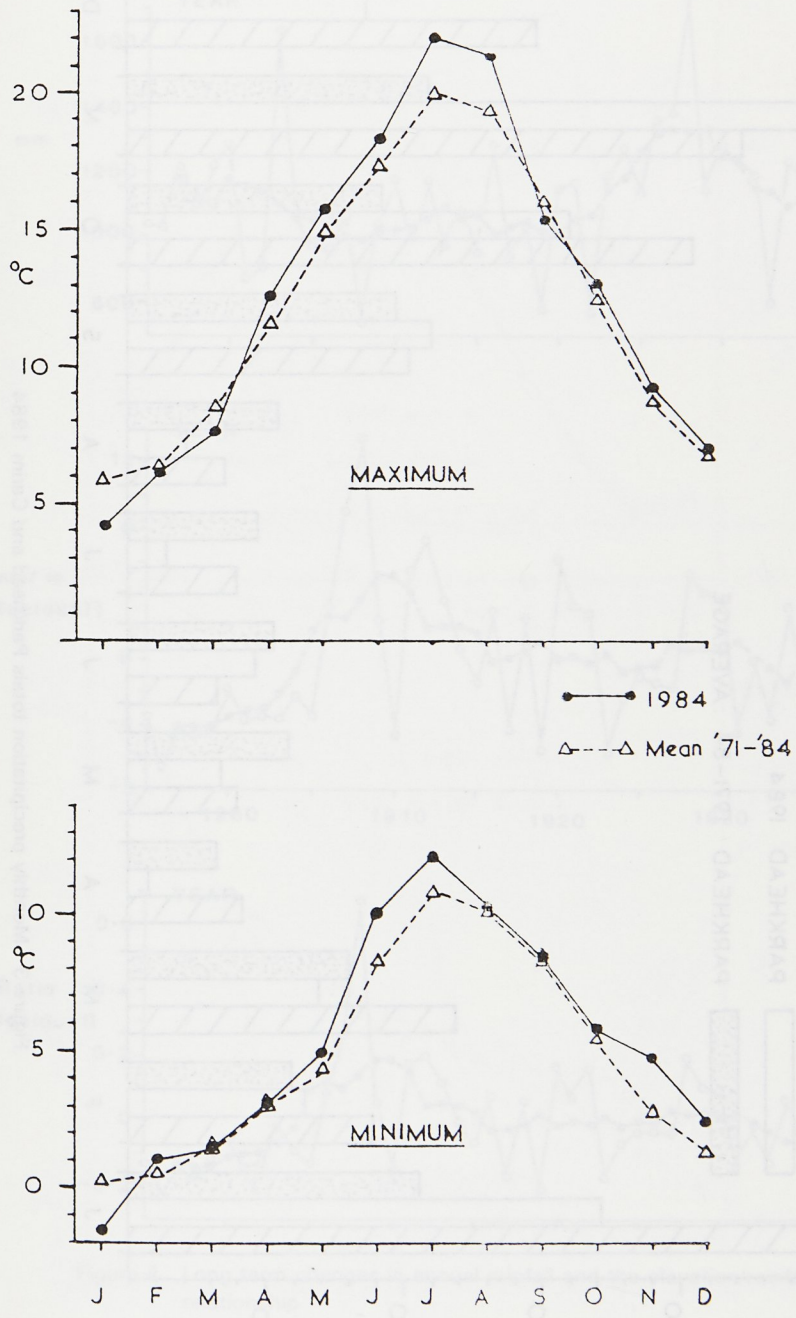

Figure 2 Monthly air temperatures Stirling (Parkhead) 1984

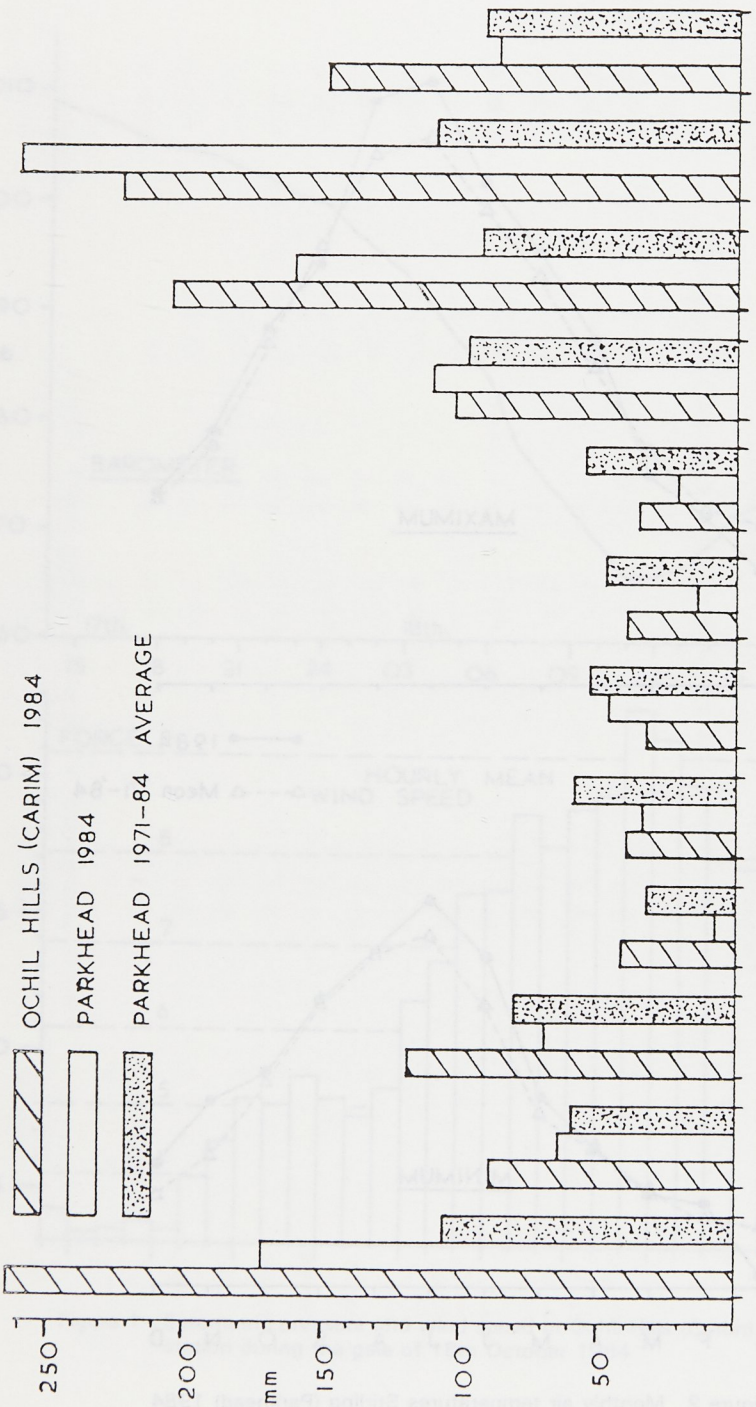

Figure 3 Monthly precipitation totals Parkhead and Carim 1984

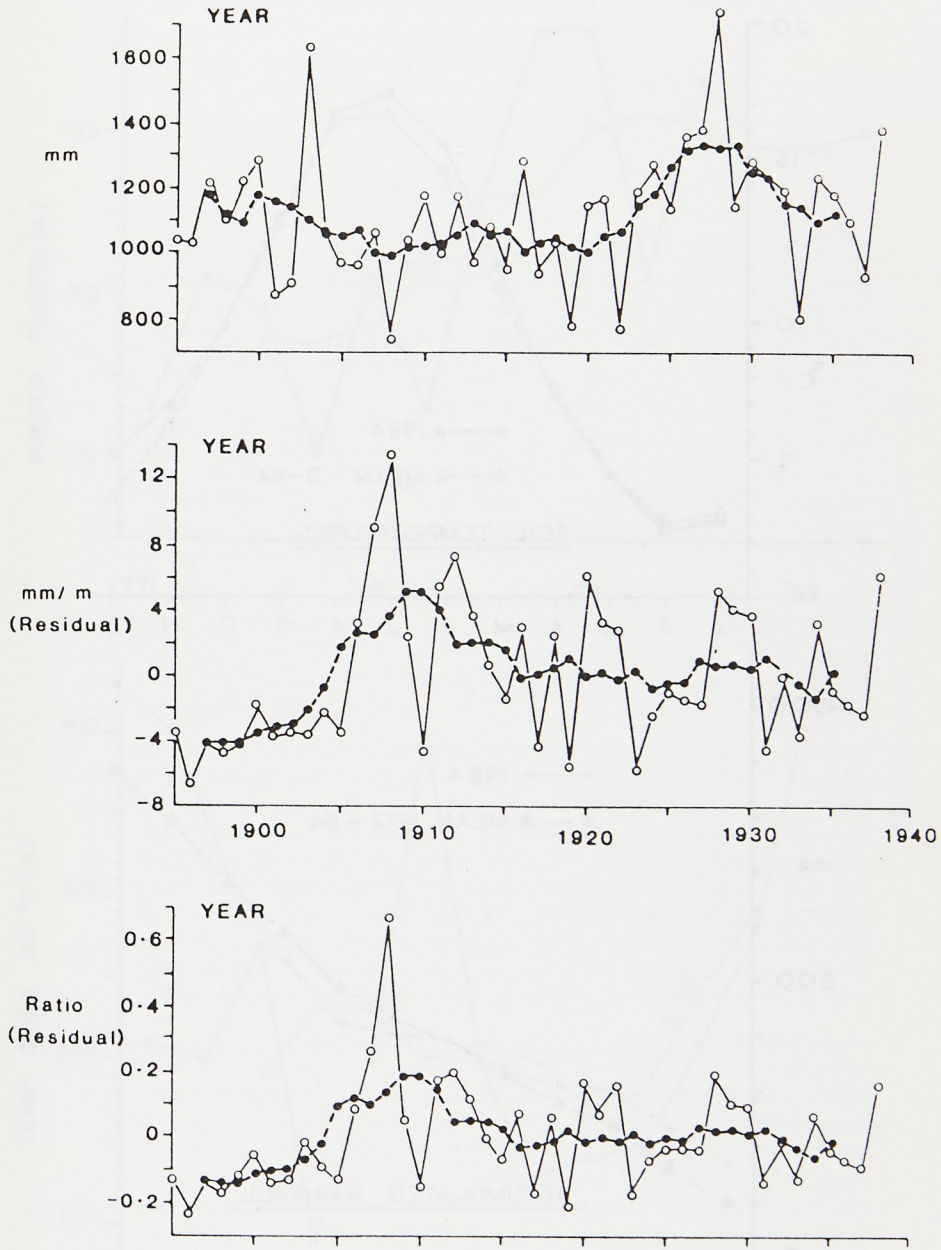

Figure 4 Long term changes in annual rainfall and the elevation/rainfall relationship

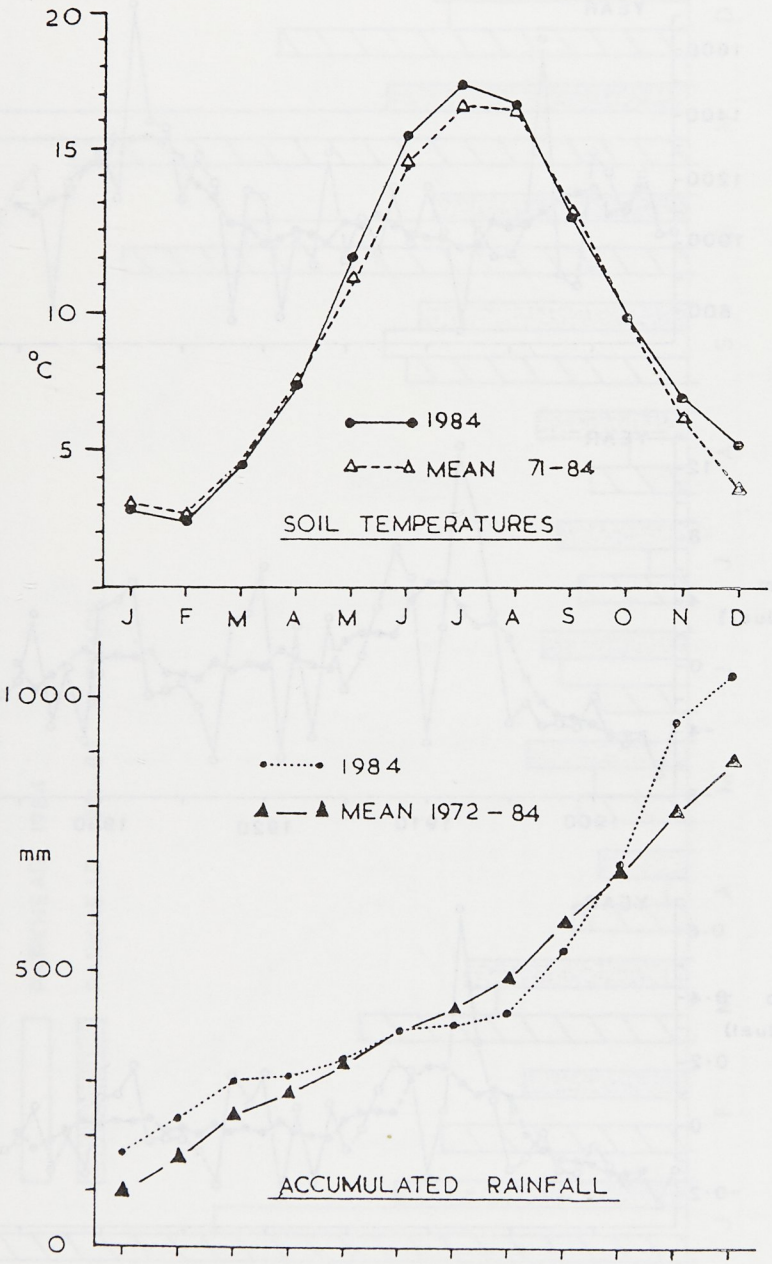

Figure 5 Soil temperatures and rainfall at Stirling (Parkhead) 1984

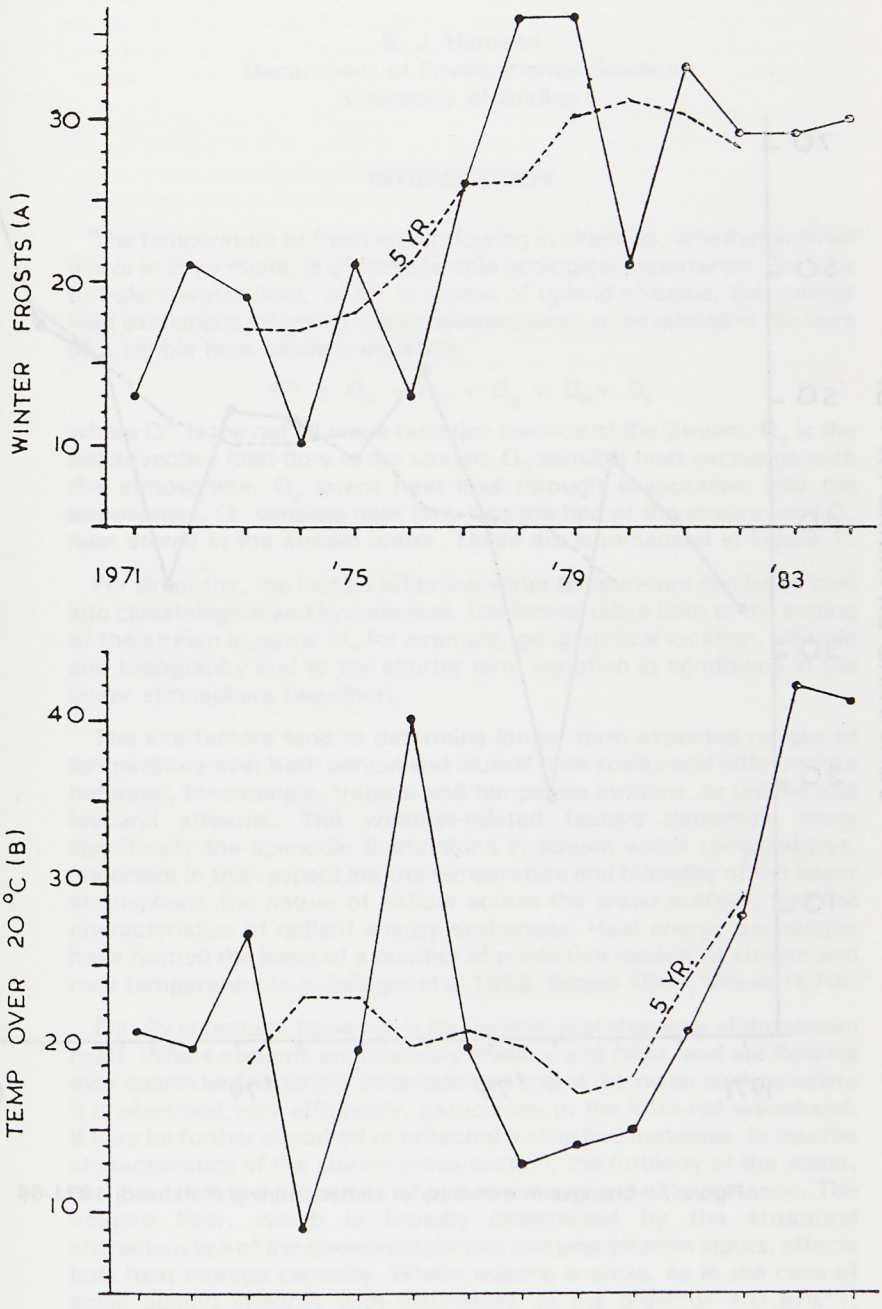

Figure 6 Winter frost and summer warmth Stirling 1971-84

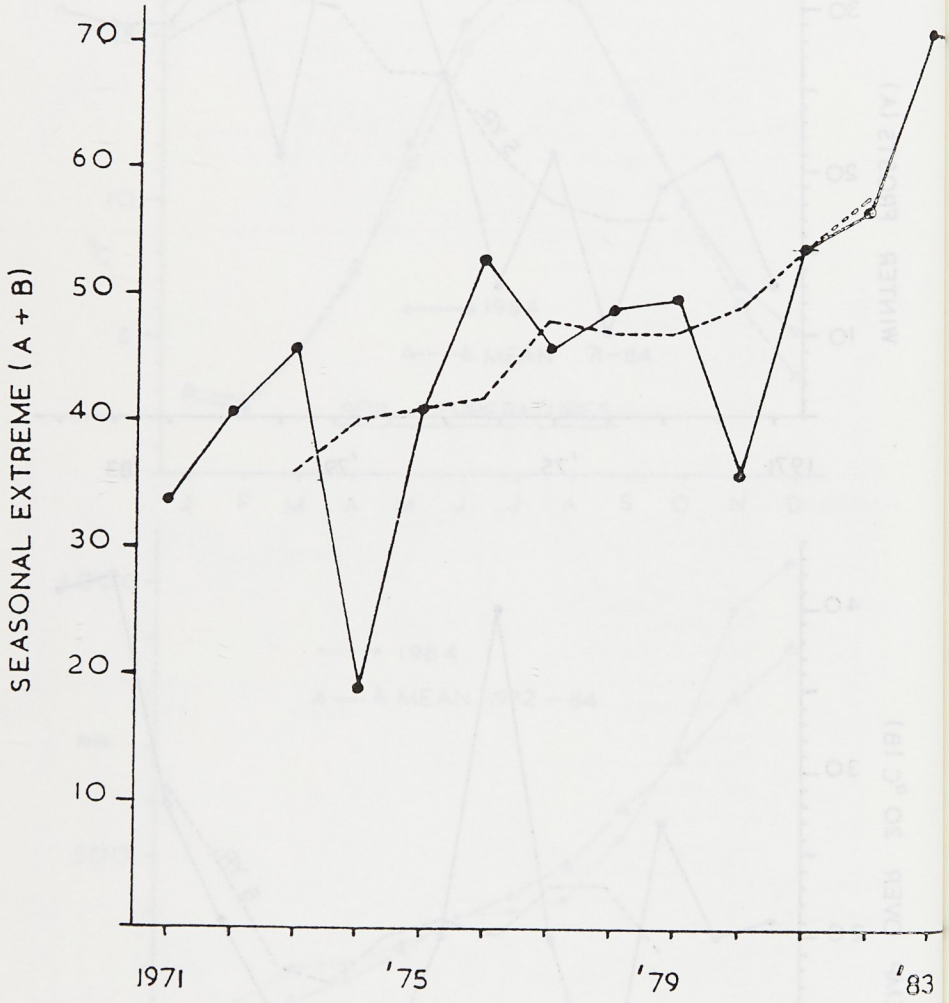

Figure 7 Changes in extremity of climate Stirling (Parkhead) 1971-84

STREAM TEMPERATURES AT HOWIETOUN FISH FARM, STIRLING

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INTRODUCTION

The temperature of fresh water flowing in channels, whether in small rills or in large rivers, is of considerable ecological importance. For fully turbulent water flow, which is typical of upland streams, the various heat exchanges affecting stream temperature can be related in the form of a simple heat balance equation:

$$Q^* + Q_a = Q_h + Q_g + Q_e + Q_s$$

where Q^* is the net all-wave radiation balance of the Stream, Q_a is the net advective heat flow in the stream, Q_h sensible heat exchange with the atmosphere, Q_e latent heat loss through evaporation into the atmosphere, Q_g sensible heat flow into the bed of the stream, and Q_s heat stored in the stream water. These are summarised in Figure 1.

For simplicity, the factors affecting water temperature can be divided into climatological and hydrological. The former relate both to the setting of the stream in terms of, for example, geographical location, altitude and topography and to the shorter term variation in conditions in the lower atmosphere (weather).

The site factors tend to determine longer term expected ranges of temperature over both annual and diurnal time scales and differentiate between, for example, tropical and temperate streams, or upland and lowland streams. The weather-related factors determine more specifically the aperiodic fluctuations in stream water temperatures. Important in this respect are the temperature and humidity of the lower atmosphere, the nature of airflow across the water surface, and the characteristics of radiant energy exchanges. Heat energy exchanges have formed the basis of a number of predictive models of stream and river temperature (e.g. Edinger et al 1968, Brown 1969, Morse 1970).

Equally important, however, is the hydrological character of the stream itself. Where streams are relatively shallow and clear, and are flowing over coarse bed materials, solar radiation enters the water surface where it is absorbed very efficiently, particularly in the infra-red waveband. It may be further absorbed or reflected by the bed materials. In this the characteristics of the stream cross-section, the turbidity of the water, and the reflective properties of bed sediments are of importance. The volume flow, which is broadly determined by the structural characteristics of the stream catchment and precipitation inputs, affects bulk heat storage capacity. Where volume is small, as in the case of small upland streams with discharges of the order of 1.0 m^3s^{-1},

water temperature tends to respond very quickly to changes in ambient atmospheric conditions. The linear velocity of flow also determines the rate at which heat flows through a stream system and controls thermal lag within it.

There is an identifiable progression in the nature of stream temperature variation as flow proceeds away from shallow and turbulent upland streams towards more turbid river flow across flood plains. In the former, periodic (diurnal) and aperiodic changes in temperature are very marked and increase in magnitude away from the source as the stream water approaches equilibrium with ambient atmospheric conditions. In the latter, response to changes in ambient meteorological conditions is sluggish due to greater thermal capacity and reduced turbulence, and temperatures depend more on advected heat arriving from upstream. This change has been well documented (Edington 1964, Boon and Shires 1976, Smith 1981) and is summarised here in Table 1.

TABLE 1
Typical thermal characteristics of streams and rivers (from Smith 1979)

Characteristic	Streams	Rivers
Annual maximum temperature	25°C	20°C
Annual minimum temperature	0°C	1°C
Diurnal range of temperature (winter)	2°C	less than 1°C
Diurnal range of temperature (summer)	10 – 12°C	3°C
Maximum rate of change	3°C/hour	0.5°C – 1.0°C/hour

The thermal lag effect resulting from these heat transfers is manifested in a progressive delay, or phase change, in diurnal temperature oscillation with distance downstream (Yakuwa 1960, Ishikawa 1970). Temperatures in upland streams typically reach a maximum three to four hours after mid-day while downstream the timelag may extend to over 20 hours (Smith 1972).

OBSERVATIONS AT HOWIETOUN

Observations of stream temperature in Loch Coulter Burn were made during the summer of 1985. The catchment (Figure 2) is approximately $5 \cdot 9 km^2$ in area and is underlain by extensive boulder clay deposits over both extrusive (basalt) and intrusive (quartz-dolerite) igneous rocks. Most of the soils are poorly drained brown forest soils or peaty gleys, the latter being the more extensive. The vegetation is predominantly open moorland with some enclosures and there is an area of mixed woodland in Canglour Glen. Average discharge at the fish hatchery is of the order of 2 to 3 $m^3 s^{-1}$. For most of its course Loch Coulter Burn flows over coarse bed materials. There are two main tributaries which converge in Canglour Glen. The northern tributary drains an extensive area of peaty

moorland below Drummarnock while the southern tributary is a regulated outfall from Loch Coulter reservoir. Under wet weather conditions these contribute approximately equal volumes to total streamflow but after an extended spell of dry weather, flow within the northern tributary becomes relatively insignificant and flow at the hatchery is sustained by the Loch Coulter outfall.

Flow from the northern tributary has a thermal regime related to the peaty ground from which it flows and will have a discernible diurnal oscillation. The southern tributary, however, has a thermal regime related to that of the reservoir, which is thermally stable and will provide very little diurnal oscillation in outfall temperature. Below the confluence, Loch Coulter Burn flows beneath a woodland canopy in Canglour Glen, which shades the water surface from direct solar radiation. Below this there is a small outfall from a treatment works which may, at times, inject water at slightly higher than ambient temperature.

Temperatures were recorded at two sites along the burn (Figure 2), one at Loch Coulter outfall, and the other immediately above the Howietoun fish hatchery. At the former, two thermistor probes were placed on the bed of the outfall flume and connected to a Grant Miniature Temperature Recorder. This sampled at hourly intervals and logged on to pressure paper charts. At the lower site, four replicated thermistors were inserted down white PVC tubing until they were 0·05m above the stony bed of the stream (Figure 3). Additional probes were mounted in a ventilated thermometer screen on the north bank, at a height of 1·2m above ground level, two of which measured dry-bulb and two wet-bulb temperature. Temperatures ($\pm$0·2°C) were also sampled hourly using a Grant Recorder. Charts were translated manually and stored on file on the University's DEC/VAX mainframe computer.

Observations began in early June and continued for twelve weeks. Due to persistent instrument failure very little data were obtained for the Loch Coulter outfall site. At the fish farm, however, an almost continuous data set was obtained for the period. The weather was abnormally wet, the rainfall in July and August being over 250% of average (Table 2). Rainfall was registered on 70% of the days during the observation period. Monthly air temperatures were between 1 and 2°C below average, and winds were dominantly south-westerly.

TABLE 2 Weather Conditions during Summer 1985 (after Harrison 1986)

Month	Total Precipitation (mm)	Percentage of Average	Mean Maximum Temperature (°C)	Diff. from Average	Mean Minimum Temperature (°C)	Diff. from Average
June	45.8	85.6	16.1	−1.3	7.6	−0.6
July	171.1	299.1	18.3	−1.5	11.5	+0.7
August	171.9	268.2	16.6	−2.6	9.6	−0.5
September	186.6	177.5	15.1	−0.8	8.9	+0.5

DAILY VARIATION IN WATER TEMPERATURE

The small amount of data available for the Loch Coulter outfall confirmed that diurnal variation in temperature was very small and was generally less than 1°C. This is in accord with observations made for similar locations elsewhere in Britain (Lavis and Smith, 1972).

At the fish farm site, temperatures followed a clearly defined diurnal oscillation reaching a maximum in the late afternoon and a minimum in the early morning (Figure 4). Water temperature at time t (T_t) through a symmetrical 24 hour oscillation can be represented mathematically in the form –

$$T_t = \bar{T} + C.\mathrm{Sin}\left(\frac{2\pi t}{P} + \varnothing\right)$$

where $\bar{T}$ is the average temperature, and C the amplitude, $\varnothing$ the phase angle and P the period (24 hours) of the sine wave. The derived phase angles for the Howietoun water temperatures show a moderate degree of consistency (Figure 5). The mean phase angle of 1.584 radians is equivalent to 6·05 hours in a 24 hour wave, and indicates maximum temperatures occurring at or around 18·00 GMT.

The recorded rates of rise of temperature varied from + 0·1°C hr^{-1} to + 1.7°C hr^{-1} with an average of 0.28°C hr^{-1}, while the rate of fall varied between −0·1°C hr^{-1} and −1·9°C hr^{-1} around an average of −0·21°C hr^{-1}. That this is considerably lower than the rates indicated in Table 2 is due to a combination of the damping effect of Loch Coulter, and the relatively cool cloudy weather conditions under which measurements were taken. Under such cool weather conditions the temperature of the stream rose above 16·0°C on only two occasions reaching a peak of 18·5°C in early July. The amplitude of daily variation was relatively small lying between 0·3°C and 5·2°C, and the average was 2·2°C which is slightly lower than the typical magnitude of variation of upland streams in Britain (Crisp and LeCren 1970, Boon and Shires 1976).

STREAM TEMPERATURE CONTROLS

The uptake of short wave solar energy, and the exchange of sensible heat with the atmospheric boundary layer have been suggested as dominant controls over daily fluctuations in stream temperatures. Mackichan (1967), for example, stressed the importance of the diurnal radiation cycle in a study of small streams in Nebraska while Macan (1958) concluded that solar heating was not responsible for the major temperature fluctuations in a small stony upland stream in northern England. Boon and Shires (1976) in a study of the North Tyne also stressed the importance of sensible heat exchange between turbulent stream water and the overlying atmosphere. An attempt has been made to assess the relative importance of radiant energy and sensible heat

exchanges for diurnal stream temperature fluctuation at Howietoun.

Air temperatures at the fish farm exhibited diurnal oscillation, which was considerably larger in amplitude than in the stream (Figure 4) varying between 2·4°C and 16·7°C over the observation period (average 7·6°C). Derivation of the 24 hour sine-waves has indicated that the phase angle was as variable as for stream water (Figure 5). There was an average phase difference between air and water of 0·860 radians, which is equivalent to 3·38 hours, air temperature reaching its maximum nearly three hours after mid-day. There was, however, a very strong correlation between stream and air temperature for both daily maximum and daily range (Figure 6), which suggests that sensible heat flux and advection in the atmospheric boundary layer are primary controls over thermal conditions in the stream at Howietoun.

Net radiation typically exhibits clear diurnal variation reaching maximum values around mid-day. In the absence of radiation data for the site, daily maximum and minimum net radiant flux (Wm^{-2}) were obtained from the University of Stirling's Ochil Hills weather station (332m OD) 16km to the north. Because of the strong influence of topography on radiant energy exchanges over terrestrial surfaces, these data could be regarded only as an indication of regional radiation conditions. The correlation between daily maximum stream temperature and maximum net radiation was poor (Figure 7) which tends to support the view that radiant energy is perhaps a less important control of stream temperature than sensible heat exchange. However, correlation between daily ranges of stream temperature and net radiation was highly significant. The processes involved in this implied cause–effect relationship are, however, very complex and consideration must be given to long-wave radiation exchanges within the atmospheric boundary layer and between surrounding soil-vegetation surfaces and the air layer above them. There is also a strong correlation between air temperature and net radiation daily ranges.

CONCLUSIONS

Observations of stream temperature at Howietoun during the cool cloudy summer of 1985 indicate that there is a clear diurnal oscillation the timing of which is relatively consistent. This has permitted reliable estimates to be made of daily mean and daily range of stream temperature from single spot measurements at 12·00 GMT. The amplitude of oscillation would appear to be related to the strong control exerted by thermal conditions in the atmospheric boundary layer, and to a considerably lesser extent by radiant energy exchanges. Loch Coulter probably has a suppressing effect on the magnitude of temperature fluctuations.

ACKNOWLEDGEMENT

The author wishes to acknowledge the assistance of Mr Ian Semple, assistant manager of Howietoun Fish Farm, and Mr John Phizacklea, formerly technician in the Department of the Environmental Science, Stirling University.

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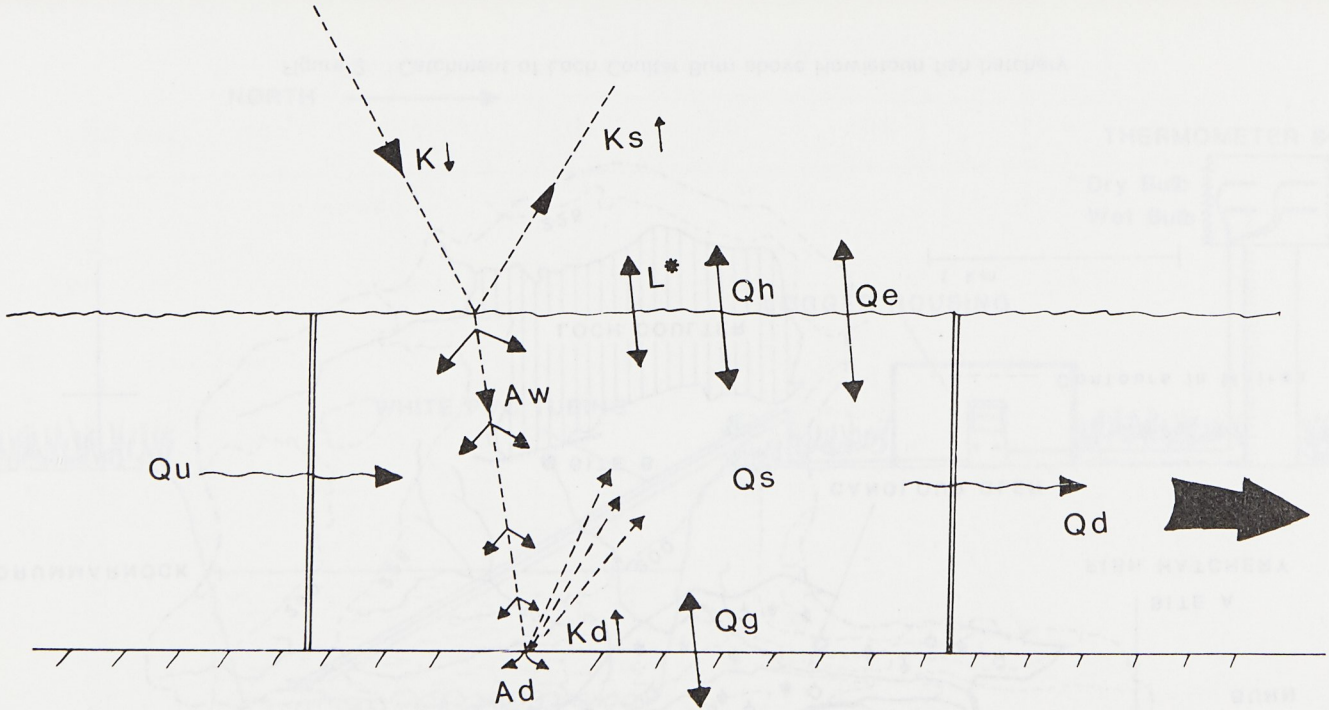

Qu	Heat Input from Upstream	Aw	Absorption of Radiation into Water
Qd	Heat Output Downstream	Ad	Absorption of Radiation into Stream Bed
K↓	Short Wave Incoming Solar Radiation	Qs	Sensible Heat Storage
Ks↑	Short Wave Reflected Radiation from the Stream Surface	Qh	Sensible Heat Exchange with the Atmosphere
Kd↑	Short Wave Reflected Radiation from the Stream Bed	Qe	Latent Heat Exchange with the Atmosphere
L*	Net Exchange of Long Wave Radiation	Qg	Sensible Heat Exchange between Stream and its Bed

Figure 1 Principal energy exchanges in stream water

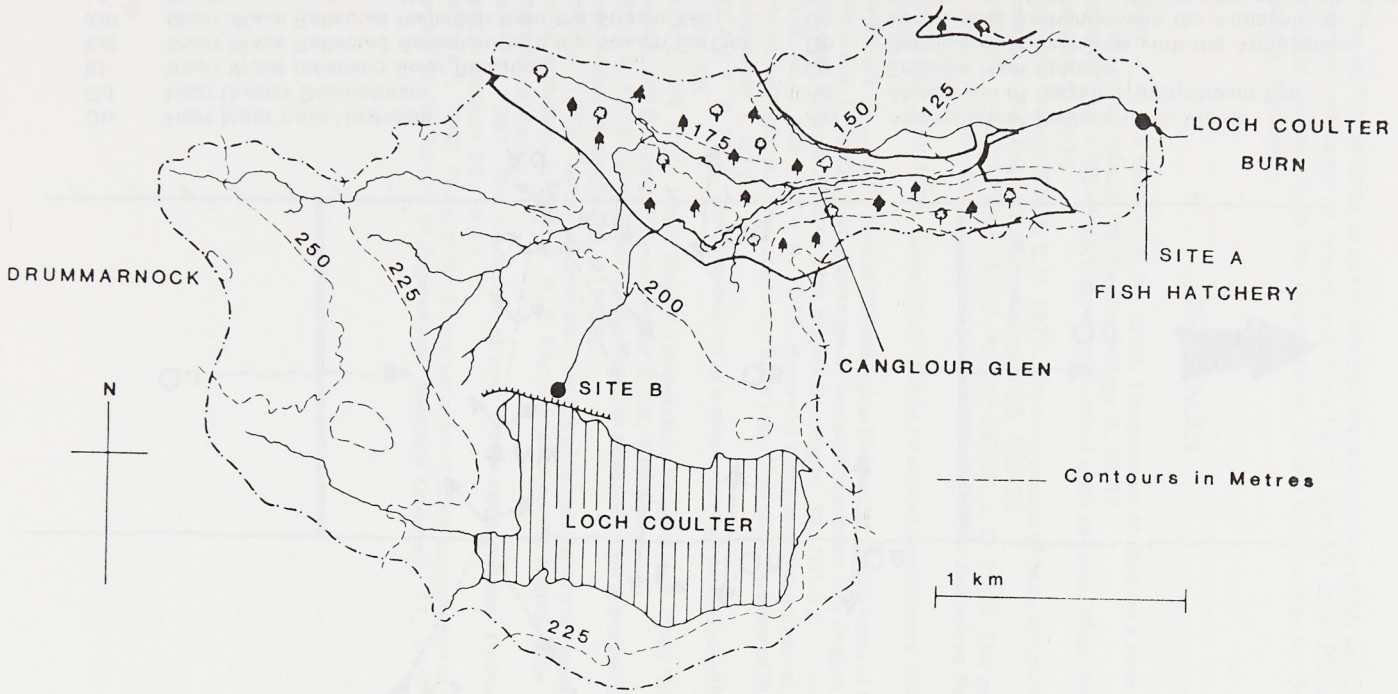

Figure 2 Catchment of Loch Coulter Burn above Howietoun fish hatchery

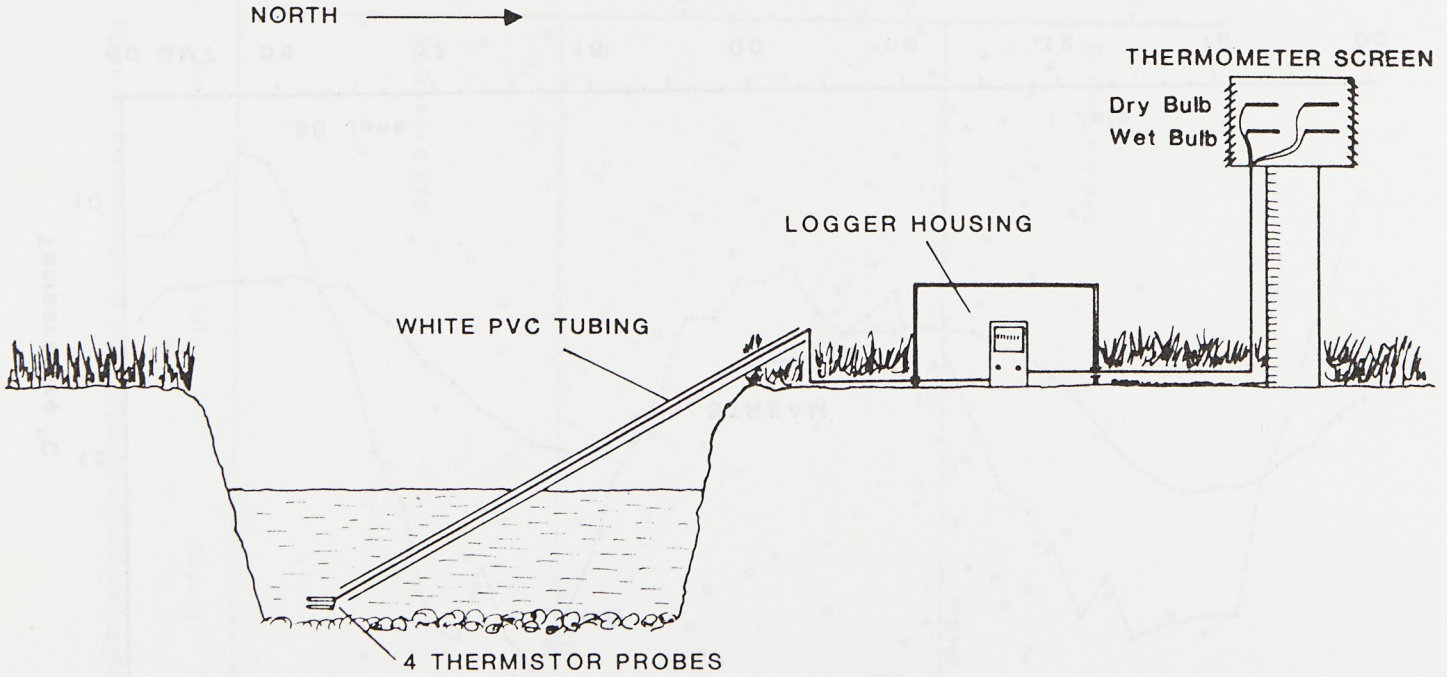

Figure 3 Instrumentation at the fish hatchery site (Site A)

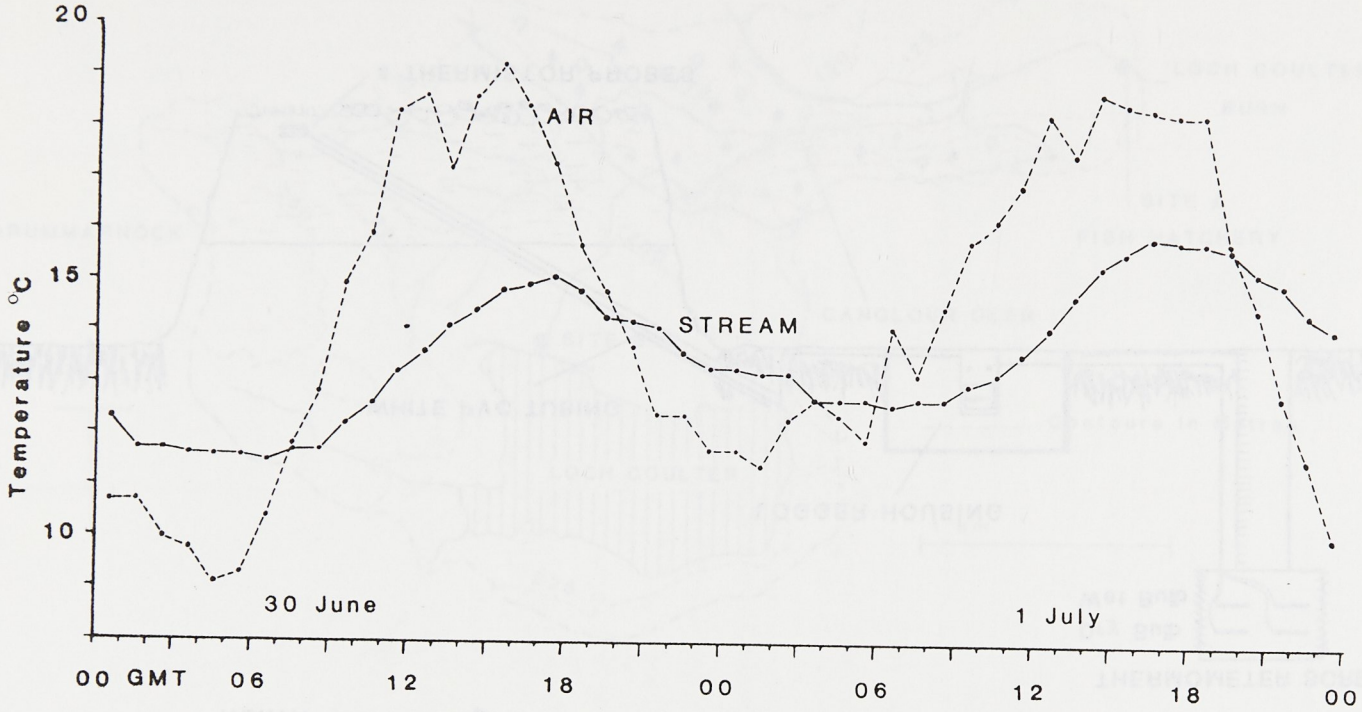

Figure 4 Typical daily variation of temperature in stream water and air

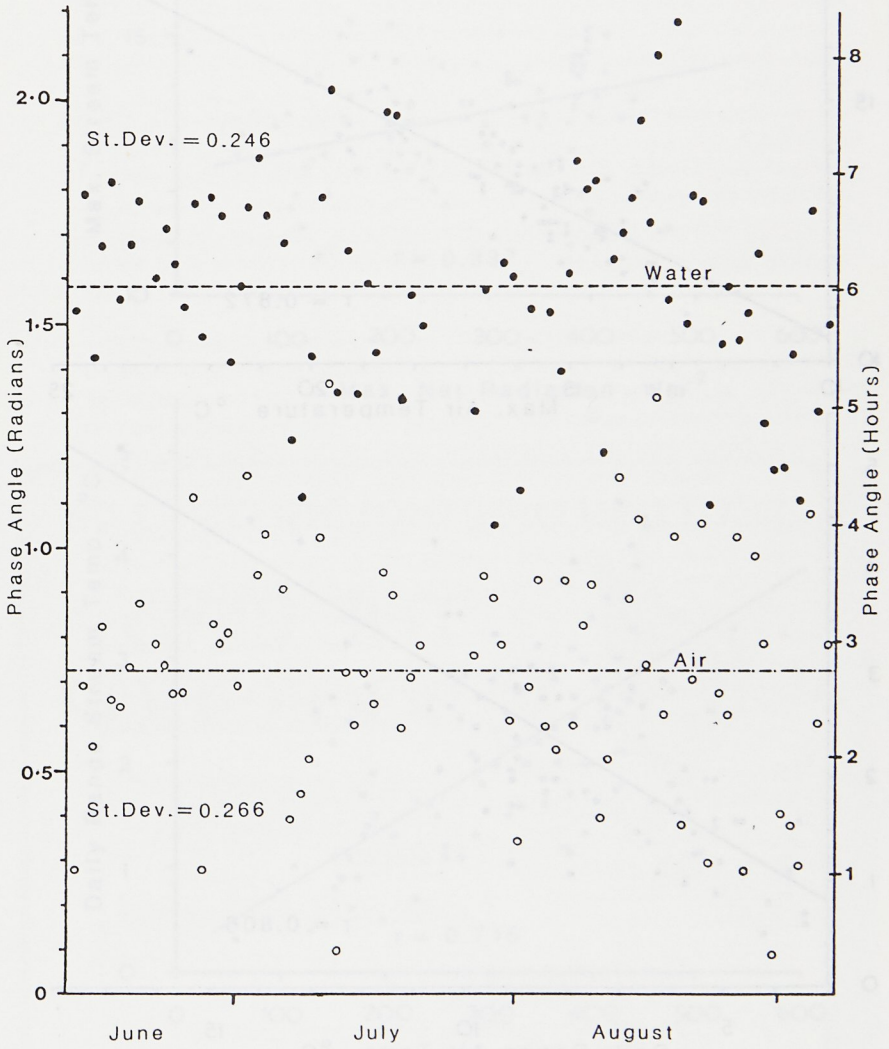

Figure 5 Derived values of phase angles of 24-hour temperature waves

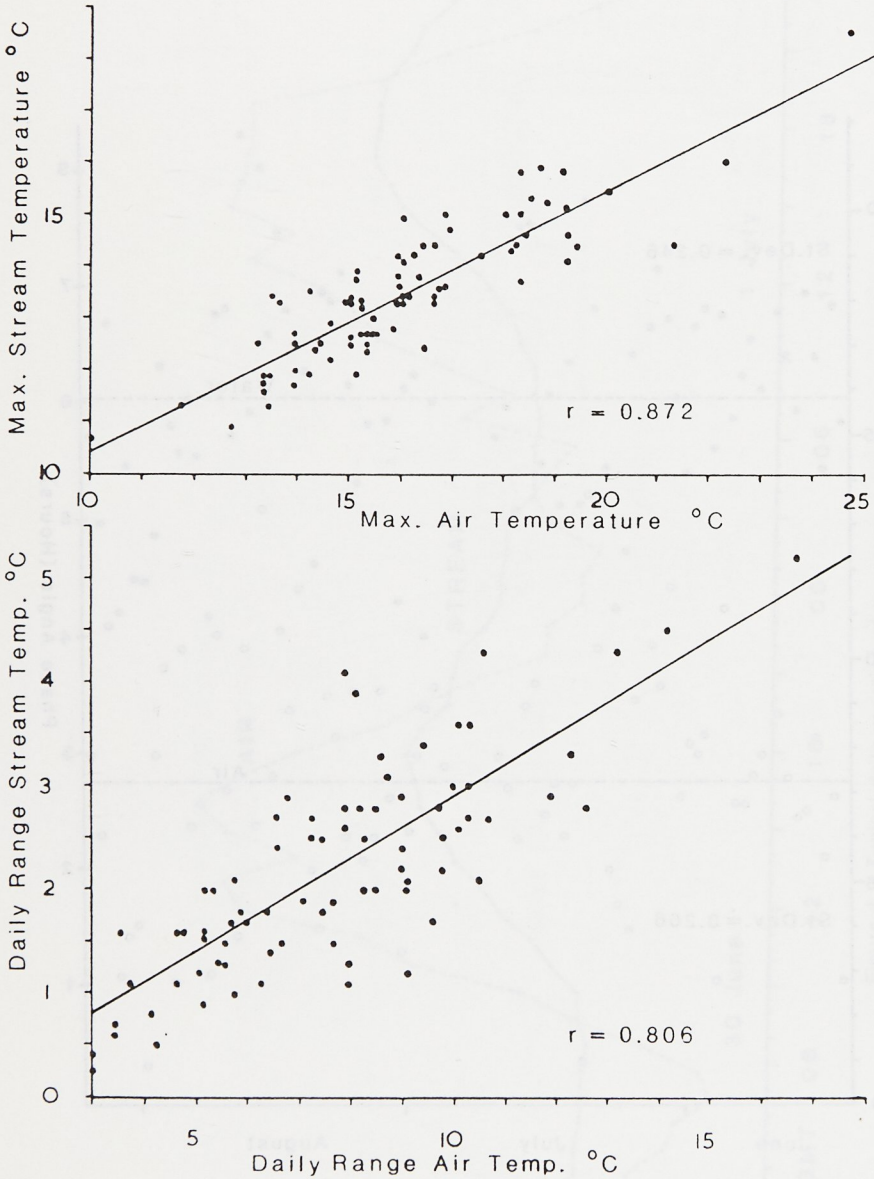

Figure 6 Relationship between stream and air temperature

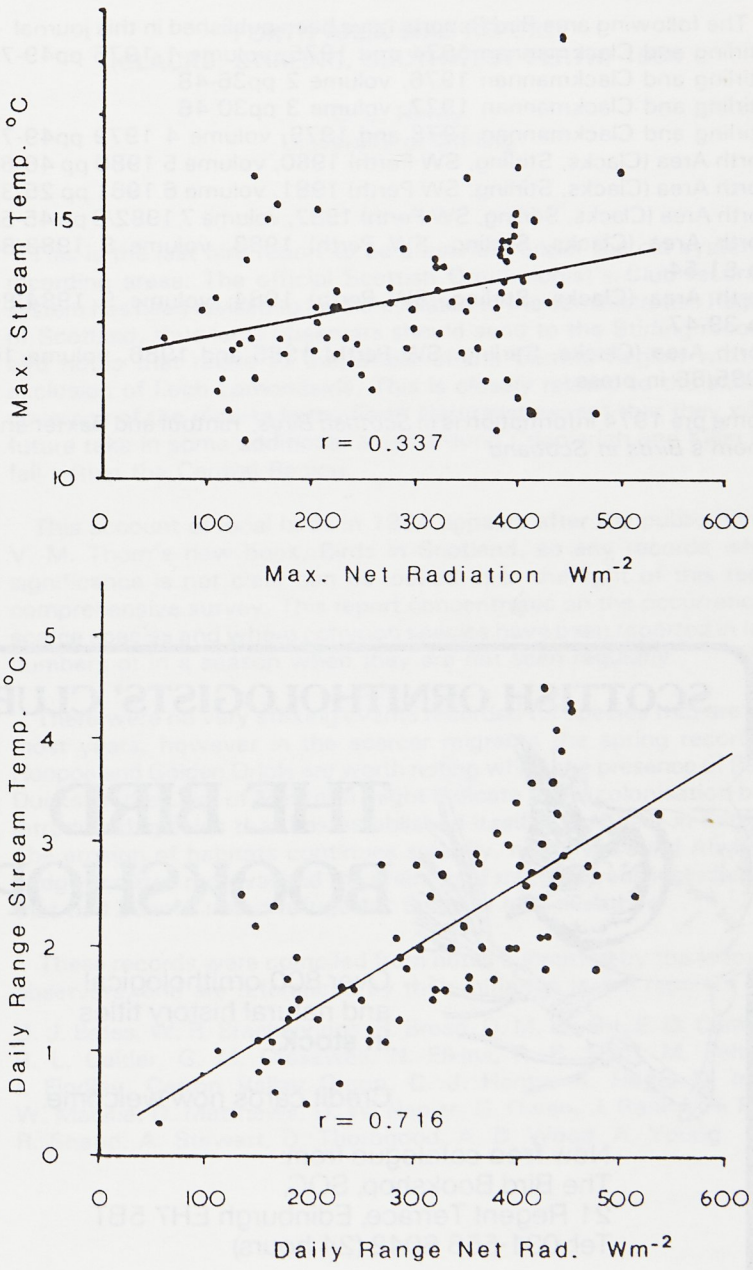

Figure 7 Relationship between stream temperature and net radiation

AREA BIRD REPORTS

The following area Bird Reports have been published in this journal --
Stirling and Clackmannan 1974 and 1975, volume 1 1976 pp49-74
Stirling and Clackmannan 1976, volume 2 pp36-48
Stirling and Clackmannan 1977, volume 3 pp30-46
Stirling and Clackmannan 1978 and 1979, volume 4 1979 pp49-73
Forth Area (Clacks, Stirling, SW Perth) 1980, volume 5 1980 pp 46-65
Forth Area (Clacks, Stirling, SW Perth) 1981, volume 6 1981 pp 25-33
Forth Area (Clacks, Stirling, SW Perth) 1982, volume 7 1982/3 pp 45-56
Forth Area (Clacks, Stirling, SW Perth) 1983, volume 8 1983/84 pp 51-54
Forth Area (Clacks, Stirling, SW Perth) 1984, volume 9 1984/85 pp 39-47
Forth Area (Clacks, Stirling, SW Perth) 1985 and 1986, volume 10 1985/86 in press

Some pre 1974 information is in *Scottish Birds,* Rintoul and Baxter and Thom's *Birds in Scotland*

FORTH AREA BIRD REPORT (CLACKS, STIRLING, SOUTHWEST PERTH) 1984

C. J. Henty
University of Stirling

This is the last bird report to be presented under the old system of recording areas. The official Scottish Ornithologist's Club recording system has been revised to be more related to the administrative Regions of Scotland, thus local observers should send to the Stirling recorder bird notes that relate to the whole of the Central Region with the exclusion of Loch Lomondside. This is closely related to the existing coverage of the reports in the Forth Naturalist except that they will in future take in some additional areas around Crianlarich and Killin that fall within the Central Region.

This account of local birds in 1984 appears after the publication of V. M. Thom's new book, Birds in Scotland, so any records whose significance is not clear can be looked at in the light of this recent comprehensive survey. This report concentrates on the occurrence of scarce species and where common species have been reported in large numbers or in a season when they are not seen regularly.

There were no very striking events recorded for species that are seen most years, however in the scarcer migrants the spring records of Hoopoe and Golden Oriole are worth noting whilst the presence of Ruddy Ducks on the Lake of Menteith might indicate a real colonisation by an introduced species that has established itself in numbers in England. The erosion of habitats continues steadily, notably around Alva with hedge and tree removal and the draining of marshy areas including one that had been a noted refuge for Snipe in hard weather.

These records were compiled from notes submitted by the following observers, and are referenced by their initiation in the report:

D. J. Bates, W. R. Brackenridge, R. Broad, D. M. Bryant, E. D. Cameron, R. L. Calder, G. M. Cresswell, N. Elkins, R. R. Elliot, M. Feltham, I. Findlay, Carron Valley Group, C. J. Henty, A. Hogg, D. Irving, W. Mackie, D. Matthews, D. W. Napier, G. Owen, J. Renny, H. Robb, R. Shand, A. Stewart, D. Thorogood, A. D. Wood, A. Young

C, S and SWP in the margin indicate the county areas Clackmannanshire, Stirlingshire and southwest Perthshire respectively.

SYSTEMATIC LIST

RED-THROATED DIVER
S 3 Skinflats 18th December (GMC)

BLACK-THROATED DIVER
S 1 on a western loch 23rd July and 2 on 9th August (DT)

GREAT CRESTED GREBE
C 2 prs Gartmorn Dam 4th April (MF)
S 12 Carron Valley Reservoir on 18th May (1st 17th March, 2 to end year) – no breeding due to low water (CVG DT). 180 Kinneil 21st January (ADW AY)
SWP Pair with eggs Blairdrummond GP 21st April (MF), 2 pairs each reared 1 young (WRB). 2 Glensherup 29th April (DMB)

SLAVONIAN GREBE
C 1 Gartmorn Dam 25th August (WRB)

GANNET
S 4 juveniles Skinflats 8th September (GO WM)

WHOOPER SWAN
S 9 Stirling 19th February and 25 on 26th (GO WM) 4 E at Airthrey 10th October (DMB). Carron Valley Reservoir: 10 on 13th October, 17 (3 juvenile) on 4th November, 16 on 18th December (CVG DT). 12 Kippen 1st December (RB DJB)
SWP 23 Blairdrummond Moss 11th February; 35 Lecropt 3rd March, 28 on 19th April, 16 Thornhill 25th November (GO WM MF DT WRB)

BEAN GOOSE
S Carron Valley Reservoir 117 28th to 30th September to 72 on 21st October; 4 on 2nd December (GO WM CVG WRB). 1 with Pinkfeet Skinflats 21st April (GO WM).

PINK-FOOTED GOOSE
S 1000 Gargunnock 14th March (RB). 1000 Grangemouth 11th March, 469 Skinflats 26th October (GO WM)
C 40 NE Tillicoultry 23rd April (RRE)
SWP 1500 Sheriffmuir 11th May. 14 Doune 11th September, 800 Thornhill 6th October, 2000 Lecropt 4th November, 2000 Aberfoyle 10th November, 2500 Lake of Menteith on 9th October, 10th November, 16th November (RB WRB DT)

WHITE-FRONTED GOOSE
S Skinflats, 7 on 23rd March and 4 on 24th, Eurasian (GO WM)
SWP 2 at Thornhill on 27th October, Greenland (DT)

GREYLAG GOOSE
S 300 Kinneil 26th February, 800 Gargunnock 4th March, 435 13th November (RB GO WM WRB)
SWP 56 SE very high Lochearnhead 2nd November (CJH)

BARNACLE GOOSE
S 31 Skinflats 13th October (WRB GO WM), 1 Carron Valley Reservoir 21st October (CVG)

BRENT GOOSE
SWP 1 (pale breasted) with Pinkfeet and Greylags at Thornhill 10th November (RB)

SHELDUCK
S Grangemouth, 1573 on 22nd January and 1800 on 25th August (DMB)

WIGEON
S 550 Grangemouth 18th February, 116 (max) Carron Valley Reservoir 16th December (DMB CVG)
C 2 males Upper Glendevon Reservoir 29th May (CJH)
SWP bred Loch Mahaick (per WRB)

TEAL
S 420 Grangemouth 14th January and 580 on 18th February, 400 on 4th November (DMB WRB DT), Carron Valley Reservoir 208 on 11th February, 867 on 28th August and 559 on 14th October (CVG)
C Pair and male Upper Glendevon Reservoir 29th May (CJH)
SWP 131 Loch Macanrie 6th October (RB)

MALLARD
S Carron Valley Reservoir: 385 on 21st January and 11th February, 456 16th December influxes in late July and mid September, 202 Kinneil 21st January, 381 Airthrey 16th December (CVG CJH)
C 1200 Gartmorn Dam 25th August (WRB)
SWP 250 Loch Watston 24th July, 248 Lake of Menteith 6th October (WRB RB)

PINTAIL
S Grangemouth: 48 on 22nd January, 45 on 4th November, 20 on 20th December, 11 Loch Coulter 16th September (DMB CVG GO WM GMC WRB)

SHOVELER
S 1 Airthrey 10th September (DMB)
C Pair Gartmorn Dam 4th April and 1 on 25th August (WRB)
SWP Pair Loch Mahaick 23rd April

POCHARD
S Carron Valley Reservoir: few at start of year, 180 on 19th November (CVG)

TUFTED DUCK
S Carron Valley Reservoir: few at start of year, 227 on 29th July – highest recorded moult flock (CVG)
SWP 3 broods (17 young) Blairdrummond GP on 8th August (WRB)

SCAUP
S 1 Kinneil 4th January and 9 on 23rd December (GO WM)

LONG-TAILED DUCK
SWP 1 Loch Rusky on 27th October (DT)

GOLDENEYE
S 16 Skinflats 13th October, 27 Loch Coulter 11th November (GO WM WRB)

RED-BREASTED MERGANSER
S Carron Valley Reservoir: 5 on 18th May, 7 on 12th August and 7th September (CVG)
SWP 3 pairs Blairdrummond GP 21st April

GOOSANDER
S 18 Carron Valley Reservoir 14th August (DT)
C 8 Glendevon Reservoir 17th March and 6 on 15th November; up to 6 on Devon at Dollar January to April and November to December. Pair on Upper Glendevon Reservoir 29th May (RRE CJH)

RUDDY DUCK
SWP 8 (5 males) Lake of Menteith 26th April (WRB)

HEN HARRIER
S 1 Carron Valley Reservoir 14th October (ADW)
C 1 Tillicoultry 15th December (RRE)
SWP 1 male Menteith Hills 22nd April, male and female Callander 11th June to 10th August (DT MF) 1 Sheriffmuir 19th September (CJH)

GOSHAWK
C 1 Muckhart 19th September (DMB)

BUZZARD
C 1 Alva 29th January, at Tillicoultry February, March, August to December, maximum 3 on 7th September (CJH RRE)
SWP Pairs Glen Ogle, Callander, Blairdrummond, Sheriffmuir, Cromlix (5 on 5th June) 6 Lake of Menteith 22nd April (DI MF WRB)

MERLIN
S 1 female Skinflats 14th, 15th and 22nd January. 1 male Sheriffmuir 21st March (MF GO WM)
SWP 1 female Thornhill 27th October (DT)

BLACK GROUSE
S Leks: 9 Callander 27th April, 10 Balquhidder 23rd May
SWP 3 males Kippen Muir 17th March (DT)

RED-LEGGED PARTRIDGE
SWP Pair Sheriffmuir 16th March (MF)

WATER RAIL
S 1 Parkfoot Marsh 11th February, 1 Gartmorn 4th April, 1 Carron Dam 27th December (ADW AY GO WM)
C 1 Alva 22nd January (CJH)
SWP 1 Cromlix 13th August (WRB)

CORNCRAKE
S 1 Kippen 21st and 23rd May (WRB)
SWP 1 reported Cromlix (per WRB)

OYSTERCATCHER
S 1st Stirling 16th February, 42 Kippenmuir 17th March (DT)
SWP 1st Ashfield 13th February, 300 Blairdrummond gravel pit 13th April (WRB DI)

RINGED PLOVER
S 4 pairs Carron Valley Reservoir (AD AY)
C 1 displaying Upper Glendevon Reservoir 29th May (CJH)
SWP 3 pairs Blairdrummond gravel pit 21st April, 2 young 8th August (MF WRB)

GOLDEN PLOVER
S 245 Skinflats 29th September and 500 on 27th October (NE)

GREY PLOVER
S 40 Skinflats 29th September (GMC)

LAPWING
S 1300 Skinflats 29th September and 27th October (NE)

KNOT
S 2340 Skinflats 22nd January and 2000 on 25th December (DMB DI GMC)

DUNLIN
S 4050 Grangemouth 19th February and 1200 on 25th December (DMB GMC)

LITTLE STINT
S Skinflats: 1 on 27th August, 1 on 24th and 28th September and 3 on 29th (GMC GO WM)

CURLEW SANDPIPER
S Skinflats: total 16 on 28th to 30th August and 23rd September to 7th October (GMC GO WM)

RUFF
S Grangemouth area: total 51 from 19th July to 12th October, maximum 6 on 29th September, 7 on 7th October and 5 on 12th (GO WM DMB)
C 1 Cambus 6th August, 8 Alloa Inch 13th October (WRB)
SWP 1 Cromlix 13th August (WRB)

JACK SNIPE
S 2 Grangemouth 14th April, 2 Skinflats 26th December (GO WM)
SWP 1 Doune Ponds in March (WRB)

SNIPE
S 10 Kinneil 21st January and 36 on 23rd December, 13 Skinflats 22nd September, 10 Carron Valley Reservoir, 29th July, 1 pair present (NE GO WM ADW AY)
C 55 Cambus early December (WRB)
SWP 12 Cromlix 13th August (WRB)

BLACK-TAILED GODWIT
S Grangemouth area: 2 on 9th March, total 10 from 21st April to 3rd May, 1 on 18th and 22nd June, total 127 from 19th July to 27th September, maximum 13 on 9th August, 19 on 29th August and 25 on 23rd September, 5 on 4th November (GMC DMB DT GO WM DM)
C 1 Gartmorn Dam 25th August (WRB DM)

BAR-TAILED GODWIT
S 286 Grangemouth 19th February, 210 Kinneil 23rd September (DMB)

WHIMBREL
S Grangemouth area: 2 on 6th May, total 18 from 19th July to 24th August, maximum 3 on 12th and 17th August, 2 Carron Valley Reservoir 28th August (DM GO WM AY)

CURLEW
S 452 Grangemouth 19th February, 304 Skinflats 29th September (DMB NE)

SPOTTED REDSHANK
S 1 Skinflats 22nd September (GMC)

REDSHANK
S 1336 Grangemouth 19th February (DMB)

GREENSHANK
S Grangemouth area: 1 on 14th January, 9th and 31st March, 21st April, total 11 from 7th August to 23rd September, maximum 4 on 3rd September. 3 Bandeath 15th August, 1 Carron Valley Reservoir 12th and 22nd August (GMC WRB GO WM DI ADW)
C 1 Cambus 6th August (WRB)

GREEN SANDPIPER
S 1 Skinflats 30th July (GO WM)

WOOD SANDPIPER
S 3 Skinflats 29th and 30th July (GO WM)
C 1 Muckhart 25th April (DMB)

COMMON SANDPIPER
C 1st Cambus 16th April, Tillicoultry 19th, Muckhart 25th (WRM RRE DMB)
SWP 1 Deanstoun 13th April (MB)

TURNSTONE
S 3 Carron Valley Reservoir 29th July, 2 Kinneil 23rd December (ADW GO WM)

ARCTIC SKUA
S Skinflats: 2 on 9th September, 3 on 22nd and 1 on 29th (GMC GO WM)

BLACK-HEADED GULL
S 1450 Grangemouth 14th January (WRB)
SWP 300 pairs Cromlix 5th June, c50 young reared (WRB)

LESSER-BLACK BACKED GULL
S 1 wintered Stirling. 1 Kinneil 26th February (WRB GO WM)

HERRING GULL
S 2000 Kinneil 14th January (WRB)

GLAUCOUS GULL
S 1 Kinneil 14th January (WRB)

GREAT BLACK-BACKED GULL
S 200 Kinneil 14th Janaury (WRB)

KITTIWAKE
S 1 Kinneil 19th July. 1 Carron Valley Reservoir 18th November, 30 (adult and juveniles) flew W on 2nd December (WRB GO WM)

SANDWICH TERN
S 27 Skinflats on 23rd September (DT)

ROSEATE TERN
S 1 Skinflats 20th July (GO WM)

COMMON TERN
S 26th June, 33 adult and 18 juveniles at Grangemouth Dock, 6 adult and 3 juveniles on River Carron (GO WM)

GUILLEMOT
S 4 Skinflats 19th February and 5 on 12th October, 7 Bandeath 20th December (WRB DI GO WM)

RAZORBILL
S 1 Skinflats 22nd January (DI)

STOCK DOVE
SWP 26 Blairdrummond gravel pit 8th August (WRB)

BARN OWL
S reported breeding Craigforth (Stirling) (per WRB)
SWP 1 road death Lecropt 22nd September (WRB)

TAWNY OWL
SWP 9 out of 11 nest boxes occupied, Trossachs, 24 young fledged (HR)

LONG-EARED OWL
S 2 pairs Carron Valley Forest 27th February, 1 on 21st September; 5 Letham Moss 27th December (ADW AY GO WM)

SHORT-EARED OWL
S Grangemouth: total 5 from 14th January to 27th February, 16 from 8th August to (maximum 5) 20th December. 1 Balgair Muir 19th June, 1 Carron Valley Forest 21st October (DMB GMC NE DT GO WM ADW AY)
SWP Pair with 3 young at Cromlix 8th August (WRB)

SWIFT
S 10 Stirling 12th May, 1 Bridge of Allan on 3rd but not at breeding site till 13th, 70 on 23rd June. 60 over Stirling 31st July (DJB WRB CJH DI)
C 1st Tillicoultry 16th May, last on 10th August, 4 Alva 16th May (DMB RRE)

KINGFISHER
S 3 on River Carron near Larbert, bred but no young seen (WRB GO WM)
C 1 Muckhart 8th and 29th September (DMB)
SWP Reports from Rivers Balvag, Teith, Allan Water (WRB)

HOOPOE
S 1 Gargunnock 24th to 26th April (Mrs Jackson, RB DT WRB)

SKYLARK
S 160 Kinneil 21st January (ADW AY)
SWP 150 Thornhill 5th February (DT)

SANDMARTIN
C 1st Tillicoultry 17th April, last 5th September (RRE)
SWP 1st Blairdrummond gravel pit 13th April, Lake of Menteith 14th April (WRB DI). c125 pairs Barbush (c500 in 1983)

SWALLOW
S 1st Skinflats 18th April (GO WM)
C 1st Muckhart 17th April, Tillicoultry 19th April (DMB RRE)
SWP 1st Doune 17th April (WRB)

HOUSE MARTIN
C 1st Cambus 24th April, Glendevon 28th April, 1 Tillicoultry 23rd November (WRB DMB RRE)

TREE PIPIT
SWP 1st Port of Menteith 21st April, Menteith Hills and Strathyre 22nd, Sheriffmuir 23rd (DT WRB)

YELLOW WAGTAIL
S 1 Kinneil 13th May, 3 on 23rd and 24th, 1 on 18th June (GO WM WRB)

GREY WAGTAIL
S wintered : 1 Stirling 21st January (WRB)
SWP wintered : 1 Balquhidder 6th December (at 350m) (WRB)

PIED WAGTAIL
S Grangemouth: 32 on 9th March and 20 on 27th, 27 on 18th August, 2 alba Skinflats 23rd and 27th April (GO WM)

WAXWING
S 1 Cornton 21st December (WRB)
SWP 1 Dunblane 11th December (WRB)

REDSTART
SWP 1st Balquhidder 23rd April, Menteith 24th April (WRB) 28 pairs Trossachs, 150 young fledged (HR)

STONECHAT
S 1 Sheriffmuir 3rd May, 1 Carron Bridge 14th October (WRB MF)

WHEATEAR
SWP 1st Loch Katrine 4th April, Glen Ogle 15th April, Glendevon 14th April (DMB WRB MF)

FIELDFARE
S 40 Loch Coulter 7th October, 100 SW Airthrey 24th October, 310 SW Kippen Muir 12th November (DMB ADW CJH)
SWP 1st Glen Artney 5th October, 1000 SW Ashfield 10th November (WRB)

REDWING
C 1st Tillicoultry 12th October (RRE)
SWP 1st Doune 30th September, 52 on 6th October, 1 Strathyre 3rd October, widespread on 4th. Steady movement SW and W Crianlarich 27th October (WRB CJH)

BLACKCAP
S 1 female Skinflats 20th December (GMC)
C 1 male Muckhart 26th December (DMB)

WILLOW WARBLER
S 3 Skinflats 21st April (GO WM)

C 1st Tillicoultry 23rd April (RRE)
SWP 1st Doune 18th April, Menteith 21st, widespread on 22nd (WRB DI MF)

PIED FLYCATCHER
SWP 46 pairs Trossachs 199 young fledged; 5 pairs Loch Voil, 2 pairs Port of Menteith (MF HR)

GOLDEN ORIOLE
SWP Male Doune Ponds 15th May (WRB)

GREAT GREY SHRIKE
S 1 Carron Valley Forest 11th February (ADW AY)

CARRION CROW
S 160 Kinneil 21st January (ADW AY)

HOODED CROW
SWP 2 Cromlix 29th February (DI) – remarkably scarce away from breeding area

HOUSE SPARROW
C 120 on ripened wheat at Alva 31st July (CJH)

BRAMBLING
C 1 Muckhart 3rd January and 2 on 29th September, 2 Tillicoultry 20th January and 1st to 6th February (WRB DMB RRE)
SWP 40 Ashfield and 12 Feddal 7th January (WRB)

GOLDFINCH
S 40 Carron Bridge 14th October, 17 Skinflats 20th December (GMC ADW)

LINNET
S 570 Kinneil 21st January (ADW AY)

TWITE
S 180 Kinneil 21st January, 9 Skinflats 22nd January, Carron Valley Reservoir 45 on 14th October and 65 on 18th November (ADW AY DI)

REDPOLL
S 150 Kippen 17th November (WRB)
C 70 Gartmorn 19th November, 50 on 30th, 27 Tillicoultry 11th December (RRE)
SWP 50 Doune 23rd September (RWB)

CROSSBILL
S 100 Carron Valley Forest 19th November (ADW AY)
C 2 Forestmill 4th March (ADW), pair Dollar 11th October (JR)
SWP 4 Menteith Hills July, pair and 2 immature Loch Achray 23rd September (WRB DT)

HAWFINCH
SSP 1 Dunblane 14th February (WRB)

LAPLAND BUNTING
S 2 Skinflats 25th December (GMC)

SNOW BUNTING
S Grangemouth area: 15 on 14th January, 30 on 22nd, 13 on 19th February (WRB DI ADW AY GO WM)
SWP 200 Ben Each 29th February (WRB)

YELLOWHAMMER
C 25 West Plean 19th February, 70 Tulligarth 8th March, 35 Blackgrange 31st March (ADW WRB)

CORN BUNTING
S 1 Skinflats 21st April, 23rd May, 12th July (MF GO WM)

BOOK REVIEW

BIRDS IN SCOTLAND. Valerie Thom. Poyser, Calton. 1986. 382 pp. £24. ISBN 0 85661 040 2

Valerie Thom must be congratulated on producing a fine, up-to-date account of the status and distribution of birds in Scotland. The first sixty of its 382 pages are devoted to short chapters succinctly describing the major habitats to be encountered in the country, together with summaries on protection and conservation and a reminder that most avifaunas, including that of Scotland, are continually changing.

The vast majority of the book (290 pages) comprises the species accounts, which for the more common species include a vignette and a distribution map. Resident and common wintering/passage birds are usually given one or two pages of text, whereas vagrants/rarities receive up to a quarter of a page. These accounts do not follow any set pattern and the content varies in style according to the species under discussion. However, status and breeding distribution are the predominant themes throughout; count data are generally very up to date with the year 1985 appearing surprisingly frequently for a book published in spring 1986. Perhaps not enough attention is given to winter distribution of our resident birds, though this information is now adequately covered in the new B.T.O. 'Winter Atlas'. The vignettes certainly add character by breaking up the text, though the occasional one looks rather odd (e.g. Knot p 179).

My main quibble with this book lies in the maps. Essentially they have been modified from the 'Breeding Atlas' to take recent reports into account and although the author has used them to give a general impression, they can be misleading at a local/regional level. Two basic formats are used interchangeably: 'widespread/local or sporadic' and 'regular breeding/scarce or sporadic'; the latter tends to be used

when the breeding birds are relatively thin on the ground. This can lead to some confusion when a species is both a resident breeder and a more widespread or numerous winter visitor as is the case with many of our ducks. Whenever I see a map of, for example, Wigeon distribution (p111), I automatically, and in this case wrongly, presume it shows winter distribution. Thus, to me, the map implies that the bird is virtually absent from the Inner Hebrides, when for example up to 500+ regularly winter on the Isle of Islay. Perhaps what is really needed is a completely-worded key on each map stating that the information in the top left-hand corner always refers to breeding and that at the bottom to wintering and moulting. On the contrary, the notation for seabird colonies and major wintering haunts leaves no room for doubt as to where to find the birds. The final part of the book (30 pages of appendices) gives useful information for potential visitors to Scotland with grid references, regions and old counties for all sites mentioned in the text, listings of area bird reports, island checklists and very up-to-date references.

Overall, the impression given by the book is highly satisfactory and the presentation is up to the usual, and now expected, high standards of T. and A. D. Poyser. However, when one looks more closely at details in the text and maps for some species in a Central/Tayside Regional (Forth Bird Report area) context, then some inaccuracies and overgeneralisations may begin to appear in the eyes of a local birder. According to its map (p135), the Goosander does not appear to breed or winter in Clackmannan, Kinross or Southeast Perthshire. Goosanders can be encountered frequently on the River Devon in winter and spring in all these districts and small parties are a common sight in many of the Ochil Reservoirs; indeed some of them breed locally. The Peregrine also seems a little misrepresented (p151). They are shown as scarce breeders on local hills – nowadays I would consider them widespread in this area in summer; and more importantly the text tends to give the impression that these fine raptors will not be encountered outside the breeding area. In winter, our upland sites are more or less deserted and the population moves to, or is replaced by, one eating waders on the Saltmarshes and mudflats of the Upper Forth estuary or chasing pigeons over farmland. A similar winter story applies to the Short-eared Owl. Both the Whinchat (p274) and Stonechat (p275) are shown as scarce or local in the Forth Bird Report area: however the former is a common breeder in the bracken-clad Ochil Glens and the latter almost absent. In this case, however, the text contradicts the map and admits that the Stonechat is well nigh absent from the Upper Forth, Central and Tayside Regions! The map of Raven distribution (p321) shows this species to be absent from the Ochils even though a few pairs may still breed and groups of up to 10 may be encountered at any time of the year.

Nevertheless, this book represents real value for money and I am sure the vast majority of Scottish ornithologists will already have a copy on their shelves . . . . and, more importantly, will thumb through it regularly as I do.

STEVE NEWTON

GIANT HOGWEED (*Heracleum mantegazzianum* Somm. & Lev.) BY THE RIVER ALLAN AND PART OF THE RIVER FORTH

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INTRODUCTION

Giant Hogweed *(Heracleum mantegazzianum)* is a native of the Caucasus Mountains, but is now widely naturalised throughout north-central Europe and Scandinavia (Tutin et al 1968). It was introduced into Britain as a garden ornamental in the late nineteenth century and since the 1930's has become widespread in Scotland (Drever and Hunter 1970) where it is spreading at an increasing rate (Williamson and Forbes 1982). It is most commonly found growing next to waterways, and the banks of the River Allan have become extensively colonised. Giant Hogweed may have been introduced into the area from the gardens of Cromlix House (from which a stream drains into the River Allan) where it is known to have been planted in the first decade of this century (R. Eden personal communication).

Giant Hogweed is conspicuous by its large size, with mature individuals under favourable conditions reaching 3·5m tall and possessing leaves over 1m wide. It takes three or four years to mature, senescing each winter to grow back more vigorously the next spring from the large tap root. Immature plants can be distinguished from the smaller, native Hogweed (*Heracleum sphondylium* L.) by their bristles and red blotches which cover the hollow stems (although Stewart and Grace 1984 have described hybrids which show intermediate characteristics). Giant Hogweed is monocarpic, flowering and reproducing only once at the end of its lifespan, when locally individuals have been observed to produce from 2,000 to 20,000 seeds (Neiland 1986).

The spread of Giant Hogweed has caused concern primarily because of the injurious sap which contains furocoumarin chemicals that sensitize human skin to strong sunlight (Youngman 1958, Knudsen 1983). There have been several cases of severe blistering and dermatitis amongst children and gardeners who have come into contact on sunny days with the copious sap that exudes from cut stems (Drever and Hunter 1970). Giant Hogweed can restrict public access to river banks and may cause erosion since it often replaces existing vegetation which has helped to stabilise the soil.

In the present paper, our aims are to describe part of the local distribution of Giant Hogweed, and to explain its distribution and possible means of control. A more detailed account can be found in Neiland (1986).

METHODS

Distribution

The distribution of Giant Hogweed on the banks of the River Allan and some of its tributaries, and the section of the River Forth downstream from its confluence with the Allan to Stirling Bridge, was mapped up to 50m from the water's edge on 3, 4, 16, 20 and 24 August 1985. At all sites, the number of adults were counted, except where there were over fifty when the colonies were simply classified as 'large'. Immature individuals were also recorded and numbers estimated where possible. Neiland (1986) includes notes on the types of habitat in which Giant Hogweed grows and details of their soil chemistry.

Dispersal

The seeds of Giant Hogweed, in common with other Umbelliferae, separate into two carpels when dry, and the marginal ridges of these form a broad wing which suggests an adaptation to wind dispersal. To investigate this, dried seeds of average size were released from a height of about 2m (a frequent height of adults) on a windy day in an open area on Stirling University Campus, and the distance they travelled was measured. The wind speed and duration of wind gusts was also recorded. The process was repeated several times. Having then established a relationship between windspeed and dispersal distance, maximum expected dispersal distances for seeds in the area were calculated using local windspeed data for sample days in August 1985.

Most Giant Hogweed grows in riparian habitats, perhaps because water is an important means of dispersal. To investigate whether this was the case, the time taken for seeds to sink was recorded, and calculations were made as to how far it was theoretically possible for seeds to be dispersed using water velocity data for the River Allan.

Seeds may be removed and dispersed by birds and this was studied at a Giant Hogweed site in Bridge of Allan (NS 788 963) on 21 and 22 August, 1985.

RESULTS

Giant Hogweed grows at numerous open sites along the bank of the Rivers Allan and Forth (see Figure 1 – fold-out map). At most sites where adults were present, there were less than 50 flowering plants. The largest colony was in Bridge of Allan (NS 788 963) where there were many hundreds of adults and thousands of immature plants. This was an area of privately-owned river bank where no attempt had been made to control Giant Hogweed. At 80% of the sites where adults grew, seedlings and non-flowering plants were present. Sites without mature plants may have resulted from recent colonisation or destruction of older individuals by control measures.

Giant Hogweed grows in open woodland near the banks of the Allan and plants were occasionally seen on roadside verges and railway lines close to the rivers. It was also found on wasteland, rubbish tips, land around derelict buildings or demolition sites, and in gardens. There are large numbers on wasteland next to a scrap-metal yard at Causewayhead (NS 806 952), around the foundations of the demolished Pig Testing Station in Bridge of Allan (NS 789 963) and in the gardens of Cromlix House (NN 785 059). Although not mapped, a few plants were found to grow at considerable distances from the banks of the Allan. One individual was seen about 1km from the river on a roadside verge near the main entrance to Stirling University (NS 801 969), and another by the M9 motorway at NS 780 977.

Dispersal

The wind dispersal experiment showed that seeds could be blown considerable distances. Even in moderate windspeeds of about 3m/sec they could travel over 2m, while in high winds of 14m/sec, they were blown over 10m. This is further than had been suggested by previous workers (Clegg and Grace 1974).

The investigation of water dispersal showed that seeds remained afloat for two or three days. Although they may sink more quickly in turbulent water they can clearly be carried several kilometres downstream even at low water river velocities of 0·15m/sec (Forth River Purification Board communication) if unhindered by obstacles. During periods of high water the river is liable to burst its banks and deposit seeds further from the usual channel.

Dispersal by birds was not observed and none were seen to feed on the seeds. Tits and warblers were attracted only by the numerous insects which swarmed around the umbels.

DISCUSSION

The results of mapping suggest that the plant is increasing its numbers and distribution in the study area in spite of control measures by Stirling District Council, Bridge of Allan Community Council and a few riparian landowners. But it does remain absent from agricultural land because it cannot tolerate grazing or ploughing. Cattle, goats and sheep readily graze Giant Hogweed and seem attracted by the scent, particularly of the flowers. Neiland (1986) observed cows tearing open black plastic bags in order to reach inflorescences within. The animals appear to suffer no ill-effects from eating the plant, although there are rare reports of it causing blisters around the mouth (Andrews et al 1985). Ploughing cuts through the roots of the emerging plants and thereby prevents their establishment. Although the Rivers Allan and Forth do pass through much agricultural land, riverbanks are often fenced or left unploughed and therefore provide a suitable habitat for the plant. This is also the case with areas of wasteland or open woodland.

Giant Hogweed is not grazed naturally in Britain and neither hares nor rabbits were observed to eat it; nor does it suffer from insect herbivory. Therefore, if grazing by domestic animals or ploughing cannot be used to control it, other methods must be found. Herbicides and cut and slash methods have been used on the banks of the River Allan to control Giant Hogweed, but so far with only limited success. Amongst the herbicides, 'Glyphosphate' is the most effective (Neiland 1986) but is expensive and in common with other herbicides can be injurious to wildlife, tending to kill non target species in the vicinity. It was used during the summers of 1984 to 1986 on the extensive areas of bank owned by Stirling District Council (SDC), and has proved very effective at reducing the population of larger plants which represent the major problem as far as the access to riverbanks is concerned. However there are still large numbers of seedlings appearing each year in these sprayed areas. The seed which gives rise to these plants may have been a) blown in from opposite untreated privately-owned banks, b) washed in by the extensive flooding during the summer of 1985 and c) represent a reservoir of dormant seed in the soil. Cut-and-slash methods are more selective than herbicides but laborious and unpleasant for workers who touch the cut stems. Moreover the plants will regenerate unless they are cut just before the seeds are ripe. The problems of control are made more difficult by the ease of dispersal of the large numbers of seeds that are produced annually, and the seeds' dormancy which enables them to persist in the soil for many years (Forbes and Williamson 1983).

If Giant Hogweed is to be controlled in the study area then a co-ordinated strategy aimed at eradicating all the colonies is needed, not just those on land owned by SDC. Carefully timed cutting and herbicide spraying operations can be successful in controlling the plants, but must be maintained over several years to be effective, and this requires long-term planning by the local authorities.

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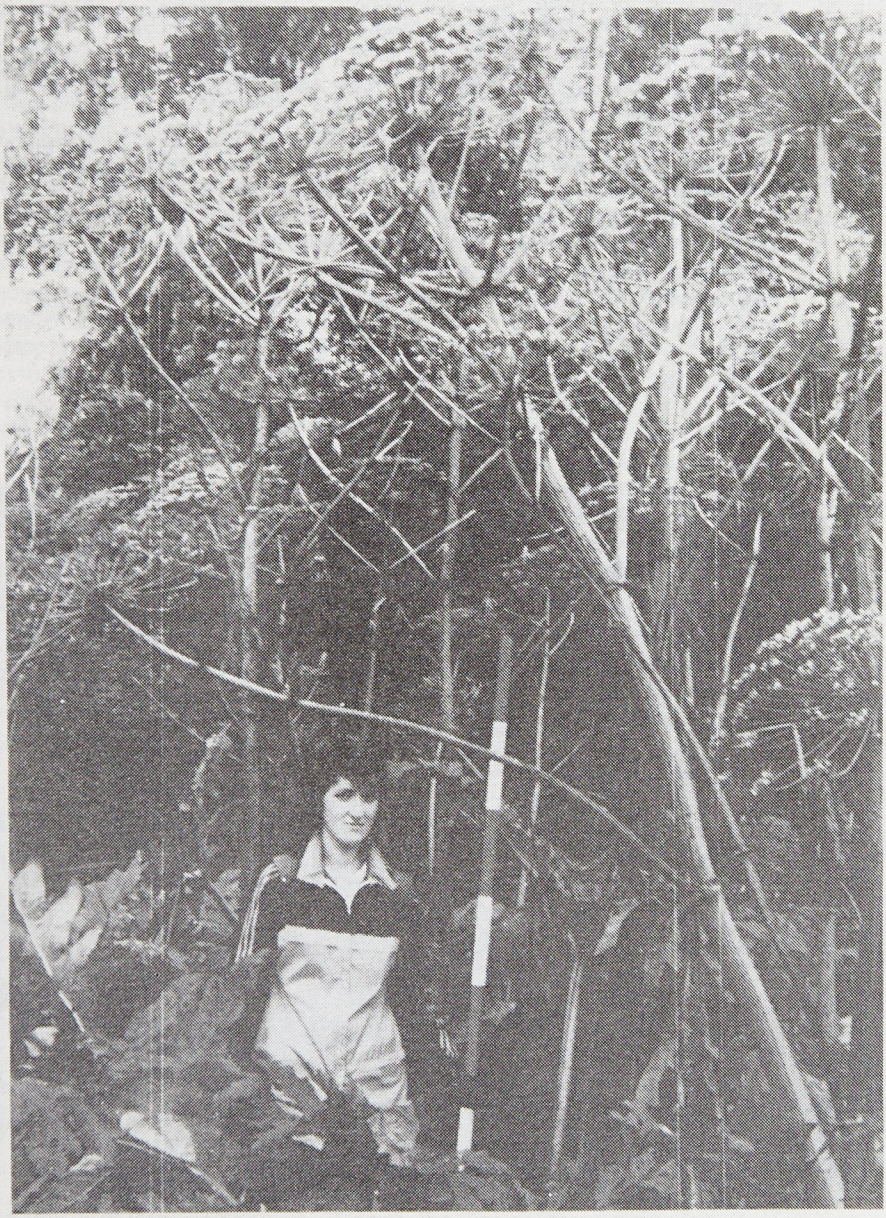
The Giant Hogweed *Neiland*



The Giant Hogweed *Neiland*

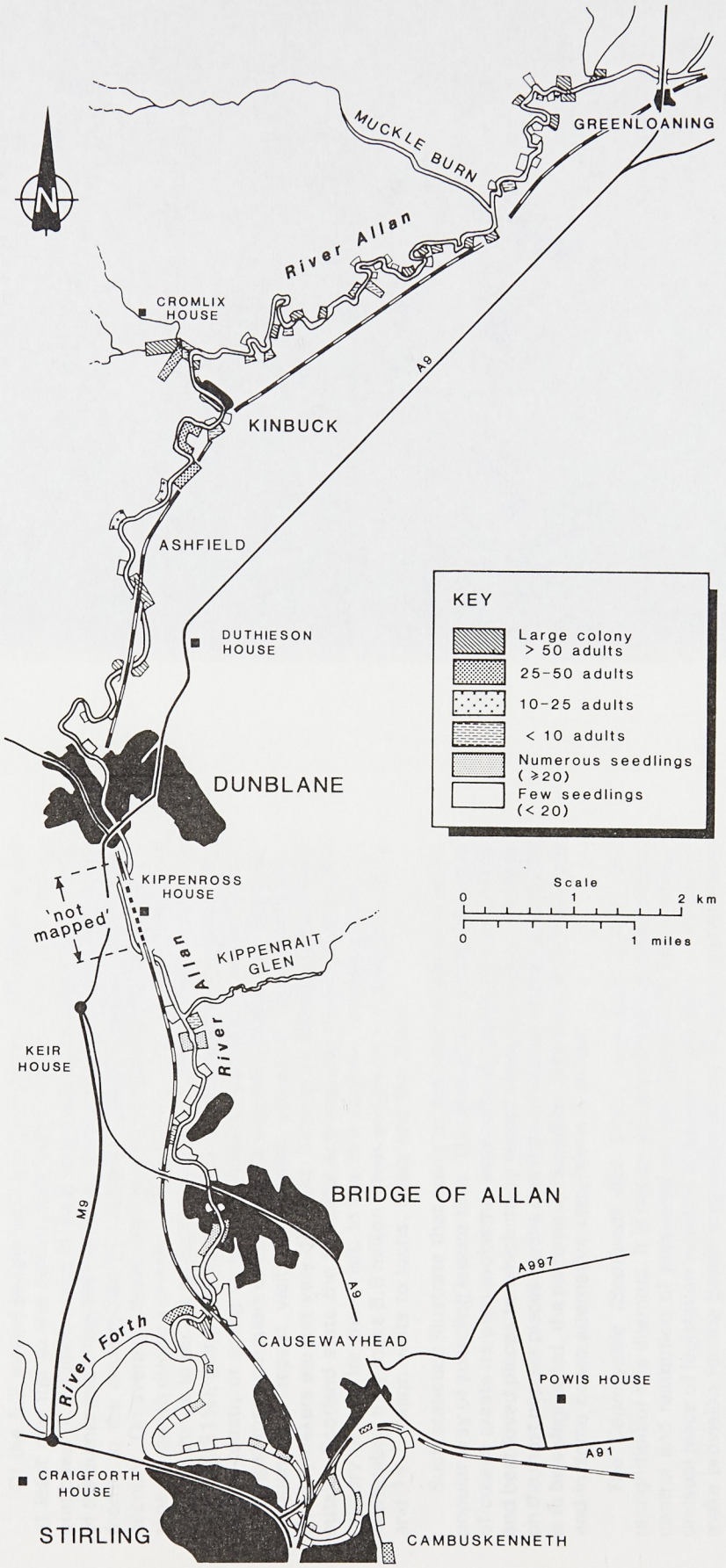


Fig. 1 Hogweed distribution along the River Allan and a part of the River Forth

RECREATION MANAGEMENT AND COUNTRYSIDE CONSERVATION

J. R. Turner
Countryside Commission for Scotland

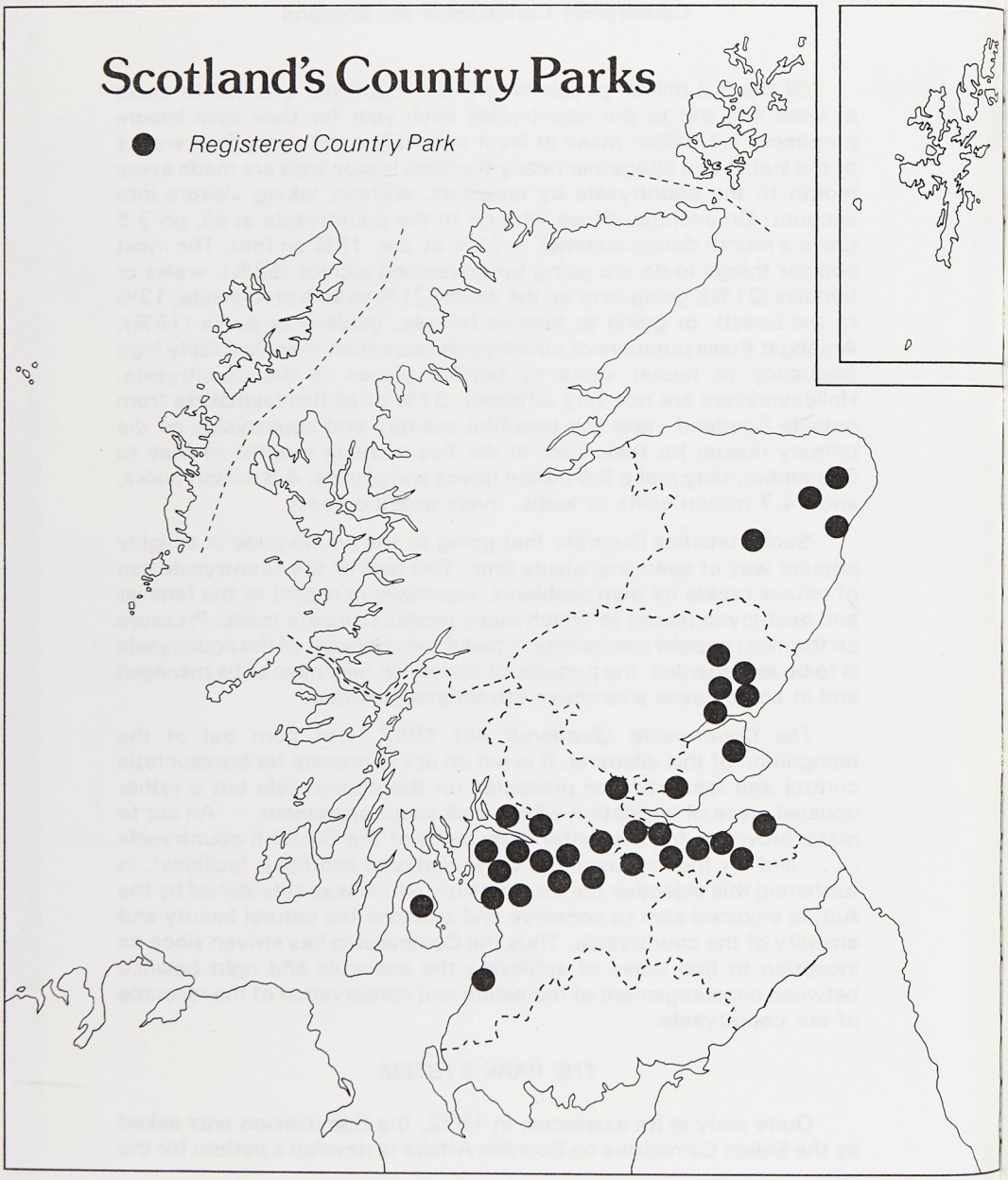
Of the 5.2 million people who live in Scotland, 2.8 million make at least one trip to the countryside each year for their own leisure purposes. 1.7 million make at least one leisure trip every four weeks of the sumer and altogether nearly 6 million leisure trips are made every month to the countryside by residents, without taking visitors into account. On average, those who go to the countryside at all, go 3.5 times a month during summer – 71% by car, 15% on foot. The most popular things to do are going for drives and picnics (52%), walks or rambles (21%), going to or on the water (21% to loch or riverside, 12% to the coast), or going to historic houses, gardens or parks (15%). Amongst these pursuers of countryside recreation there is a fairly high frequency or repeat visits to familiar places in the countryside. Holidaymakers are not very different. 37% of all holidaymakers from outside Scotland state the beautiful scenery and countryside as the primary reason for their visit. In the five summer months of May to September, they make 8.5 million drives and picnics, 4.8 million walks, and 14.7 million visits to lochs, rivers and the coast.

Such statistics illustrate that going to the countryside is a highly popular way of spending leisure time. This love of the countryside can of course create its own problems, especially in regard to the familiar and best-loved places to which many repeat visits are made. Pressure on the most popular places means that if the character of the countryside is to be safeguarded, the patterns of recreation may have to be managed and in some cases alternative attractions provided.

The Countryside (Scotland) Act 1967, was born out of the recognition of this dilemma. It is not an act to provide for bureaucratic control and restriction of pressures on the countryside but a rather unusual piece of legislation which is all about enjoyment – 'An act to make provision for the better enjoyment of the Scottish countryside . . . . and for the improvement of recreational and other facilities'. In furthering this objective the Commission, which was established by the Act, is enjoined also to conserve and enhance the natural beauty and amenity of the countryside. Thus the Commission has striven since its inception to find ways of achieving the desirable and right balance between encouragement of recreation and conservation of the resource of our countryside.

THE PARK SYSTEM

Quite early in its existence, in 1972, the Commission was asked by the Select Committee on Scottish Affairs to develop a pattern for the


Scotland's Country Parks
Registered Country Park

provision of recreation facilities in the countryside. In 1974 the Commission published a report *A Park System for Scotland* which set out a conceptual framework to enable action (not always in the same places) both for the conservation of areas of prime landscape interest, and for the development of recreational opportunities for the Scottish people and visitors. As proposed in the report, the park system had four main elements.

URBAN PARKS

These are long-standing in most towns and cities, but in the past have seldom been linked positively in strategic terms with countryside provisions. The forging of these links was seen as desirable in the future.

COUNTRY PARKS

The Countryside (Scotland) Act provides the statutory authority for country parks. Thirty-three of these now exist, owned, established and run by planning authorities for intensive recreational use. They range from quite small areas of about 10 hectares to extensive areas of countryside comprising a variety of landscapes and extending to 675 hectares. Generally they are close to centres of population and their range of distribution corresponds very closely with the central belt of Scotland.

REGIONAL PARKS

Two such parks have now been established. In Fife, the Regional Council has designated a regional park in the Lomond Hills to be known as the Fife Regional Park. It includes Lochore Meadows Country Park and part of Benarty Hill. In the Pentland Hills, Lothian Regional Council has designated an area of 9,000 hectares as a regional park after confirmation of the designation order by the Secretary of State, following upon a public local inquiry into objections in May 1985. The Clyde-Muirshiel Regional Park is expected to be formally designated by Strathclyde Regional Council soon. At Loch Lomond, the Regional Councils have published a designation order to which there have been some objections, and these are currently being considered by the Secretary of State.

SPECIAL PARKS

These would have been areas already under substantial recreational pressure and having particular attributes of scenic character which give them a national rather than a regional or local significance. This national significance would justify the involvement of some national input into decisions affecting their management and development. The Countryside Commission for Scotland proposed, therefore, that there should be a separate park authority for each special park, with two-thirds of the members appointed by the existing local authorities and one-third by central government to represent the scenic recreational,

scientific and other important aspects of the park. The Commission recommended that these park authorities should have local planning powers, and a very high proportion of the finance for capital works and running costs would be provided by central government, on whom would rest responsibility for designation. Loch Lomond, the Cairngorms and Glen Coe/Glen Nevis were suggested as possible special parks. In the event, local authorities were not prepared to support these proposals in their entirety and, accordingly, no action has been taken by government to secure the legislation which would be necessary for them to be implemented.

AREAS OF SCENIC IMPORTANCE

While the park system is recreation orientated, adequate conservation of scenic resources is seen as an essential part of the concept. Beyond this, the Commission recognised from the outset that there are areas in Scotland of outstanding scenic importance in national and even international terms which are not under great recreational pressure at present and which it might therefore not be appropriate to designate as parks within a recreational system. In an extensive study carried out over a period of three years the Commission identified 40 such areas of national scenic significance, covering in total about a million hectares, or one-eighth of the land and inland water area of Scotland. The results of this study were published in April 1978 in a report entitled *Scotland's Scenic Heritage.* This was the first overall assessment of Scottish scenery and was well received by the general public, voluntary bodies and local government interests in Scotland. The review was seen by the Commission and Government as providing a practical basis for landscape conservation. Protection of the 40 national scenic areas will be achieved in two ways. First, the Secretary of State for Scotland has introduced new consultative procedures for development control. The machinery now exists whereby the Countryside Commission for Scotland is consulted by planning authorities in relation to proposals for certain classes of development which are likely to have a significant effect on scenic interest. In the event of a planning authority and the Commission not being in agreement as to the disposal of a case, it is notified to the Secretary of State for Scotland to decide whether or not to call in the matter for determination centrally.

The six classes of development where the Secretary of State has retained this limited power of intervention, should a planning authority and the Commission disagree, are

(I) Schemes for five or more houses, flats or chalets except for those within towns and villages for which specific proposals have been made in an adopted local plan;

(II) Sites for five or more mobile dwellings or caravans;

(III) All non-residental developments requiring more than 0.5 hectares

(IV) of land, excluding agricultural and forestry developments;

(V) Vehicle tracks (including those for agriculture) over 300m in altitude, except where these form part of an afforestation proposal which has been agreed by the planning authority;

(VI) All local highway authority roadworks outside present road boundaries costing more than £100,000.

Developments not falling within these categories will be dealt with in the normal way by the planning authority and are not required to be notified to either the Countryside Commission for Scotland or the Secretary of State, though many planning authorities in fact consult with the Commission regularly on a range of issues affecting the countryside. Some developments not previously subject to statutory planning control now are e.g. buildings over 12m in height and vehicle tracks over 300m in altitude.

The Commission wishes to encourage development of the right kind in the right place, in close co-operation with other local and national agencies, without putting at risk the quality of Scottish scenery – or its aesthetic and economic value for tourism and recreation, and as a productive working countryside. The Commission's many statutory obligations include a duty to consider the social and economic needs of local communities throughout Scotland.

The second means of protecting national scenic areas is through land management and the further countryside legislation of 1981 will now allow planning authorities or the Countryside Commission for Scotland to make management agreements with private landowners. Under such agreements, land-uses can be modified on occasion in the interests of scenic conservation and steps designed to promote the enjoyment of the countryside by the public. In return, the planning authority or the Commission may make a payment to the owners in recognition of the public benefit secured by the agreement.

LOCH LOMOND

Take now the example of Loch Lomond and outline broadly what has happened there so far in terms of this kind of planning. Although there had been earlier attempts to secure legislation in the interests of public recreation in the Scottish countryside, it was the impetus of planning for post-war reconstruction during the Second World War which led in 1945 to the publication of a report on national parks by a committee under the chairmanship of Sir Douglas Ramsay. This included a recommendation for the creation of national parks in Scotland:

Loch Lomond and the Trossachs	82,900 hectares
Glen Affric/Glen Cannich/Strathfarrar	67,350 hectares
Ben Nevis/Glen Coe/Black Mount	158,800 hectares
The Cairngorms	46,600 hectares
Loch Torridon, Loch Maree/Little Loch Broom	129,500 hectares

While the idea of national parks made steady progress towards legislation in the early post-war years in England and Wales, this was not so in Scotland. Since access to the countryside was easy and apparently free, there was neither significant pressure from landowners about the extent of public access, nor agitation by recreational interests for a greater degree of access. For these and other reasons it was not seen as necessary to apply to Scotland the provisions of the National Parks and Access to the Countryside Act 1949 which set up national parks in England and Wales, except for those sections dealing with nature conservation. However, these five areas suggested by the Ramsay Committee were designated as national park direction areas to provide a planning oversight of them by central government. Loch Lomond was therefore one of these NPDAs and remained so until 1980 when it became one of the national scenic areas outlined earlier.

Even while the report *A Park System for Scotland* was under preparation, the Commission was involved with the then planning authorities of Perthshire, Stirlingshire and Dunbartonshire in a group known as the Loch Lomond Technical Group which was chaired by the Commission. This group prepared a report, *The Loch Lomond Recreation Report,* which was published in 1974. Following upon the reorganisation of local government in 1975 a new group was established by the two new regional councils and two new district councils but still chaired by the Commission, which prepared a draft management plan for conservation and recreation known as *The Loch Lomond Study.* In the light of this study the district councils in association with the regional councils agreed to prepare a Local (Subject) Plan for Recreation, Conservation and Tourism. That plan was the subject of public local inquiry in 1984. The Reporter accepted the need for the plan and for there being a park authority for Loch Lomond.

The Commission has supported the four local authorities at Loch Lomond in their approach to the Secretary of State to look at Loch Lomond in the national context and to set up an *ad hoc* park authority with adequate constitution, powers and access to an appropriate level of Exchequer support to conserve one of the finest areas of Scottish countryside. The Secretary of State has intimated that he believes satisfactory arrangements can be made within procedures already available and that he would oppose any proposal by the local authorities to proceed with private legislation to set up an independent statutory park authority.

In the absence of any statutory machinery to accord the area the national status which the local authorities have properly recognised to be appropriate, the Commission has agreed that the most suitable arrangements available would be that Loch Lomond could be promoted as a Regional Park in terms of Section 48A of the Countryside (Scotland) Act, albeit with rather special connotations. It is likely that a Special Park Committee would be set up jointly by the four local authorities, with a proporation of its membership nominated by the Commission, and that funding for administrative costs exclusive to the Park would

be eligible for grant-aid from the Commission, perhaps at a rate of 50%, rather than the normal 37½% applicable to regional parks. The Commission supports the provisions of the plan, and although as yet it has no commitment to pay grant on the eligible capital projects identified in the plan it would endeavour to support within its means as many of these as possible.

The benefit of establishing a regional park at Loch Lomond is that through the joint committee for the park it will be possible to take a co-ordinated approach to the management of the Loch and its surroundings as an entity. Currently responsibility for the area is divided between two district and two regional councils. The plan puts forward a strategy for the reconciliation of recreational and tourist demands with the need to conserve and enhance the environment of the area. It should also provide a useful basis to guide priorities for and discussions about public and private investment in the area, which because they will be considered by a committee with responsibility for the whole area will have more chance of being informed and balanced.

This paper was presented at the 11th Man and the Landscape Symposium at Stirling University on 16th November, 1985.

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BOOK REVIEW

DISCOVERING WEST LOTHIAN. William F. Hendrie.
John Donald, Edinburgh. 250pp. 1986. £6.50. ISBN 0 85976 162 2.

A highly readable well produced work by a recognised authority on the history and legends of the area – for centuries Linlithgowshire – lands of the Forth from the Avon to the Almond rivers, with the Union Canal between, and taking in Bo'ness and Queensferry. For people of central Scotland and visitors alike it reveals a wealth of interest in an area tending to be regarded as one of east to west valleys and travel, and sometime called 'Corridor County'.

From the west we have 30 pages on 'Bo'ness, Burgh Town on the Point' – its coal, shipping, saltmaking, whaling; historic Kinneil House; and the Carron ironworks and James Watt connections.

A similar length chapter two takes us through Linlithgow including the viaducts and canal, where David Wilkie produced the first sample of chloroform – now a main street restaurant . . .

Chapter three, from the 13th century through Mary Queen of Scots to a new Queen's aisle in 1986, takes us through Linlithgow's historic Saint Michael's church and the royal 'Palace of Pleasure' . . .

Chapters four and five include Blackness, the famed houses of the Binns and Hopetoun, the Queen's Ferry and Dalmeny, the great road and rail bridges, the Earl of Roseberry . . .

The second half of the book then goes inland through Bathgate – covenanting, shale and 'paraffin' Young; then into the hills – Cairnpapple's archaeology, Torphichen's historic abbey and Knights, the short lived 'God's blessing' silver mine of the 1600's; on to the Armadale and Whitburn areas on the route Glasgow to Edinburgh – with industrial and human anecdotes, the story of the Union Canal and its area, Niddry Castle, Kirkliston; and on to old and new town Livingston – Scottish kings' hunting, local lore, the 17th century botanist Sir Patrick Murray's basis of Edinburgh's Botanic Garden, Livingston Mill restoration . . .

So, throughout factual information is blended with tradition and anecdotes of people, places and events, 'discovering' West Lothian to the reader with an enthusiasm which could stimulate pleasurable outings and further researches.

L. Corbett

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PEOPLE OF THE FORTH (1)

THOMAS JOHNSTON, MP, PC, CH, 1882-1965

B. J. Elliott
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In his book outlining the work of Scotland's Secretaries of State from 1926-1976, George Pottinger accorded to Thomas Johnston, who held the office from 1941-1945, the title of 'The Lion Rampant'. In its three-column obituary of Johnston, the *Stirling Journal* noted he had been previously hailed as the 'greatest living Scot' and *The Times* obituary declared him an 'outstandingly successful Secretary of State.'[1]

There is no doubting Johnston's reforming zeal, nor his formidable political skills. Additionally his personal morality was Calvinistic, a boxer in his youth and a life-long teetotaller who refused both the extra salary to which the office of Secretary of State entitled him and a peerage in 1945 as a reward for his efforts on behalf of Scotland and the Churchill coalition government.[2]

Indeed his political ambitions seem to have been quite modest, at least until he became Secretary of State. His early passions were history and journalism, the former being one of his chosen subjects at the University of Glasgow following his early education at Lairdsland school in his native Kirkintilloch and Lenzie Academy. Then it was as a journalist and editor (1906-35) of *Forward* a socialist weekly which he had founded with R. E. Muirhead, that he first became moderately famous and influential. He also published four books including his autobiography in 1952.

As with so many other national politicians, Johnston cut his political teeth in local politics, in his case the twelve man Kirkintilloch town council. Kirkintilloch was a pioneer in many fields – a municipal cinema house in 1914, and the home of Scotland's first (and profitable) municipal bank in 1919. Less successful were the municipal pig-feeding and jam-making schemes. Johnston was pleased however, that Kirkintilloch voted for municipal temperance under a 1913 Act – one of the few burghs to do so.

Inevitably, Johnston claimed in his memoirs, he was pressurised into standing as a parliamentary candidate for the Labour Party. It was 1918 and the first post-war election was called. Johnston contested the West Stirlingshire constituency but lost to the Conservative, Sir Harry Hope. Four years later he reversed the result by 815 votes, lost the seat in 1924 and then represented Dundee following a by-election victory from 1924-29. He then regained West Stirlingshire in 1929 but for only two years. Finally he regained it a second time in 1935 holding it until his retirement from Parliament at the end of World War II.[3]

Johnston first held political office as Under-Secretary for Scotland in MacDonald's 1929-1931 government, an experience which may have disillusioned him and weakened his ambitions. Even more insidious was his dislike of the sleeping compartments of the LMS railway which he was obliged to use week by week while Parliament was sitting and which, according to his own telling, wore him down as he entered his fifties. However, an even greater demon than the LMSR entered his life when he gained first hand impressions of Nazism during a visit to Danzig in 1936. This was one of a number of overseas visits, including to India, Canada and Russia which Johnston made and had made considerable and varied impressions upon him.

Thus, even before World War II broke out Johnston accepted the post of Regional Commissioner for Civil Defence in Scotland although typically he refused to take the official title until 3 September, 1939. He recalled that there was 'no limit to the urgent and sticky problems set me.' These included what to do with zoo animals, Scotland's crown jewels, and the huge stock of inflammable whisky in bonded warehouses, in anticipation of heavy bombing. But even these problems paled beside the task of evacuating 170,000 Scottish women and children from the cities – a feat actually achieved in three days.

By the time Scotland had been drawn completely into the physical war in particular through the devastation of Clydeside in the spring of 1941, Johnston had, extremely reluctantly, he claimed again, been persuaded by Churchill to join the War Cabinet as Secretary of State for Scotland – with the horrific possibility of spending up to four nights a week in LMSR sleeping cars. However, before accepting he had got Churchill to agree to the establishment of a 'Council of State' for Scotland, composed of all living ex-Secretaries of State. Furthermore he demanded Churchill's support for any measure upon which the Council of State was agreed.

With the rest of the cabinet preoccupied with the War, and as a result being obliged to adopt a series of radical measures such as rationing, the conscription of women and the detention of aliens, Johnston was able to initiate his own series of radical measures to improve the future of Scotland.[4]

There were in addition compelling political reasons why Johnston and through him, the Labour Party should be seen to be doing something for Scotland. These related to the serious economic decline of Scotland in the 1920s and 1930s which even the stimulation of war had failed to arrest and the subsequent rise of nationalist sentiment. Johnston was hardly a devolutionist much less a nationalist but he did realise the need for a high profile if the Labour Party was to regain the Scottish seats lost in 1931 and not retaken in 1935.

The first of Johnston's 'high profile' gestures was the proposal to establish a North of Scotland Hydro-Electricity Board. An enquiry under Lord Cooper was completed in ten months and found in favour of the

Thomas Johnston

The Provost, Magistrates and Councillors of the Royal Burgh
of Stirling
request the pleasure of the company of

at the Ceremony of the Presentation of the
Freedom of the Royal Burgh of Stirling to the
Rt. Hon. Thomas Johnston, P.C., LL.D.,
in the Allanpark Cinema, on Friday, 24th October, 1952,
at 3 p.m. Doors open 2.15 p.m.

Charles W. Norman,
Town Clerk.
1st October, 1952.

Presentation of this Ticket
admits to Front Stalls.

scheme. The subsequent bill was passed by Parliament without a division although there were fierce complaints outside, many amusingly documented later by Johnston.

Less amusing, particularly to one group of Labour MPs was the threat of such a development to the Scottish coal industry. As they had forecast, when the new Hydro stations came on stream in the 1950s, demand for Scottish coal slumped whilst the new industry did little to regenerate the economy of the Highlands.[5]

Simultaneously as the idea of a Hydro Board was taking shape, Johnston was busy establishing the Scottish Council on Industry, 'a sort of industrial parliament' he called it with a representation widely drawn from the local authorities, STUC, banks and industry all under the chairmanship of Sir Will Y. Darling, Lord Provost of Edinburgh. By July 1945 over 700 new or expanded firms were in operation employing 90,000 workers for which the SCI claimed credit. It is not known how many were still in business 40 years later.[6]

One of Johnston's most successful schemes to improve the quality of life in Scotland was the Emergency Hospital Scheme first in the Clyde Valley, later throughout Scotland. These hospitals, well equipped but lying empty, awaiting the casualties of bombing raids which never took place were turned over for the use of civilian war workers to whom no charge was made for operations or special treatment. No serious opposition was encountered from the medical profession and the national waiting list of 34,000 for hospital admission was removed by VE day (10 May 1945). This scheme has since been seen as the forerunner of the National Health Service in Scotland.

In agriculture Johnston had mixed success. He persuaded the Ministry of Agriculture to hand over to the Scottish Office the running of Crown Lands in Scotland. He also secured joint control with the Ministry of Agriculture of the Forestry Commission when it was first brought under Ministry Control in 1943. Four of the nine Commissioners were, at Johnston's insistence, Scots. His attempts to secure a uniform price for milk in the UK failed but he did inaugurate sea fish farming experiments at Loch Sween.[7]

The vast range of diverse responsibilities faced by the Scottish Secretary of State may mean, if he is a keen reformer like Johnston was that it is not possible for him to exert enough pressure on all subjects. This may well have been the case with Education, although in seeking reforms here he was also faced by the entrenched and centralised power of the Scottish Education Department; for example in the failure of the Sixth Advisory Council on Education in Scotland to open up the system to democratic review. He was also interested in curriculum reform but it was not from his suggestions that the impetus for reforms later came.[8]

At the end of World War II Johnston resigned as both Secretary of State and as a member of Parliament. He was then 63 years of age but

he did not sink into an inactive retirement. He quickly joined the Scottish National Forestry Commision as Chairman, until 1948, by which time he had also become Chairman of both the Scottish Hydro Electricity Board and of the Scottish Tourist Board. The latter post gave him the opportunity to tour the USA 'selling' Scotland. The former made him ex-officio member of the British Electricity Authority in 1947-48 where he had to fight off a takeover of the Hydro-Electric Board by the BEA. Johnston remained with both the Hydro and Tourist Boards until 1959. He became President of the Scottish History Society in 1950, Chancellor of Aberdeen University in 1951, National Governor for Scotland of the BBC in 1955 and President of the British Electrical Development Association in 1958.

Thomas Johnston was a freeman of four towns: Kirkintilloch (1931), Edinburgh (1944), Campbelltown (1945) and Stirling (1952). He received honorary doctorates from Glasgow, Aberdeen and St Andrew's Universities. His highest honour, bestowed in 1953, was that of Companion of Honour.

After a lengthy residence in Fintry, Johnston and his wife Margaret spent their last years of marriage in Lynn Drive, Milngavie where he died in 1965.[9]

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BOOK REVIEW

STIRLING OBSERVER 150 YEARS ON. Bob McCutcheon. Edited by Alan C. Rennie. *Stirling Observer,* Stirling 1986. £6.95. ISBN 09511736 1 8.

This is a very attractively produced publication which celebrates the 150th anniversary of the founding (1836) of what was then Stirling's second weekly newspaper (and now its only one). Well over half the book is composed of historic photographs covering a wide range of subjects and activities and it is these photographs which give it its value.

The topical organisation of the physical environment, schools, religion, transport, industry and leisure is reasonable and the accompanying text contains a mass of interesting data. However the overall result is disappointing because the text is neither historically complete nor does it rise above a rather pedestrian narrative. For example the section on religion far from covering the 150 years stated begins around 1700 and scarcely enters the 20th century. It is concerned principally with the construction and fabric of various places of worship in Stirling and makes almost no attempt to analyse the social significance of religion in the town.

Similarly the chapter on railways is concerned principally with the construction of new lines and stations in the 19th century and only in a throwaway phrase is the reduction of services since 1960 (actually it began in 1930!) mentioned. The economic and social significance of railways in central Scotland is shunted into a siding. Regretably also only two maps – one of Stirling in 1820 and one of a canal which was never built – appear in this book, where maybe a dozen could have been usefully included.

It is unfortunate therefore that whilst the development of local history as an academic discipline has, in the period covered by this book, developed from sycophantic adulations of the squirearchy and bland institutional histories of schools and churches to rigorous analyses of political, economic and social structures, this particular publication is much nearer to the former definition of local history than the latter.

B. J. Elliott

AN ORAL HISTORY OF THE HILLFOOTS TEXTILE INDUSTRY

Editorial note – In volume 8 we published an outline of this project by Garry Scobie, which was then just commencing. Here now is a fuller description which shows its innovative use of word processing and the microcomputer in generating this valuable information resource, which might stimulate further studies of the textile industry in this area.

INTRODUCTION

In early 1985 application was made to the Manpower Services Commission for assistance in funding a project under the Community Programme to compile an oral history based on the textile industry of the Hillfoots villages. The application was successful and by July the team of project supervisor, three interviewers and a word processor operator had joined the Regional Council's Special Programmes Unit. Their remit was to record the memories of people who had earned their living in the Hillfoots textile industry. By July 1986, the recordings had been completed and transferred to computer disc ready to be distributed to schools, libraries and other interested parties in the Region. This paper highlights the various aspects of the work involved in producing this oral history package.

RESEARCH AND INITIAL CONTACTS

The first weeks of the project involved basic research into the area in question. The Hillfoots textile industry had been chosen as a subject primarily because it had been one of the largest employers in this area for most of the 19th and 20th centuries and the number of mill buildings still working bear testimony to its history. Although the industry has suffered a steady decline in recent years, there are large numbers of potential interviewees still living in the Hillfoots villages. Secondly, very little has been written on this industry with specific reference to the Hillfoots area and it was felt that this choice would accurately reflect the history of the area.

The first task of the team was to acquaint themselves with the available material. The following were the main sources studied –

THE WOOLLEN MILL BUILDINGS IN THE HILLFOOTS AREA, Brian A. Park. 1984. 180 pp. Forth Naturalist and Historian, Stirling.

TILLICOULTRY, A CENTENARY HISTORY 1871-1971. Eric J. Evans. 1972. 86 pp. Burgh of Tillicoultry.

REMINISCENCES OF DOLLAR, TILLICOULTRY AND OTHER DISTRICTS ADJOINING THE OCHILS. W. Gibson. 1882. 160 pp. Morrison and Gibb, Edinburgh.

THE INDUSTRIES OF SCOTLAND, THEIR RISE, PROGRESS AND PRESENT CONDITION. David Bremner. 1869. 540 pp. David and Charles, Newton Abbot.

THE (OLD) STATISTICAL ACCOUNT OF SCOTLAND. Sir John Sinclair, editor. 1793. volume VIII. Clackmannanshire.
THE NEW STATISTICAL ACCOUNT OF SCOTLAND. W. Brodie. 1845. volume VIII. Clackmannanshire.
THE THIRD STATISTICAL ACCOUNT OF SCOTLAND. volume 18 Counties of Stirling and Clackmannan. T. Crouther Gordon. 1966. 605 pp. Collins.

The first and second statistical accounts and the books by Gibson and Bremner deal with the end of the 18th century and the 19th century. The third statistical account has updated the progress of the mills in the Hillfoots area but gives only a brief outline of the subject. Evans gives greater detail on the mills in Tillicoultry and Brian Park concentrates on the architecture of the mill buildings with some additional historical background. The project required more information on the 20th century and particularly useful sources were the *Alloa Advertiser,* the *Alloa Journal* and the *Devon Valley Tribune.* These newspapers are held on microfilm in Alloa Library and the team spent many hours during the early weeks of the project searching for articles which had been written on the textile industry. Many useful articles came to light which helped to put the mills into their proper historical context. Changes in ownership were noted, mill fires, strikes and closures all helped to give a useful background to the project and highlighted those areas of mill history which were vague or sketchy.

At the same time, the team were drawing up a small leaflet advertising the project and making contact with volunteers for interview. This leaflet was distributed in the local libraries and post offices in the area. At the same time, two members of the team were already in the field making initial contacts. It is important to stress the benefits of employing local people on this type of project as they not only have knowledge of the area but often have personal contacts through family and friends. Each member of the project team found that they knew of someone who had worked in the textile industry and it was to these people that the team made their first approach. These initial contacts passed on the names of workmates and friends and word spread on the local grapevine. In the first instance, the interviewers visited potential interviewees at home and explained the aims of the project and types of questions they might be asked. This personal touch achieved a staggering response and within several weeks the interview list had reached 100. Within another month, 192 people had been provisionally booked for interview.

During the first contact, it was explained that a letter would be issued confirming the time and the day of the interview and other arrangements if this proved unsuitable. This approach was adopted as it would probably be several months in some cases before the actual interview would take place. Such was the response to the project that it was not possible to interview everyone but 'thank you' letters were sent to all those who had been contacted by the team.

THE QUESTIONNAIRE

In the first weeks of the project and while initial contacts were being made, the team also drafted a questionnaire to use in the formal interviews. The purpose of this questionnaire was to ensure that the knowledge gathered during the interviews could be collated in a constructive manner and to avoid the temptation of recording anything and everything. The questionnaire ensures that each interview can be used comparatively by being in a standard form. It is both the foundation and the structure of the project, and the team's initial studies and careful planning ensured it was 'built correctly' as below –

A 1. What AGE were you when you first started working?
2. Can you remember what your first PAY was?
3. What HOURS did you work?
4. What sort of HOLIDAYS did you have?

B 1. What sort of WORK did you do in the mills?
2. What sort of TRAINING did you have?
3. What changes in MACHINERY were there?

C 1. What were working CONDITIONS like?
2. Were there many ACCIDENTS?

D 1. Were there any UNIONS at your mill?

E 1. What do you remember about the mill during the WAR years?

F 1. Were there any specific EVENTS at the mill which affected your work?
2. Did any other members of your FAMILY work in the mills?

G 1. Was there anything that you DISLIKED about your work?
2. What did you LIKE about your work?
3. Do you have any STORIES about your mill life?

THE EQUIPMENT

Central Regional Council's Industrial Development Committee agreed to fund the considerable cost of the capital equipment which included a BBC model B Computer, a Cumana CD200 Disc Drive, a Star Dot-Matrix Printer and a Sanyo green-screen Monitor. The computer was fitted with a Wordwise Plus chip which would provide the word processing facilities necessary for the handling of vast quantities of data which were the result of many hours of recorded material on cassette. These recorded interviews were transcribed by the word processor into the computer and stored on floppy discs. The effectiveness of this approach will be discussed later in the section on editing.

Each interviewer was supplied with a Uher CR 160 portable cassette recorder which was purchased with its own carrying case, special

storage battery and re-charging unit. The sound quality of this equipment is first class and proved to be invaluable when the interviews were being transferred onto disc. Good sound reproduction is vital when dealing with the spoken word and its importance cannot be overestimated as any audio typist will confirm. An interview which has been clearly recorded can save much time and effort. The small and unobtrusive tie clip microphones favoured by television personalities and newsreaders have been tried and tested in the field of oral history and were adopted for this project. This type of microphone not only provides a good clear recording but the team found that the interviewees quickly forgot the microphone and were more at ease throughout the interview.

THE INTERVIEWS

The tremendous response from the people of the Hillfoots meant that the team were unable to interview everyone who was contacted initially, although a total of 104 people were interviewed during the course of the project. The following list gives some idea of the wide variety of occupations and mills covered during the interviews and it should be noted that many of these mills no longer exist –

Paton and Baldwin's, Kilncraigs Mill, Alloa.
Paton and Baldwin's, Clackmannan Mill, Clackmannan.
'Donbros', Donaldson Brothers, Hallpark Mill, Sauchie.
J. and R. Archibald's, Devonpark Mill, Devonside.
J. Hewitt and Company Limited, Devonpark Mill, Devonside.
Murray's Hosiery, Balcarres Street, Tillicoultry.
R. J. Bryant's and Sons (Alloa) Limited, Stirling Street, Tillicoultry. (initially started in Alloa).
Daiglen Walker Institute, Stirling Street, Tillicoultry.
Jaeger, J. and D. Paton's Mill, Tillicoultry and Walker Institute, Stirling Street, Tillicoultry.
E. O. White, subsidiary of Jaeger's in Bryant's, Stirling Street, Tillicoultry
Findlay Knit, Harvieston, Tillicoultry.
Blair and Hunter's Hosiery, Tillicoultry.
Mackinlay Hosiery, Tillicoultry.
J. and D. Paton's, Lower Mill Street, Tillicoultry.
Oak Mill, Lower Mill Street, Tillicoultry.
Middleton Mill, Upper Mill Street, Tillicoultry.
Scott and Archibald, Middle o' the Toun Mill, Upper Mill Street, Tillicoultry.
Clock Mill, Upper Mill Street, Tillicoultry, D. C. Sinclair.
Wilson Brothers, Dalmore Works, Alva.
Glentana, Dalmore Works, Alva.
William Archibald and Sons – Strude and Ochilvale Mills, Alva.
Solric D'Fysun, Brookfield Mill, Alva.
J. Porteous, Meadow Mill, Alva.
J. G. Gray, Burnbrae Mill, Alva.
Dolf Textiles, Burnbrae Mill, Alva.

Burnbrae Dyeing and Finishing, Alva.
C. Thomson, Burnside Mill, Alva.
Arnott's Hosiery, Arnott's Mill, Alva.
Makins, Greenfield Mill, Alva.
Todd and Duncan, Alva.
Alva Handloom Weaving Company, Alva.
Hunter and Donaldson, Coblecrook Mill, Alva.

OCCUPATIONS

Baller; Carder; Mender; Darner; Picker; Cutter; Twister; Seamer; Reeler; Winder; Despatcher; Ingiver; Drawer; Printer; Feeder; Piecer; Presser; Dyer; Spinner; Web Cutter; Weaver; Handloom Weaver; Pattern Weaver; Hand Finisher; Hand Sewer; Warper; Foreman Warper; Knitter; Foreman Knitter; Machine Knitter; Loom Tuner; Wool Blender; Tailor; Designer; Mechanic; Millman; Boilerman/Fireman; Supervisor; Warehouse Foreman; Yarnstore; Millshop; Storeman; Examiner; Manager; Director; Mill Owner; Officer Worker; Secretary; Model.

EDITING

As soon as the first interview had been recorded, the word processor operator began transcribing the results onto computer disc. In other projects, such tapes have been typed out using conventional typewriters but this system has many drawbacks which can be overcome quickly and efficiently by using a word processor. For example, backup copies can be made immediately to ensure that anything lost or damaged can be quickly replaced. The interview can be printed as often as necessary and given to a member of the team to work on editing. The basic proof reading and editing were carried out on paper and then corrected on the screen of the word processor. The final version was then retained on disc.

Despite a well constructed questionnaire and a competent interviewer, it can be difficult to prevent an interviewee from straying from the topic in hand, but the recorded interview on disc can be readily edited and such sections deleted. A great advantage of this process is the ability to hold an edited version of the interview on computer disc and yet maintain the original cassette recording in the form of the first and unedited interview. The original cassette recordings are housed in Central Regional Council's School Resources Unit in the Old High School, Stirling.

Using a word processor in this type of project has other advantages. The entire interview need only be typed once as sections of the interview can be shifted back and forward, deleted and corrected. Conventional typewriters would be extremely time consuming as, for every correction made, a new copy would require to be typed. Using the word processor, one can make as many changes to the text as necessary

to produce a finished professional interview. The results achieved by the project team would not have been possible over a 12-month period using conventional methods of transcribing the recorded interviews.

THE FINISHED PRODUCT

The Oral History of the Hillfoots Textile Industry produced over a quarter of a million words on disc. Each interviewer had been allocated a reference number for his/her interviews, for example – when Heather Morton had recorded her first interview this was given the code HM1, Lesley Spilman's 10th interview was given the code LS10. These codes appear on the cassette recordings and are used as file names on the computer discs. Each interview includes a heading which outlines when the interview was recorded, the date of birth and age of the interviewee at the time of interview, and the mills where he/she worked with appropriate dates. The team also included a series of footnotes at the end of each interview to clarify any specialised terminology or historical facts.

A computer programme was stored on each disc which would enable different areas of each interview to be printed or displayed. In simple terms, the topics covered in the questionnaire were adopted as KEY WORDS and they appear at the beginning of each section of the interview relevant to that particular key word. At the end of each section of the interview relevant to that particular key word the word END appears. When the programme has been loaded, the operator can type in any one of the key words used in the system and the computer will find and print/display that section of the interview covered by the key word from every interview on the disc. The key words available on every disc are as follows –

Accidents, Age, Conditions, Departments, Events, Family, Footnotes, History, Holidays, Hours, Liked/Disliked, Machinery, Pay, Power, Stories, Tape, Training, Unions, War, Wool, Work.

The key word TAPE will print the heading at the beginning of each interview described above.

The interviews have been stored on single sided, single density 40 track floppy discs and the entire project is stored on 18 discs including one reference disc. Each disc has been given a separate code using the initial of the particular interviewer, for example – Heather Morton's first completed disc was given the code DISCHMA and Lesley Spilman's third completed disc was given the code DISCLSC. The files on the reference disc correspond to the code on every disc and, if the file DISCHMA is called up on the reference disc, a series of headings such as Machinery, Mills or Occupations will appear. After each heading, there are lists of the types of machinery or occupations which appear in the interviews on that disc. Also included on the reference disc under the file name of TEXTILE is a copy of the operating instructions for the system. (Examples of interview and reference data are on page 78).

THE TEA PARTY

In the final weeks of the project, the interviewers visited all those who had taken part and presented them with a printed copy of their interview and an invitation to morning tea in St. John Vianney's Community Hall, Stirling Street, Alva on 22nd July, 1986. Although many of our interviewees were elderly, the response was enthusiastic and the morning proved to be a great success (see photo). The computer equipment used was shown and demonstrated by the team, and Councillor Pat Burt, Vice Chairman of Central Region's Industrial Development Committee, formally thanked all who had given their time and effort to the project (see photo).

CONCLUSION

Every interviewee had something interesting to say; every interview contributes to the overall store of knowledge and ultimately to our understanding of the past. The quantity and quality of the material gathered by this project is readily accessible and speaks for itself. It is one of the largest collections of oral history interviews on one topic in Scotland today.

This article is based on reports compiled by the project Supervisor, Garry Scobie. For further information – on the system, techniques, availability of or access to disc recordings, Manpower Services Commission Crown Copyright regulations, etc. – contact Ms Anne Keenan, Senior Project Officer, Central Regional Council Special Programmes, The Old High School, Stirling.

The Tea Party

TAPE:-HM11 DATE:-22 NOVEMBER, 1985. WEAVING.

INTERVIEWEE:-ALEXANDER. 63 YEARS OLD. BORN 1922. LOOM TUNER.

Places Of Work:-J & D Paton's, Tillicoultry from 1936 to 1941, Wilson's, Dalmore Works, Alva from 1958 to 1961, Glentana, Dalmore works, Alva from 1961 to 1983 and the Clock Mill, Tillicoultry for the Y.T.S. and the M.S.C. from 1983 to 1985. END

Q. AGE What age were you when you first started working?
A. Fourteen year old. My brothers were working in the Mill at the time, and my brothers come home and told me to go down, I had an interview with the foreman tuner in the Mill at the time. And I went down for the job and he asked if I had any experience in engineering and that, and I had said to him that I had put lights up in the house for my mother, in the hall, and he told me, "Just start on Monday."
Q. PAY What was your first wage?
A. 9/6d (1) a week, paid weekly in a wee tin box. That was flat rate. You had always to go and ask for rises. They didn't come very easy. You had to have the confidence to go and approach the supervisors. END
Q. HOURS What hours did you work?
A. From eight o'clock in the morning till six o'clock in the evening, and Saturday till lunch time quite a bit. Clock in and clock out. You had your breaks. Ten o'clock, ten minutes break, the same in the afternoon at three o'clock, a ten minute break. (If you were late) it would be taken off you, but that didn't happen a lot. There was no time I ever had anything taken off me, but I believe away back they used to shut the gate on them after five past eight, before my time.
Q. HOLIDAYS What holidays did you get?
A. Well, when I started first we used to get a week's holiday, but you had to sign on the buroo. You didn't get any pay when I started first. You had three days lie-time so there was very little (money). If you got your holidays you didn't get paid. END

An interview data, extract example

DISC HMB HM26

Home Town:- Tillicoultry.

Mills:- J & D Paton's; Burnbrae Dyeing & Finishing Company; Glentana; John G Gray's; J Thomson & I Donaldson.

Occupations:- Finisher; raising operator; wool sorters; designer.

Machinery:- Sewing-machines; milling-machines; damper-machine; moser; raising-gig; teasle raising-machine; chopper; 'wee kickers'.

Processes:- Brushing; raising; scouring; milling; waulk-milling; finishing; cropper; pressing; tentering; damping; steaming; dyeing; mosering; repairing; knotting; greasy darning; weaving; spinning; carding; winding.

Dates:- 1927-1941; 1946-1947; 1959-1968; 1968-1976.

Places:- Devonside; Coalsnaughton; Galashiels College.

Materials:- Cashmere; wool.

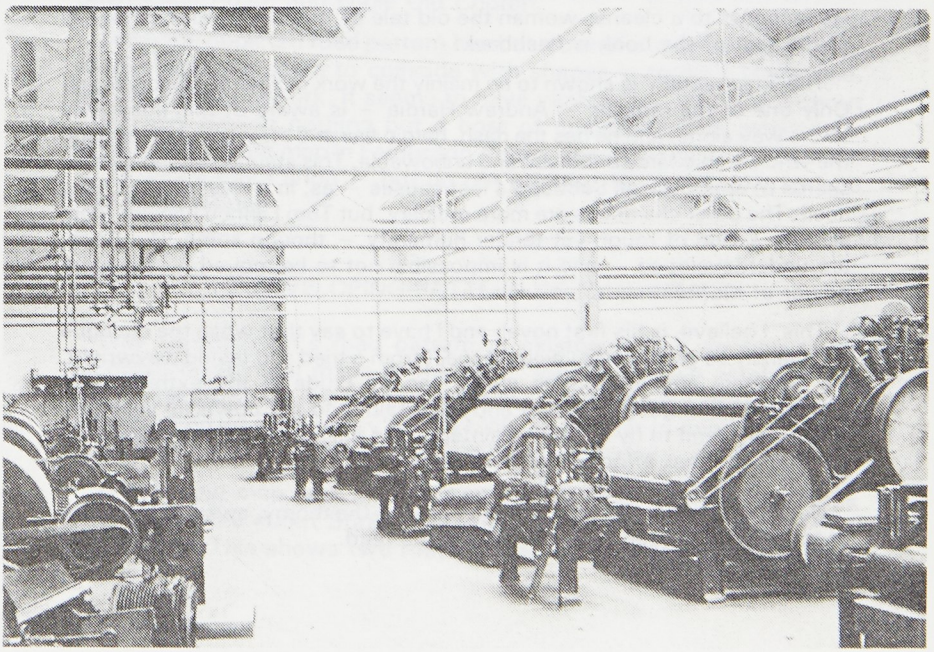
Finished Products:- Scarves; rugs; tweeds; headsquares.

Departments:- Raising; finishing.

Keywords:- TAPE; AGE; PAY; HOURS; HOLIDAYS; WORK; MACHINERY; FOOTNOTES.

A reference disc, example extract

Kilncraig Mill, 1948 photos, Scobie Collection
(a) Combing Flat - (b) Carding Shed



BOOK REVIEW

THE BOYS FROM BONNYMUIR – an infamous episode of 19the century Scotland. Tom Lannon. Albyn Press, 1985.
172 pp. £5.95. SBN 0284 98653 4

Tom Lannon's novel starts with a middle-aged 19th century business man having a nightmare in Australia. The dream is of an execution. Two newly hanged bodies have already been decapitated. The dreamer, overwhelmed with horror, watches the beheading of a third victim, and we realise it is himself.

The dreamer, of course, wakes up. He is Allan Murchie who, forty years before as a lad, was involved in the abortive and pathetic radical Scottish "insurrection" of 1820 which started in Glasgow and ended on the forlorn field of Bonnymuir, near Bonnybridge – a few workmen (but representative of much popular feeling) desperately trying to bring about a Scottish equivalent to the French Revolution, about thirty years too late.

The two bodies of the nightmare are those of the ringleaders, Andrew Hardie and John Baird, executed later in Broad Street, Stirling, Murchie and all the other survivors of Bonnymuir having been transported. Today (1861) Murchie and his fellow-revolutionary Barr are on the other side of the political fence, reactionary capitalists, pillars of the establishment, for Australia has treated them kindly.

Driven by his recurrent nightmare and a sense of guilt – a need to exorcise certain demons – Murchie returns to Stirling, turns his back on the romantic nationalism epitomised by the laying of the Wallace Monument's foundation stone, and ends up in the Tolbooth where he and the others were tried. He recounts to a cleaner-woman the old tale of 'the boys', and almost all of the rest of the book is flashback.

The 'insurrection' is shown to be mainly the work of *agents provocateurs.* Only one of the radicals – Andrew Hardie – is aware of this possibility all the way along, and he has the dash, heroic flair and stoicism to go through the whole tragic farce unbowed and unbowable. This staunch young weaver seems to epitomise all Scotland's lost causes – as, in a way, does Stirling itself. The other characters are more ordinary, but Tom Lannon handles them all with a kind of rough yet tender humanity – though some, like Baird, are underdeveloped – and it is impossible not to be moved by the stark power of his treatment.

This, I believe, is his first novel, and I have to say that while the dialogue is generally as good as you would expect from a tried and tested playwright, his narrative and descriptive styles can be crude in the extreme. His command of language is loose and uncertain, and the powerful elements in his story tend to fly apart or disintegrate in his hands. Perhaps powerful emotion has that effect on tyro novelists.

Nevertheless *The Boys from Bonnymuir* has the thorny, awkward integrity of its subject-matter, and demands to be read.

David Angus

AIRTHREY ROADS
Captain Haldane's Magic Roundabout

K. J. H. Mackay and David Angus

To those who have watched the transformation of the grounds of Airthrey Castle from the rustic surroundings of a maternity hospital to the present bustling mini-city that is Stirling University, it may appear that they have witnessed the ultimate in landscape alteration possible on such a site. Yet there is evidence that throughout the previous two centuries – if we confine our attention to this period – the Airthrey estate experienced a **series** of total transformations, each rivalling the most recent changes.

The germ of the idea that drastic landscaping had been applied previously came from a study of Menzies Fergusson's two-volume classic, *Logie: A Parish History.* In it there is a double-page spread entitled 'A Plan of Aithray Roads, 1769', by the surveyor John Farquharson (Figure 1).

Comparison with a current large-scale map (Figure 2) quickly establishes two salient facts: the roads shown bear little relation to today's network; and the surveyor has allowed himself a fair degree of flexibility regarding his compass directions, and also in his use of a scale – though this latter is not even indicated. However, a moderate amount of distortion allows features on the sketch-map to fit in with recognisable features on the Ordnance Survey map, including the bridge at 'Bridge (of) Allan', East Lodge ('Blalowan') at the foot of the Sheriffmuir Road, and Logie Old Church.

Once the depicted road pattern has been transferred to the O S map, certain sections seem to coincide with shapes in today's landscape. But as a **road** network, it seems to have vanished – virtually without trace and leaving nothing but a host of questions. The paragraphs accompanying the map in Fergusson's book give some of its background – of which more anon – but do not attempt to identify the various routes delineated.

THE DEVELOPING PATTERN OF MAIN ROADS

Was Farquharson's road pattern in existence long enough to be recorded on general maps of the time? Indeed can we establish the precise routes of the main roads during the period about 1769, assuming they may differ from today's lines? We must bear in mind that some main roads may even be included in the 1769 plan.

The earliest map with a reliable amount of local detail is 'A Mappe of the Countrie about Stirling' by John Adair, and dating from 1685 (Figure 3a). This shows two roads diverging from 'Bridgend' (Stirling

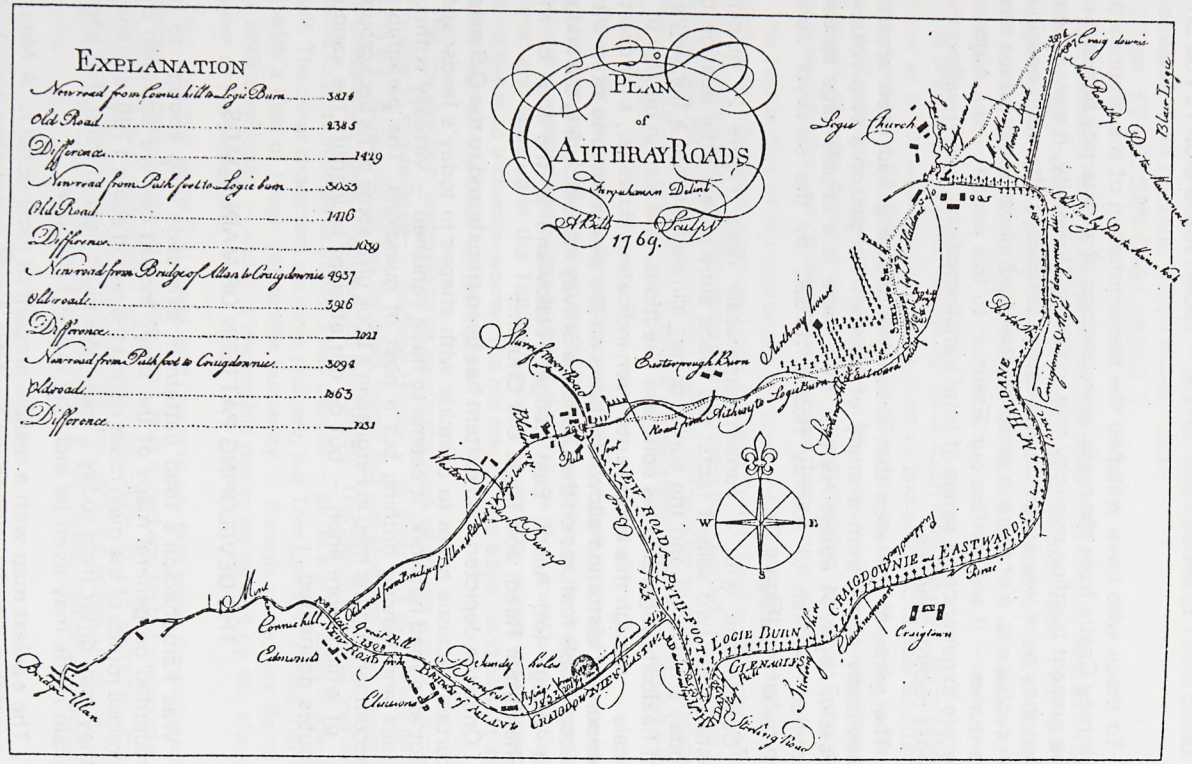


Figure 1 A plan of Aithray Roads – Farquharson – 1769

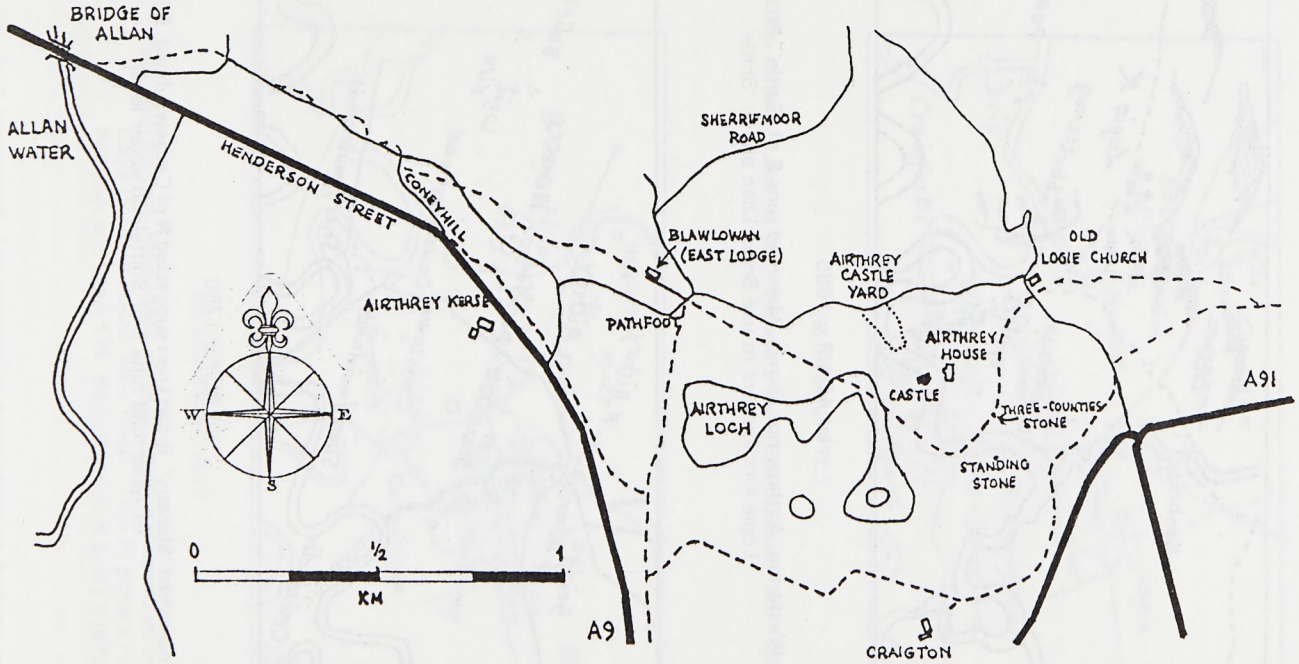
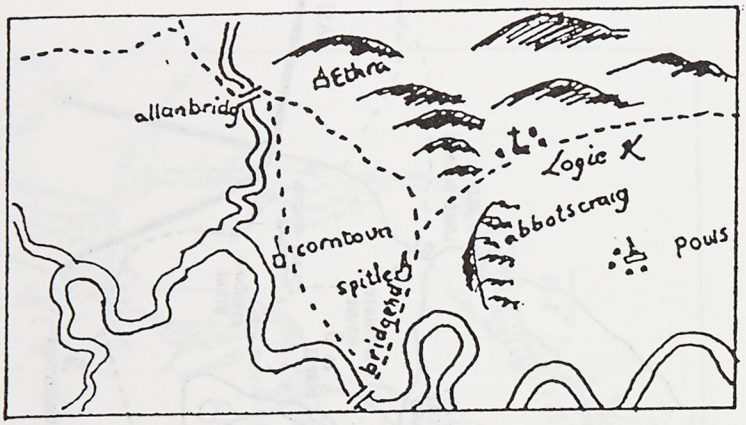
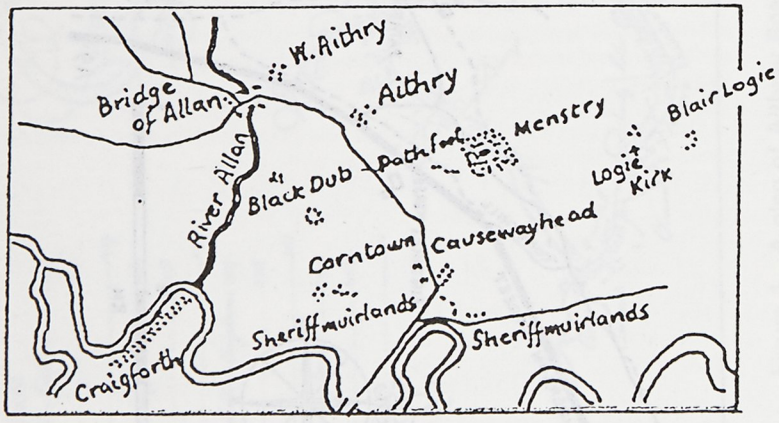


Figure 2 Outline plan of present day Bridge of Allan and Airthrey, with superposition of roads shown in Farquharson's 1769 plan (dashed lines). The degree of distortion in the 1769 plan can be seen



(a) ADAIR c 1685

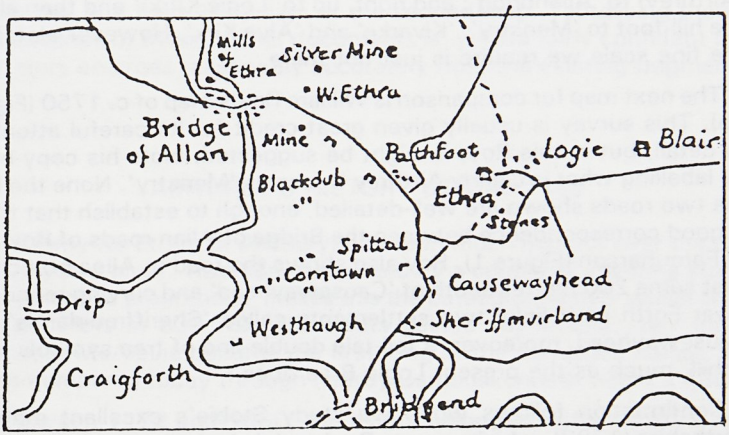
Ethra = Westerton. Airthrey not shown. Mainroad runs **E** of 'Spitle'. Road to Logie Kirk appears to use Broad Loan above 'Spitle'.



(b) ROY c 1750

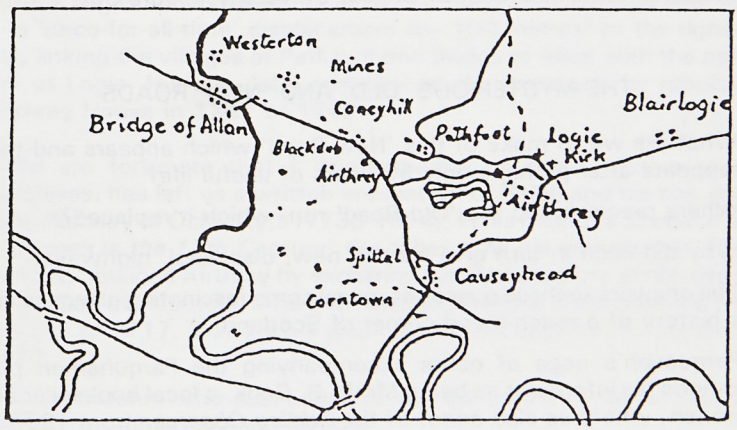
Airthrey misnamed 'Menstry'. Broad Loan suggested **N** of Causewayhead. Bridge of Allan road runs **E** of Spittal, on *upper* level.

Figure 3 Comparative Sections of local maps, drawn to same scale, cover a period of 132 years.



(c) STOBIE 1783

No Airthrey Loch as yet. Haldane's New Road leaves "A9" **NE** of Spittal.



(d) GRASSOM 1817

Airthrey Loch appears. Main road runs **W** of Spittal and continues on **lower** level. Logie Road displaces 'New Road'. Two (!) private roads connect Pathfoot and Logie Kirk. Basically, this is today's pattern of roads.

Figure 3 (continued) The successive ownerships of Airthrey correspond as follows: – Hope (Adair), Dundas (Roy), Haldane (Stobie), Abercromby (Grassom).

Old Bridge), one reaching 'Allanbridg' via 'Corntoun', the other running north to Spitle' (Causewayhead) where it forked – left, south of 'Ethra' (Airthrey) to 'Allanbridg'; and right, up to 'Logie K(irk)' and then along the hill-foot to 'Menstry', 'Kivarke' and 'Alva Kirk'. However, detail on the fine scale we require is just not there.

The next map for comparison is William Roy's map of c. 1750 (Figure 3b). This survey is usually given great credit for its careful attention to detail, but in this Roy, it might be suggested, blots his copy-book by labelling what is clearly Airthrey House as 'Menstry'. None the less the two roads shown are well-detailed, enough to establish that there is good correspondence between the Bridge of Allan roads of Roy and of Farquharson (Figure 1). Roy also shows the road to Alloa branching east some 200 metres south of 'Causewayhead' and curving round the River Forth as it links two settlements called 'Sheriffmuirlands'. At Causewayhead, moreover, a tell-tale double-line of tree symbols runs uphill, much as the present Logie Brae does.

Confirmation follows when we study Stobie's excellent map of Perthshire (1783), which repeats Roy's roads including Logie Brae, but adds the sinuous eastward line of Farquharson's 'New Road' heading for Logie, Blairlogie and Dollar (Figure 3c).

Our relief at finding this recognition of the 'New Road' is short-lived, for by 1817 Grassom shows a road pattern which bears close agreement with the Ordnance Survey maps of today, or rather of the period up to 1966 and the founding of Stirling University (Figure 3d).

THE MYSTERIOUS 'OLD' AND 'NEW' ROADS

What are we to make of this 'New Road' which appears and then disappears after perhaps only 50 years of useful life?

Where precisely did the 'Old Road' run, which it replaced?

Why did each in turn give way to new, displaced, highways?

The answers to these questions reveal some fascinating glimpses into the history of a much-loved corner of Scotland.

Fergusson's page of notes accompanying the Farquharson plan mentions his informant as being Mr W. B. Cook, a local bookseller and historian, who was also editor of the *Stirling Observer* from 1875 to 1886.

> 'A volume containing the papers in this Road Case of 254 pages, with **two** maps (our emphasis), one of which is here reproduced, is now in the possession of Mr W. B. Cook, who has kindly granted permission to use it.'

Fortunately, many of Mr Cook's local history papers are preserved in the Central Region Archives. Through the good offices of its staff papers relating to a long and involved Court Case over the construction of the

'New Road' have been made available to us. Sadly, not all the Cook volume of 254 papers has been preserved. Only 148 pages are in the Archives, and there is no sign of the second map. Tantalising though the absence of these further documents is, we are fairly confident that the story emerges reasonably accurately from the existing fragments.

AIRTHREY'S HISTORY BEFORE 1759

Airthrey (or Ethra, or Airthery) has seen much conflict over the past 1200 years or so. Tradition, supported by a couple of standing stones of impressive proportions, makes this the battleground over which Scots fought Picts in 839 AD. The Scots gained supremacy; their leader Kenneth McAlpine became the first King of the combined nation, and is remembered today through nearby Cambuskenneth with its Abbey.

Between 1472 and 1660, the estate belonged to the family of the Grahams, Earls of Montrose, and it was during the Argyll-versus-Montrose battles of 1645 that the Mansionhouse of Airthrey was burned to the ground.

Possessed thereafter successively by the Stirlings of Ardoch, the Hopes of Hopetoun and the Dundases of Manor, it was only in the time of Dundases that the estate's fortunes began to be restored. Ralph Dundas began an 'enclosure' in 1718, involving – as we shall later learn – a 'once-for-all-time' displacement (by 100 metres) of the right-of-way linking the villages of Pathfoot and Bridge of Allan with the parish kirk at Logie. His son John embellished the enclosure by rebuilding Airthrey House in 1747 or 1748.

We are fortunate that a contemporary, a close relative of the Dundases, has left us a written impression of Ralph and his son John. John Ramsay of Ochtertyre (1736-1814), in his memoirs *Scotland and Scotsmen in the 18th Century,* describes how his grandfather, Ralph Dundas, obtained Airthrey by exchanging it for a property of his, desired by the Earl of Hopetoun who then owned Airthrey. Ralph planted trees in 1716 or 1717, 'but the hill was not planted until 1725'. He died in 1729.

His son John, who succeeded him in the estate of Manor, lived in Stirling, or sometimes in Pathfoot,

> 'until 1747 when he built a small snug house at Airthrey. Conscious of his ignorance of country affairs, he contented himself while there with making a kitchen-garden, and having a few acres in grass, without any corn farm or adding to his father's small enclosures. He spent his time . . . among his books. To the want of relish for a country life rather than the extent of his debts, may be ascribed his rash sale of this sweet place to Captain Haldane, in 1759. Let me here recall with pleasure, mingled with regret, the time I spent

in my younger days at Airthrey with this good man, my uncle'. John Dundas died in 1780, aged 79.

Where was this 'small snug house at Airthrey'? Most of those who know the area suggest that the little elevated plateau called Airthrey Castle Yard is the probable site, both of the early Castle burned down in 1645, and of the Dundas house. Certainly as a defensive site it has much to recommend it. And there appear to be the remains close by of an old walled garden – possibly Dundas's kitchen-garden. Yet there are problems . . . The old House is shown on Farquharson's plan to be quite close to the Three Counties Stone, i.e. more or less where today's Castle stands; this is supported by some of the descriptions of the estate roads quoted in the Court Papers.

It is just possible that we **can** be more precise. The 25-inch O S Plan of Airthrey (1947) shows a rectangular outline (now a garden plot) 34 metres by 17 metres, some 70 metres ENE of the present Castle. A circular arc extends from what **may** be the west-facing long side of the foundations of the 1747 House? Is it mere coincidence that, less than two kilometres away, in 1746-47, Powis House was rebuilt by its owner Mr Mayne, and it still features such a portico? It would not be unheard of for two neighbours to employ the same architect.

Such conjectures must await the arrival of fresh documentary evidence, perhaps in the shape of architect's plans or perhaps in the form of Cook's **second** map.

AIRTHREY ESTATE BETWEEN 1747 AND 1759

The evidence quoted in the Court Proceedings allows us to form a fairly full picture of the Airthrey of 1747, before there was ever an Airthrey Loch or a modern Airthrey Castle. The lettered locations on Figure 4 are those quoted in the text of the Court Case, and will allow us to give a guided tour of the estate and its neighbourhood. Indeed, we should like to think that Mr Cook's fugitive second map – when it re-appears – will bear a close resemblance to Figure 4.

Starting at the Old Bridge over Allan Water, marked A in Bridge of Allan with the Change House on the right, the main road leads us by a gradual ascent to Upperhill along the line of the lower part of the present Alexander Drive, continuing approximately in the direction taken by Kenilworth Road. At B, the top of Coneyhill, there is a choice: left, for Pathfoot and Logie Kirk; right, for Stirling. This latter 'military road' goes down Coneyhill, then skirts the Carse by keeping to the terrace below the Beaconhurst Grange School and the Pathfoot and Gannochy Buildings of the University. Passing to the left of The Knock and Fairview, it joins the Logie Road at the sharp bend, and so reaches Causewayhead at K. Stirling would be reached by descending to the Long Causeway and continuing south to the Old Bridge. If we prefer to make for Alloa, we must turn off at Sheriffmuirlands (O), along the road now overlaid

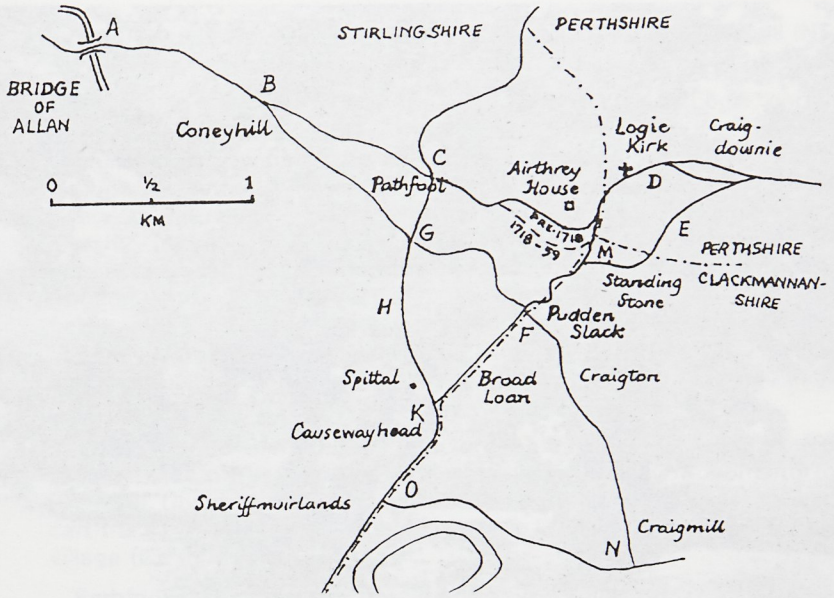


Figure 4 Airthrey Estate as Captain Haldane bought it, 1759

Plate 1 'Broad Loan' – Causewayhead. This sunken way still lies unsuspected beyond the wall to N of Logie Brae

Plate 2 Two old oaks on the banks of present loch mark where the Broad Loan crossed the marshy Pudden Slack

Plate 3 Logie Old Kirk, the parish church for Bridge of Allan, and hence a key factor in the fight to keep 'old roads' open

by the Alloa railway line. This road passes the village of Craigmill (N), at that time a larger hamlet than it is now.

The Parish Church is at D, in the heart of the village of Logie, north-east of Causewayhead and east of Bridge of Allan. Without enclosures to confine and channel the wayfarer, it is hardly surprising that a multiplicity of tracks wind their way from village to village, and from village to kirk, across the uneven tract of rough whinny grazing and marshy hollows which belong to the Airthrey policies. From Causewayhead, for example, the Kirk route leads up Logie Brae – the 'Broad Loan' – and continues as a sunken track (Plate 1) up over the field behind the Cottrell building to the point F; here it has to cross the 'Pudden Slack' – probably meaning 'frog marsh' – the hollow now partly occupied by Airthrey Loch (Plate 2). Then it climbs again to pass the Standing Stone at M and so arrive at Logie Kirk (Plate 3).

A diversion to the right at F would bring you past Craigton, round the east side of the Abbey Craig (without its Wallace Monument) to Craigmill. Diverting left at the same point would take you by a crooked cart-track on to the rough road leading from Causewayhead to Pathfoot village (C).

Pathfoot takes its name from its position at the foot of a 'peth' or steep narrow way, leading up to Sheriffmuir by a rocky defile. It was for long a village of shoemakers, or cordiners, and was still the location of an annual Michaelmas tryst or cattle market, held at the end of September. Today, the only building surviving from the days of old Pathfoot is the eastern part of East Lodge (Blawlowan) depicted in Plate 4. This boasts a 'marriage lintel' with the date 1731 bracketing the pairs of initials JB and JK i.e. James Bryce and Jean Kinross, who married in 1717!

Pathfoot was linked westwards to Coneyhill by a narrow but more or less level road which crossed the Wester Rough Burn on its way. Eastwards, the track to Logie Kirk took you within the Airthrey lands, skirting Ralph Dundas's little enclosure on the south, and at one point coming within 200 metres of Airthrey House, before cutting across the present gardens towards the Kirk.

This was the 'road' whose closure was to be the cause of a prolonged and bitterly-fought Court Case.

THE COUNTY BOUNDARIES

Mention has already been made of the Three Counties Stone. It is curious fact of some significance that Logie parish, and Airthrey estate in particular, straddled the borders of three Counties, those of Stirling, Clackmannan and Perth. The church itself was in Perthshire, but Airthrey House and most of its lands lay in Stirlingshire; i.e. all to the west of the road from Logie Kirk via Pudden Slack to Broad Loan, DMFK. The

Plate 4 Blawlowan (East Lodge) Pathfoot. The nearer portion bears a lintel inscribed 'JB 1731 JK'. The roadway in front is part of the old road from Bridge of Allan to Logie Kirk

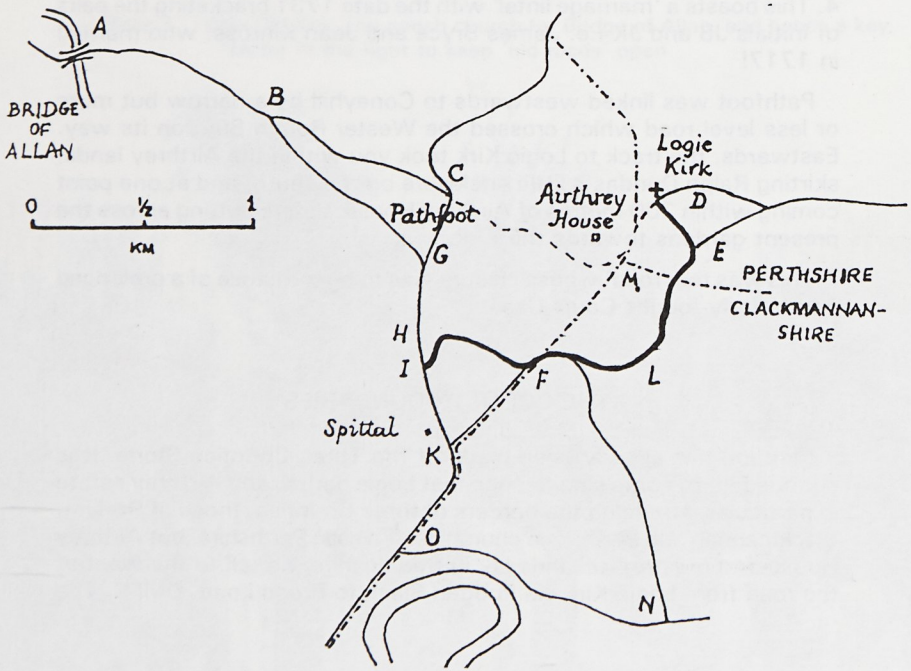


Figure 5 Airthrey Estate as it was on Captain Haldane's death in 1767

village of Causewayhead being half Stirlingshire half Clackmannanshire, led then to complications for the excisemen because whisky-smuggling was rife! (Craigmill was a notorious smuggling village). It was not till 1891 that the junction of the three Counties was moved 7 kilometres up to Blairdenon Hill.

The site of the old junction can still be visited, some 200 metres ESE of Airthrey Castle – three stone slabs set in a neat triangle, each bearing an appropriate initial, S, C or P (Plate 5). To be accurate, the Stirlingshire slab has become defaced by the action of weather. A minor puzzle is posed in that these slabs do NOT face their corresponding Counties. 'P' faces Airthrey and thus Stirlingshire, while 'C' is facing Logie and thus Perthshire. The presumed 'S' stone is in Clackmannanshire. One is forced to admit the possibility that at some time the stones were disturbed and then re-established in their present orientation. What guarantee can one have that their location is the original one!

The County boundaries of the time have been added to Figures 4 to 7, since jurisdiction in local affairs was in the hands of the respective County Magistrates. In the Airthrey case, the triple responsiblity was to prove a pitfall for the unwary Captain Haldane and his successors. (Incidentally, these old boundaries are reproduced on the latest 1982 Bartholomew Map of Central Region (1:100000); three mysterious rows of dots crossing – unexplained – the University campus.)

ROBERT THE FIRST (1759-1767)

In 1759, Captain Robert Haldane comes on the scene (Plate 6). A son, by his second marriage, of the redoubtable John Haldane of Gleneagles, first MP for Perthshire in the Union Parliament, Robert had made a fortune in the service of the East India Company. Retiring in his early fifties, he invested his fortune in two estates. One was the family home, Gleneagles, which was in danger of collapse under the mismanagement of his elder half-brother, Patrick. To this day, Robert is honoured in Gleneagles as 'the Entailer', who rescued the family from ruin. (For more see Naomi Mitchison's novel *The Bull Calves*).

His second purchase, and his favourite one, was Airthrey, and it was here that he chose to live. He was elected MP for the Stirling Burghs in 1758 and served till 1762. In this he was maintaining a family connection – his half-brother Mungo and his nephew George had in turn held the constituency before him.

He also turned an authoritative eye on the neglected condition of his new estate. The Court Case papers provide numerous quotable insights into his actions; for example,

> 'He conceived to himself the fashionable modern fancy of beautifying his place in an elegant manner, and considered it as an essential requisite to get quit of these roads which intersected his ground

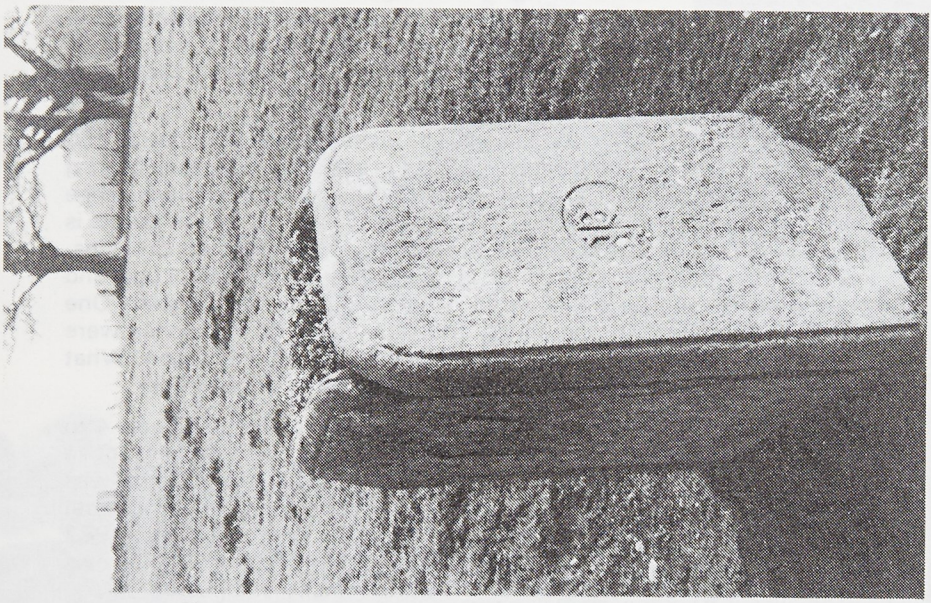


Plate 5 Three Counties Stone at the point where the old bounderies met before 1891

Plate 6 Captain Robert Haldane of Airthrey who made the 'New Road' between 1759 and 1767

> in an ugly and inconvenient manner; and, amongst others, he was not a little hurt with the idea of one passing hard by the door of his house; a situation which, whether really incommodious in itself or not, it is well-known no person choses to put up with, if he can possibly avoid it. And, perhaps, the idea is not without foundation, for nothing appears more inconsistent with the notion of a **home**, than being exposed all hours of the day to every traveller, who may chose to pass under your window.'

As will already be recalled, the nearest approach of the road to the House was of the order of 200 metres . . . . hardly what we would call 'under one's window'!

HALDANE'S NEW ROAD

Captain Haldane therefore proposed making 'at his own expense, a great and convenient road, on condition of confining all the little narrow roads into one great capital one'.

Referring to Figure 5, this was to make a short and easy ascent of Spittalbank from the point I on the military road, gain the necessary height to run on level ground past Pudden Slack until near L, whence it would make a gradual descent to E. One road would then run north to Logie Kirk, while another would link up with the Hillfoots 'old' road.

This was certainly going to be an impressive road. It would be 'near 30 feet (9 metres) in width', and about 1 · 75 kilometres long. It was to take eight years to build, and its cost was rumoured to be over £1,000, though Haldane modestly wrote of it merely costing 'above £300'. Whatever the exact cost,

> 'Mr Haldane was paying a very high price for the pleasure which he, as an individual, was to have in dressing up his little paradise about Airthrey'.

> 'Matters being thus concerted clearly for the benefit and advantage of every corner of the country . . . the execution of the transaction was gone about in the most open and undisguised manner, under the approbation of justices of Stirling and Clackmannanshires, whose probity, honour and public spirit placed them above the suspicion of gratifying the fancy of any individual, at the expense and detriment of the public'.

The first phase involved the construction of the Stirlingshire section of the new road (I — F). On 30th October, 1759, he petitioned the Justices of the Peace for the County of Stirling, notifying them of his intention to make some inclosures near his House of Airthrey, which might interfere with some of the highroads, and might occasion some alteration of them. He invited the JPs to appoint a committee from their number to inspect his plans, and to take action on their behalf.

The Quarter-sessions accordingly nominated 5 Justices, with a

quorum of two; and a date and a time were agreed for the visit of inspection. In the event, only two of the committee did turn up – Provost Thomas Gillespie of Stirling and David Gourlay of Kepdarroch. After due deliberation, and convinced of the benefit to the community of the new road, they gave written authority to Captain Haldane to carry out the intended plan;

> 'and appointed the old road (note the singular) to be shut up so soon as that part of the new road lying within the County of Stirling should be finished'.

The order was handed to a Stirling solicitor, Thomas Chrystie, who just happened to be at Airthrey House that day, in order to get it officially recorded in the JP Court-books, but by some neglect, this was not done, and the document vanished from sight.

Some eight years later, when the road-closure was being challenged in the Courts, the omission came to light. An attempt was made to cover up by getting the authorising Justices to sign a second certificate, stating that they had given prior permission for all Captain Haldane's actions.

Incidentally, the Enclosure Act of 1661 limited the distance by which a landowner could displace a right-of-way to '200 ells' or 187·5 metres, and insisted on **three** Justices granting permission. In displacing the Pathfoot–Logie road south by no less than 500 metres, on the signatures of only **two** Justices, Haldane was heading for trouble!

But wait a minute! Hadn't a previous owner, Ralph Dundas, also invoked the Enclosure Act and undertaken a 'once-for-all-time' deviation of the same road?

> 'The road in question underwent a deviation upon the Act 1661 about 50 years ago, and was then fixed in a certain line which **never** could again be legally altered. Accordingly the said line of road was acquiesced in by the proprietor of Airthrey and by the country; . . . Captain Haldane, with his eyes open, purchased the estate, seeing where the House stood, and how it was situated with respect to the publick road'.

Certainly, on the face of it, Haldane would not seem to have had a legal leg to stand on, if his road closure plan was ever disputed!

Back to 1759! Thus 'legally' authorised, Mr Haldane set to work at once, and in a little more than two years had finished the first part of his new road (Plate 7). He now felt justified in putting gates at C and D on the 'old' road, with posts set up near each of these bearing a printed notice informing everyone that this road was no longer open except to visitors to Airthrey House. Initially the gates were only 'snecked', not locked; but they caused offence to 'the common sort of people', and were damaged or lifted off from time to time. Twice the placards were torn down, and twice replaced; the third time, they were not replaced.

The 'new' road, as soon as the first section was finished, was

enclosed on both sides with stone walls and hedges. Trees were planted along its north side, and it was thrown open for public use. It eliminated the long steep pull up Broad Loan (KF) and the crooked old cart-track, full of turns (CF), but it did not yet avoid the marshy hazards and slippery slopes of Pudden Slack (FM). Behind his enclosing walls, Captain Haldane was able to make progress in other senses – fallowing, liming, manuring, taking out whins and brooms, and planting clumps and strips – and soon it was possible to describe Airthrey as 'exceeding beautiful and useful'.

It was now in order to apply to the Clackmannanshire JPs for permission to construct the second part of the road (FE). This was duly presented at Alloa on 26th October 1762. Another committee was appointed, with a quorum of two, who inspected the proposals and reported back. At the Justices' next meeting, on 17th November, their report was favourably received, and Captain Haldane was authorised to proceed.

This part of the road, together with a new bridge over the Logie Burn at E, took almost five years to complete. It was not until 4th September 1767, that the Clackmannanshire Justices (all seven!) were able to inspect the finished road, to which they gave unanimous approval, and agreed to its adoption as the County road. At the same time, they authorised the closure of the 'old road by Pudden Slack and the Standing Stone' (the remaining part of the old crooked road GFME).

FIRST SIGNS OF ORGANISED PROTEST

But there was another group of gentlemen present that 4th of September, a highly respected protest group! Captain Haldane must have verged on apoplexy. And his condition wasn't helped when he read the petition and its signatories.

Here is a quotation from a letter he wrote that same day, in obvious high dudgeon, to His Grace the Archbishop of York, otherwise Dr Robert Drummond of Cromlix, Dunblane, who was like himself a Perthshire landowner . . .

> 'To the surprise of everybody, a petition was presented, with your Grace's name at the head of it, full of absurd objections, and misrepresentations of fact, **modestly** proposing that the **old** roads' (note the plural!) 'should be opened up again, and everything, of course, restored to its ancient state of barbarity.'

The Archbishop's reply is also preserved, both letters appearing in the published Proceedings . . .

> 'My agent acts for me in all my concerns. He wants no special power for every occurrence, for he has a general one; and under that, has acted for me. I am very sorry that anything arises to obstruct your schemes . . . . I wish it may be accommodated.' (Echoes of Bishop Purdie . . .unctuously defending Canon Slope, in *Barchester Towers*?)

The Clackmannanshire JPs did not accept the protest, since the new road **was** much better, and had **no** disadvantages compared with the Pudden Slack track. However a strong petition was submitted to the Stirlingshire Quarter-sessions on 27th October, asking for **all** the Airthrey roads to be re-opened.

Forewarned by the 4th September incident, Haldane had sensed trouble from this direction, and had called for a copy of the 1759 Stirlingshire permit. Since this had long been lost, he had to secure a 'post facto' certificate from the gentlemen concerned (fortunately both alive and in good memory!). Dated 7th September 1767, this was available to the magistrates at the Quarter-sessions, so naturally they threw out the protestors' petition and whitewashed the conduct of their Investigating Committee, heaping praise on Captain Haldane and his new road.

It may well have proved a frustrating autumn for Captain Haldane, in spite of the completion of his road and his enclosures, and the official recognition of his benificence to the community. The strain of the legal tussles may have undermined his health, for on the last day of 1767 he passed away. His mortal remains were conveyed from Airthrey House to Gleneagles and the family burial ground, where a moss-covered gravestone covers his last resting place. It bears a metal plaque with a simple identification.

The first part of his final journey was over the disputed 'old' road.

A NEPHEW INHERITS . . . FOR SIX MONTHS

His widow, Elizabeth, seems to have lived on at Airthrey till her death in 1780. Ownership of Airthrey estate meanwhile passed to his nephew, Captain James Haldane, also of the East India Company. The Gleneagles estate was left to another nephew, George Cockburn-Haldane, who undid much of the good his uncle had done, and would have sold it off, had it been free of entail. (A simplified Haldane family tree is presented in Appendix 3).

Captain James had married his cousin, Katherine, daughter of Alexander and Helen Duncan of Lundie, near Dundee, and a niece of Captain Haldane. (One of Katherine's brothers was Adam, later to become Admiral Duncan, Viscount Camperdown and Laird of Gleneagles). He made no secret of his love of Airthrey, but sadly did not live long to enjoy it. Only 39 years of age, with a wife, a son (Robert), a daughter (Helen), and a child expected in a fortnight (James Alexander), Captain James caught a throat infection while staying with his in-laws at Lundie, and died on 1st July 1768.

ROBERT THE SECOND (1768 – 1798)

Young Robert Haldane was only 4 years old when he inherited his father's fortune, and Airthrey estate. His mother and his sister both died before he reached his tenth birthday, so Robert and his brother James became wards of their uncles Alexander and Adam Duncan. They attended the High School in Dundee, and completed their education in Edinburgh, where Robert eventually enrolled in the University. James went to sea and proved an outstanding Naval Captain. Robert also managed to spend three years at sea, serving in HMS "Monarch" under the command of his Uncle Adam. He then returned to University, enjoyed a Grand Tour of Europe, and married Miss Katherine Oswald. It was in 1786 that he decided to make Airthrey his family home, and to continue the improvements made by his great-uncle, Captain Robert.

RE-OPEN THE OLD ROAD!

Whatever happened to the Road controversy, in the interim? The protesters still felt they had a case, in spite of the local JPs' rebuttal. Fifteen months after Captain Robert's death, an action was raised in the Court of Session, in Edinburgh, against the trustees of young Robert. The action was in the names of representatives of landowners and tenants of west Perthshire, from the parishes of Logie, Lecropt, Dunblane, Kincardine, Kilmadock and Callander. They asked that the proceedings of the Stirling Quarter-sessions be revoked, and that a **single** old road – the Pathfoot – Logie Kirk road – be re-opened.

What was the special attraction about the 'old' road which had all these eminent gentlemen like the Archbishop of York joining forces with, literally, hundreds of the 'common sort of people' to keep it open?

Firstly, it was 'the old patent public Kirk road' for half the parish, traversed four times every Sunday, winter and summer, sunshine and storm, on foot mostly, by every fit man, woman and child in Pathfoot and Bridge of Allan. From Pathfoot, the new road added 1498 extra metres to a direct distance of 1295 metres. No bother, perhaps, for gentry in their carriages, but an unjustified imposition for the foot-slogging faithful.

Then there was its quality as an all-seasons route – dry and firm, with a hard channelly bottom. Not at all like the Carse roads, which turned into quagmires all winter long. It was a busy road throughout the year; carts in summer, pack-horses in winter-time (200 a day are mentioned), transporting corn to the mills, and coal for lord and peasant throughout west Perthshire. In the other direction went timber for coal-mines, buildings and shipping; and oak-bark for tanneries.

Finally, it was a **local** road. Farmers took their cattle to market along it, to Pathfoot tryst, or Dunblane or Doune. Families did their flitting along it, the local GP in his chaise used it, as did the sickly gentlefolk who went to and from the goat-whey at Blairlogie. And, of course, it **was** the most direct route for funerals; quite a consideration if you couldn't afford a hearse.

How did the legal beagles in Edinburgh view these arguments, taking into account, as well, the ways that the laws had been bent by well-meaning but insensitive local Justices?

After taking extensive evidence from both sides (see Appendix 2), the Court of Session issued an 'interlocutor' or interim decision on 17th July 1770, to the effect that the Stirlingshire Justices had acted improperly in ordering the closure of this road. The pursuers were entitled to have the road re-opened; and it was remitted to one of the Lords of Session – Lord Auchinleck (James Boswell's father, as it happens) – to consider financial and other aspects of the case.

When decisions go against them, solicitors can move fast! By the following week, a 55-page counter-petition had been prepared and submitted by the Haldane trustees. They outlined the benefits of the new road over the old one, emphasised that Captain Robert would never have gone to the trouble of constructing it had he thought the old roads would continue, and pointed out that everyone knew of his efforts and his intentions to close the old Kirk road, but had not said a word against it for eight years. The removal of gates and placards he had interpreted merely as 'vulgar, wanton, acts of riot'.

The pursuers, given the right of reply, made much of the point that Logie Kirk was in Perthshire, even though most of the access road from the west was in Stirlingshire. Why had Perthshire JPs not been consulted as well on the closure proposal? The implication is that, since most of the pursuers were themselves Perthshire JPs, Haldane had realised they would not have given approval and so had not approached them.

They also drew attention to the unsatisfactory nature of any 'post-facto' certificate, and even cast doubt on the probity of the JPs concerned.

They further claimed that the Haldane trusteees had dodged the requirements of the 1661 Enclosure Act, by claiming their actions conformed to the 1669 Statute-Road Law. How could the Haldane road be regarded as a Statute-Road when paid for by a private individual acting primarily in his own interest?

As for the allegation of a delay in complaining, they disputed the trustees' assertion that the closure was enforced in 1762, and quoted many witnesses to prove that the gates were first **locked** in 1765 or 1766, that is, only a year or so before the first **formal** protest on 4th September 1767.

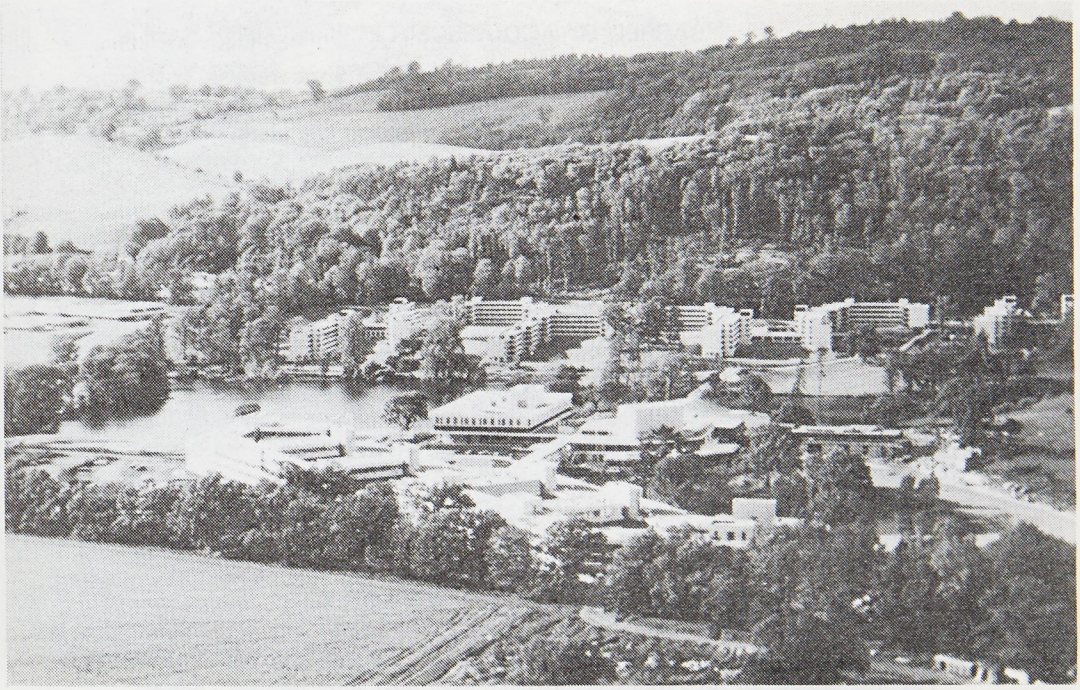


Plate 7 The University campus. The line of trees across the foreground (see Plate 11) follows Captain Haldane's 'New Road'

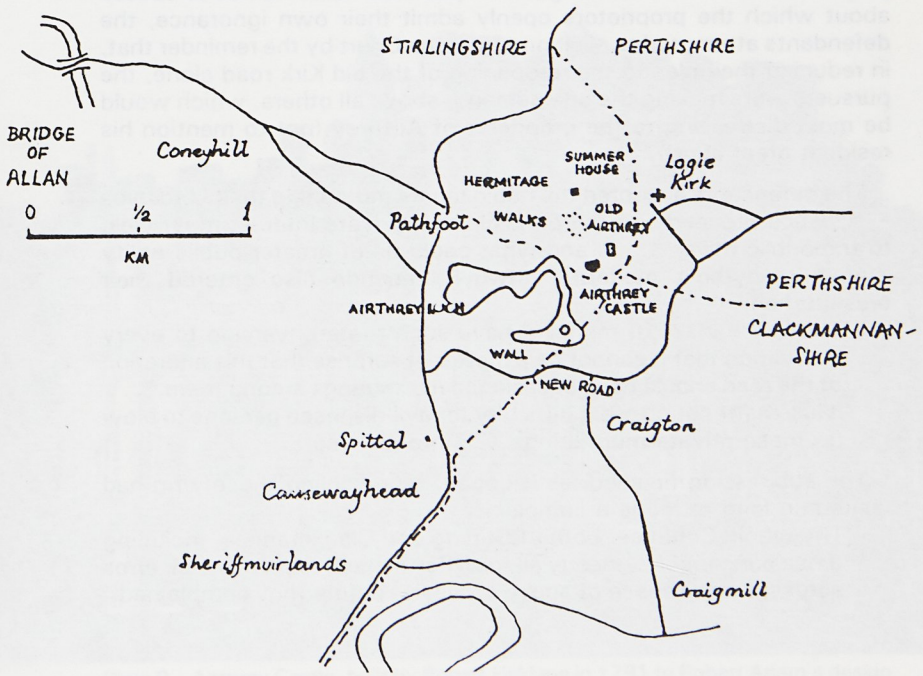


Figure 6 The estate as Robert Haldane left it in 1798

'BARRED BY ACQUIESCENCE'

The next interlocutor from the Court of Session appeared on 15th November 1770, and smacks of a judgment of Solomon . . . .

> 'Certainly, the Stirlingshire Justices acted improperly. They had no right to order the closure of the old Kirk road. But the pursuers signified their compliance by their prolonged silence, and are no longer entitled to have the road re-opened'.

This time it was the turn of the pursuers to move fast with their 'counter-counterpetition'. To be 'barred by acquiescence' in a decision which didn't get written into the Stirlingshire Quarter-session Records until **three days after their protest** was a distortion of logic, compounding a gross legal irregularity. If – as they maintained – exclusion from the old Kirk road was enforced only from 1766 onwards, how could a complaint be lodged earlier about Haldane building a new road, at his own expense, on his own ground, **not one inch of it taking the place of the Pathfoot-Logie Road?**

The pursuers logic appears irrefutable, but the Court of Session had found a formula which gave something to both sides, and they appear to have stuck to it.

The last papers in the W.B. Cook Collection are the Haldane Trustees' Answers, dated 13th December 1770. These reflect an attitude which accepts the Court's ruling as the best they could hope for in the circumstances, so 'let's defer to the wisdom of the Court, and pour scorn on our attackers'. Starting with derogatory remarks about absentee proprietors who allow their agents to put their noble names to causes about which the proprietors openly admit their own ignorance, the defendants attempted to elicit pity from the Court by the reminder that, in reducing their plea to the re-opening of the old Kirk road alone, the pursuers were making the **one** demand, above all others, which would be most distressing to the proprietor of Airthrey (not to mention his resident great-aunt!).

The defendants accepted the noble tenets motivating their Lordships – 'Justice proceeds on the principle that private interest must yield to the public utility' . . . . and what could be of greater public utility than a ready-built modern highway! Innuendo also entered their presentation:

> 'The lower class of mankind have such rooted aversion to every innovation that it cannot be a matter of surprise that this alteration of the road should have occasioned murmurings among them.' . . .
>
> 'It is a matter of no great difficulty for evil-disposed persons to blow up these private murmurings . . . into a flame.'

The submission finished, as it began, by ridiculing those who had waited so long to lodge a complaint:

> 'The whole Counties, both of Stirling and Clackmannan, including these pursuers' (. . . nearly all from Perthshire!) 'sat with their arms across, for the space of above six years, before they complained.'

Plate 8 Airthrey Loch, created by Robert Haldane in 1788, possibly Robert Adam's suggestion

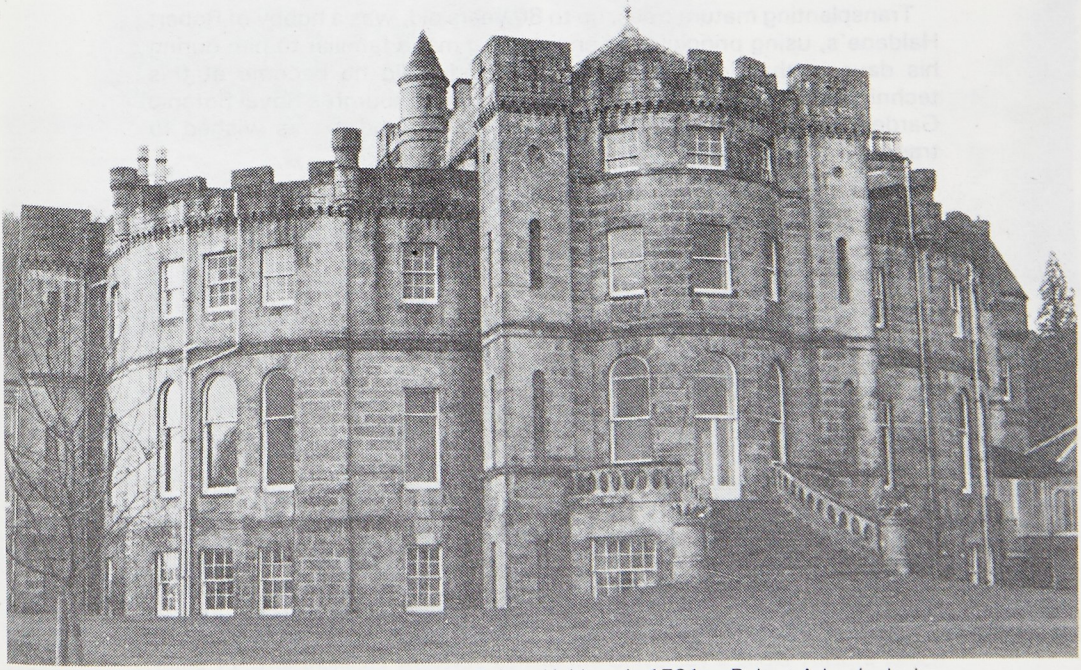


Plate 9 Airthrey Castle, built by Robert Haldane in 1791 to Robert Adam's design

It is tantalising not to have access to the rest of the Proceedings, but unfortunately, the documents covering both the County Quarter-sessions, and the final pronouncements of the Court of Session, have so far evaded our prolonged researches. However, Stobie's map of 1783 shows no sign of the old Kirk road, only Haldane's new one. For the time being, at least, Captain Haldane – though dead – had won this contest.

NEW LOCH AND NEW CASTLE

On then, to 1786, Robert Haldane and his wife Katherine returned to Airthrey and made it their home. In 1787, their only child, a daughter Margaret, was born. Happy in their 'little paradise', Robert looked for further ways to beautify the estate (Figure 6). In this he had the help of the great architect and landscape designer, Robert Adam (1728-92). In *The Landscape Garden in Scotland*, A.A. Tait says of Airthrey Castle, 'Adam concocted both landscape and castle from his imagination'. Thus, although Robert Haldane is usually credited with the idea of the creation of Airthrey Loch, there is a strong likelihood that it was part of Adam's Grand Plan.

Airthrey Loch was formed by building an embankment across the west end of the marshy valley which bisected the estate, and feeding in a proportion of the water of the Wester Rough Burn. The loch so formed (Plate 8) is of such an unusual and irregular outline that it is difficult to realise that it is man-made.

Transplanting mature trees, up to 80 years old, was a hobby of Robert Haldane's, using principles of engineering made familiar to him during his days in the Royal Navy. So successful did he become at this technique, that his advice was sought when Edinburgh's Royal Botanic Garden was being moved to its present site, and it was wished to transfer its best arboreal specimens.

He also surrounded his park with a stone wall, 6.5 kilometres long, presumably just inside the line of his great-uncle's road. He added to the gardens and the walks, and had the Hermitage and a Summer-house constructed on the tree-clad crags.

His lasting monument is the Adam-designed Castle (Plate 9) which he built in 1791 to replace the now-vanished 1748 Mansion.

SEEKING HEAVENLY MANSIONS

Ever since childhood, Robert had developed deep religious convictions. In June 1798, he sold the estate to a neighbour and distant relative by marriage, General Sir Robert Abercromby of Tullibody. Haldane's intention seems to have been to establish a Missionary Society in India, but meeting with a distinct lack of encouragement from the East India

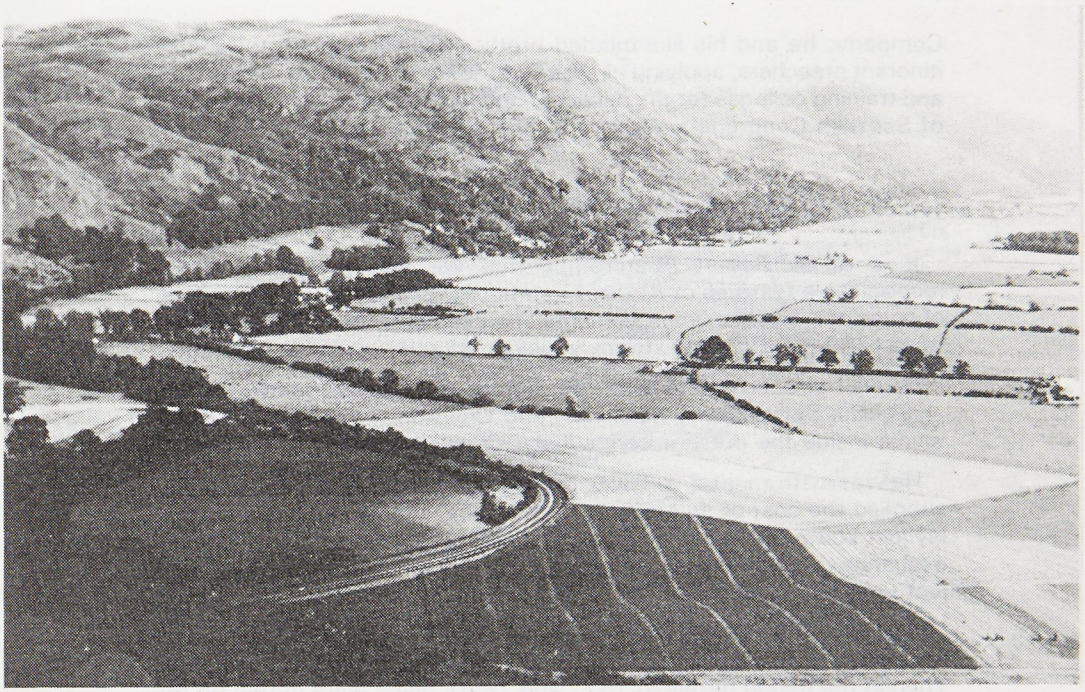


Plate 10 The present Logie Road, which was constructed as a turnpike between 1817 and 1820

Plate 11 The treelined walkway behind the University's Logie Theatre which runs on top of the wall of the 'Ha-Ha' boundary ditch

Company, he and his like-minded brother James took up the life of itinerant preachers, applying all their fortunes to the building of churches and training colleges for the ministry. Robert has been called 'the father of Scottish Congregationalism'. He died in Edinburgh in 1842.

ROBERT THE THIRD (1798—1827)

It is to Sir Robert Abercromby that we owe so many of the recognisable features of Airthrey estate today, and the disappearnace of some of the earlier 'improvements'. He lived here for almost 30 years, from 1798 to 1827, an extremely well-loved and hospitable proprietor.

He enlarged the estate by purchasing portions of surrounding farms – Spittal, Spittalkerse, Holehead, and Craigton – and enclosed the whole inside the present very substantial wall of stone and lime.

He was instrumental, in 1805, in having the new Logie Kirk built, and supplied the cost of its steeple. At that time, the manse and its glebe lay just south of the estate gardens, near the old Kirk. He arranged an exchange to a new manse and glebe in Pathfoot, known as Jock's Croft, just west of Blawlowan.

The Parish School in Logie village was given a new home on two occasions, in 1809 and 1817. The latter building survivies as Logie Villa. Then in the period between 1817 and 1820, plans were drawn up for a new turnpike road between Causewayhead and Dollar (Plate 10). This was the birth of our present-day road pattern, and rendered the Haldane 'new' road obsolete.

So the Captain's New road was dismantled, and converted into a 2-metre wide pathway bordered by a 'ha-ha', a ditch-like field-boundary (Plate 11). The walls put up alongside by Robert Haldane were removed, one suspects, to provide the dry-stone walling of the ha-ha. This can be traced in the form of the tree-lined walk-way extending from behind the University's Logie Lecture Theatre, to the East Lodge drive, near Logie Kirk.

Sir Robert was very concerned at the poor condition of many of the houses now lying within the estate boundary. He carried out an enlightened 'clearance' of the tenants of both Pathfoot and of Logie to new houses in Causewayhead. Only one old woman refused to budge, and her cottage was spared as long as she lived.

Finally – a nice touch – he built an access road from Pathfoot to Logie Kirk at the 'back of the dyke' (Plate 12), mainly to give vehicular access to the stable-yard and saw-mill, on a site now occupied by staff housing (Airthrey Castle Yard). No doubt it served the Minister as a direct link between his new manse in Pathfoot and his new church at Logie. It also restored to the Bridge of Allan parishioners a good substitute for the old right-of-way which they lost in 1767.

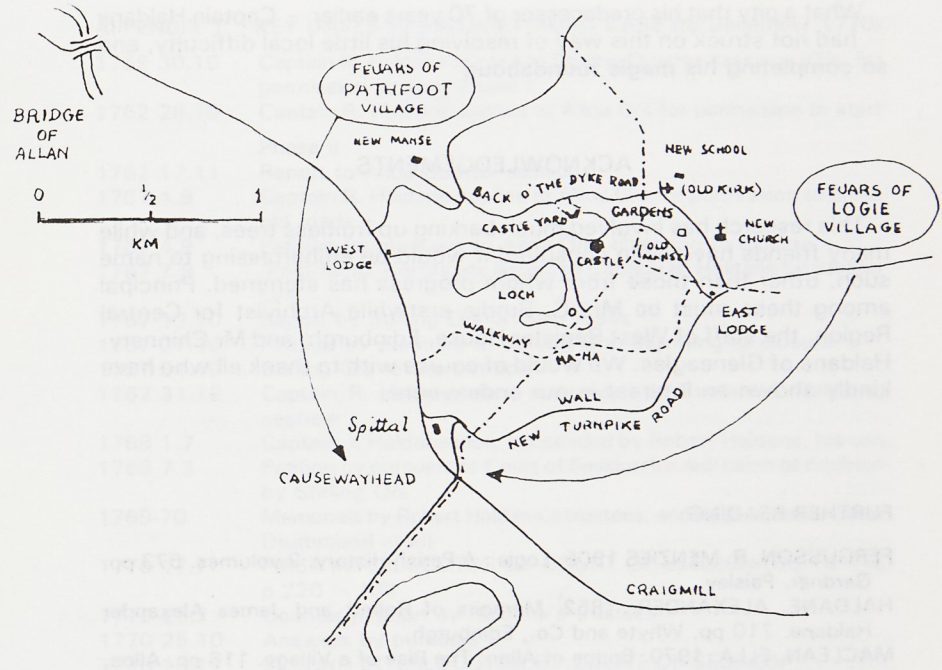


Figure 7 Airthrey Estate as it was at Sir Robert Abercromby's death in 1827

Plate 12 'Back of the Dyke' Road approaching Logie (Old) Kirk

What a pity that his predecessor of 70 years earlier – Captain Haldane – had not struck on this way of resolving his little local difficulty, and so completing his **magic roundabout!**

ACKNOWLEDGEMENTS

This research has involved much barking up fruitless trees, and while many friends have been consulted it would be embarrassing to name such, other than those from whom progress has stemmed. Principal among these must be Mrs C. Brodie erstwhile Archivist for Central Region, the staff of West Register House, Edinburgh, and Mr Chinnery-Haldane of Gleneagles. We would of course with to thank all who have kindly shown an interest in our endeavours.

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STATISTICAL ACCOUNT (NEW). 1841. Stirlingshire, volume 3, Logie Parish. 214-233.

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LEGAL SOURCES

CENTRAL REGION ARCHIVES. 1767-70. Proceedings in the Airthrey Road Case (PD 16/10). 148 pp.

WEST REGISTER HOUSE. Court of Session Receipt and Transmission Books (in Manuscript) –

Shield's Office	CS 77/15 (1767-77)
Clerks – George Kirkpatrick (KRK)	CS 78/14 (1768-70)
William Kirkpatrick (KR)	CS78/15 (1770-72)

Court of Session Minute Books

Other Offices (possibly relevant but not researched) – McKenzie and Currie	CS 16/134 to 146 (1768-71)

APPENDIX 1 KEY DATES IN AIRTHREY ROAD CASE (to December 1770)

1759 30.10	Captain R. Haldane applies to Stirling Quarter-sessions (Q/s) for permission to start Phase I
1762 26.10	Captain R. Haldane applies to Alloa Q/s for permission to start Phase II
1762 17.11	Report to Alloa Quarter-sessions
1767 4.9	Captain R. Haldane applies to Alloa Q/s for permission to close old roads
1767 4.9	Petition by pursuers to Alloa Q/s, objecting to closure
1767 7.9	'Post-facto' Certificate issued to Captain R. Haldane by Stirling Q/s
1767 13.10	Report by Stirling Q/s on new roads
1767 27.10	Petition by pursuers to Stirling Q/s, objecting to closure
1767 31.10	Stirling Q/s refuse petition
1767 31.12	Captain R. Haldane dies, succeeded by Captain J. Haldane, nephew
1768 1.7	Captain J. Haldane dies, succeeded by Robert Haldane, his son
1769 7.3	Petition by pursuers to Court of Session for reduction of decision by Stirling Q/s
1769-70	Memorials by Robert Haldane's trustees, and by pursuers (Robert Drummond et al)
1770 17.7	FIRST INTERLOCUTOR BY COURT OF SESSION (CS/16/142 p.220 – KR)
1770 25.7	Counter petition by Haldane's trustees
1770 25.10	Answers by pursuers
1770 15.11	SECOND INTERLOCUTOR BY COURT OF SESSION
1770 27.11	Counterpetition by pursuers
1770 13.12	Answers by Haldane's trustees

APPENDIX 2 DRAMATIS PERSONAE IN COURT CASE

ABERCROMBY George, of Tullibody and Menstrie	(Clackmannanshire JP)
ABERCROMBY James, of Brucefield	(Clackmannanshire JP)
ABERCROMBY Captain Ralph (later General Sir Ralph, hero of Aboukir, 1801)	(Clackmannanshire JP)
BRUCE Mr, of Kennet	(Clackmannanshire JP)
BRUCE Sir Michael, of Stenhouse	(Stirlingshire JP)
BRYCE James, of Pathfoot	(Tanner and Shoemaker)
BUCHANAN John, of Auchlessie	(Pursuer)
BURD James, of Stirling	(Merchant)
BURN Robert, of Logie	(Feuar)
CALLENDAR John, of Craigforth	(Stirlingshire JP)
CAMPBELL Sir James, of Aberuchill	(Pursuer)
CAMPBELL Robert, of Middleton Kerse	(Farmer)
CHRISTIE James of Sheriffmuirlands	(Farmer)
CHRYSTIE Thomas, of Stirling	(Solicitor)
CLARK Robert	
CLASON James, East Kerse of Airthrey	(Baillie)
COCKBURN George, of Gleneagles nephew of Captain Robert Haldane	(Clackmannanshire JP)
CULLENS John, of Blackdub	(Farmer)
DON William, of Spittal	(Solicitor)

DRUMMOND Dr Robert, of Cromlix, Archbishop of York	(Pursuer)
DRUMMOND William	
DUNCAN Adam, of Lundie – nephew of Captain (Robert Haldane) and (as Admiral Lord) hero of Camperdown, 1797	(Haldane trustee)
DUNCAN Alexander,	(Haldane trustee)
DUNCANSON James, of Manor	(Blacksmith)
DUNCANSON Jean, of Logie	(Widow of J. Laing)
DUNDAS Henry,	(Haldane's solicitor)
DUNDAS John, of Manor	(Former owner of Airthrey estate)
DUNDAS Dr Thomas, of Alloa	(Physician)
DUNDAS Thomas, of Fingask	(Stirlingshire JP)
DUTHIE William	
EASON John	
ERSKINE Baron Charles of Alva	(Stirlingshire JP)
ERSKINE James, of Alva, Lord Barjarg	(Clackmannanshire JP)
FARQUHARSON John, of Bankhead	(Surveyor)
FERGUSON Robert	
GUILD James, of Myreton and Balquharn founder of Glenochil Distillery	(Farmer)
HALDANE Captain Robert, of AIRTHREY (1705-68) – previous owner and improver, and great-uncle of –	
HALDANE Robert, of Airthrey (1764-1842)	(Owner)
HALDANE Mungo, Accountant-General of Excise Office	(Trustee)
HEDDRICK William, of Airthrey Mills	(Overseer of statute-road work)
HENDERSON John, of Logie	(Farmer)
HOOME-STEWART David, of Argaty	(Pursuer)
KNOX Gilbert	
LAING James, of Logie	(Husband of Jean Duncanson)
LENNOX Andrew	
MACEWAN John, of Tullibody	(Servant to George Abercromby)
MAYNE Edward, of Powis	(Clackmannanshire JP)
MOIR Alexander	(Servant to Captain R. Haldane)
MOIR James	(Servant to William Heddrick)
MORISON James, of Greenfield, Alloa	(Surveyor and road planner)
MORISON John, of Pathfoot	(Farmer)
MORRISON Daniel, of Keir Mills	(Miller)
MORRISON Duncan	
MURDOCH Archibald, of Gartincaber	(Pursuer)
NAPIER Lieutenant John,	(Stirlingshire JP)
OGILVIE Peter, of Pathfoot	(Blacksmith)
PEARSON John, of Kippenross and Cornton	(Pursuer)
ROB Andrew	
ROB John, of Cauldhame ex-Coneyhill and Wester Roughburn	(Blacksmith)

ROBERTSON John, of Spittal	(Tenant-farmer)
ROBERTSON John, of Logie, father-in-law of John Morison	(Late constable)
ROBERTSON-BARCLAY James, of Cavil, Fife	(Clerk to Signet; agent for Dr Drummond)
ROBERTSON William, of Westhaugh and West Grange	(Farmer)
ROBIESON John	
SCONCE Robert, of Stirling	(Land surveyor)
SHARP James	
SMITH Mr	(Clackmannanshire JP)
SPOTTISWOOD John, of Dunipace	(Stirlingshire JP)
STARK John, of Lecrop	(Retired minister)
STEWART Francis, Earl of Moray	(Pursuer)
STIRLING Archibald, of Keir	(Pursuer)

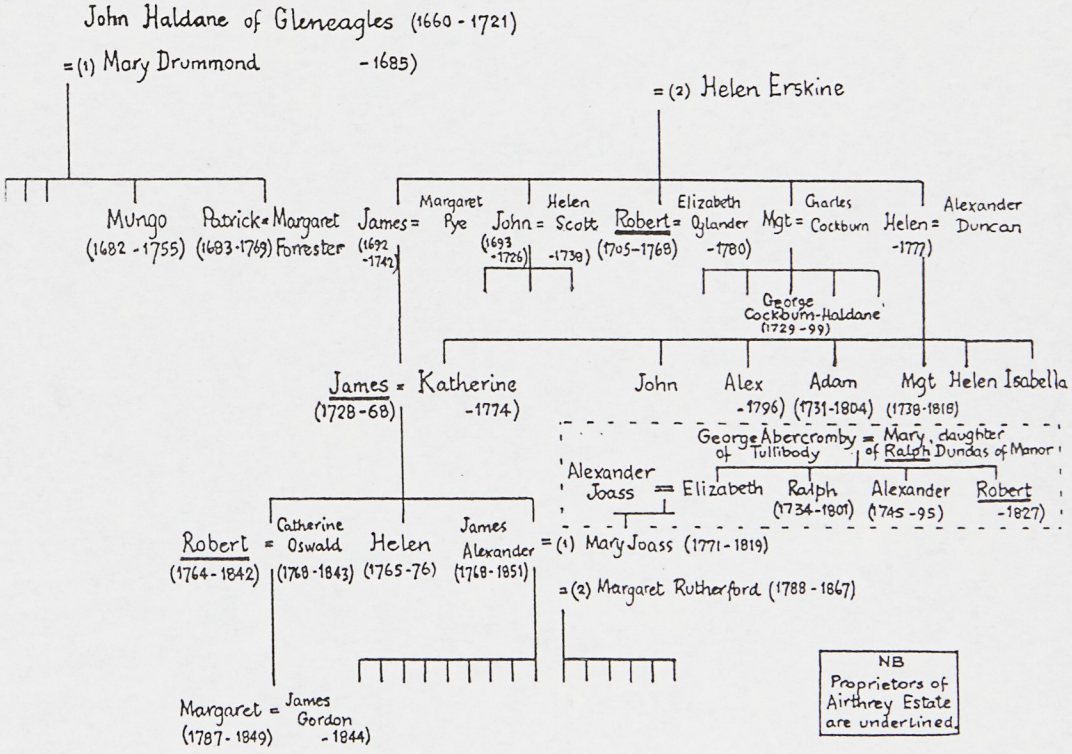
CORRIGENDA – volume 9 –

(a) Please insert this amending page at 111. We greatly regret this omission of the Haldane family tree, Appendix 3 of the Airthrey Roads paper at this page 111.

(b) Add to Author's addresses page 64a
Turner, J. R. Countryside Commission for Scotland, Battleby, Redgorton, Perth

Some reprints of this Airthrey Roads paper are available from the Secy./Editor.

Appendix 3 Simplified family tree of the Haldane proprietors of Airthrey 1759-1798



BOOK REVIEWS

SCOTTISH LOCAL HISTORY: An Introductory Guide. David Moody. Batsford Local History Series. Batsford, London 1986. £7.95. ISBN 0-7134-5221-8.

During the last 20 years the popularity of local history has grown enormously and a plethora of books has been published in the UK both on the theory and methodology of the subject in addition to innumerable studies of localities. Whilst Scotland has been well served by the latter, David Moody's book is the first which makes a comprehensive survey of Scottish sources, human, man-made and topographical as well as the usual printed and manuscript ones along with detailed advice on how to use these sources and pitfalls to avoid.

The organisation of the book moving from libraries and archives through human resources and buildings to settlements with a final chapter on writing and publishing is eminently practical and coherent. The table of local government functions from 1832-1975 is especially useful since the early 19th century is often used as a starting point for local studies.

A great deal of careful work has gone into this publication and through it David Moody has done a great service to the study of Scottish history.

B. J. Elliott

DISCOVERING SCOTTISH BATTLEFIELDS. John Kinross. Shire Publications, Aylesbury 1986. £1.50. ISBN 85263750 0.

This little book covers eighteen battles fought in Scotland between 1297 (Stirling Bridge) and 1746 (Culloden).

Each battle is described in 1½ – 2 pages and is accompanied by a simple sketch map. Its location is identified by the Ordnance Survey grid reference. There are also nine photographs of which three were taken in the Stirling area.

The language is clear and simple and so the book would be useful in secondary schools. Also its small size would make it suitable for field trips but anyone wanting deeper and more detailed studies and a greater background to these battles would need to search for other titles. Unfortunately no bibliography is included in this title.

B. J. Elliott

FISHER ROW
PLANNED HOUSING AND THE DECLINING FISHING INDUSTRY IN LATE SEVENTEENTH CENTURY STIRLING

John G. Harrison

'Fisher Row. This name is applied to 2 or 3 small dwelling houses one storey high thatched in middling repair situated east of and adjacent to the village of Raploch and are occupied by farm labourers so called it is said from the circumstance of a number of fishermen formerly residing there.'

So wrote the compilers of the *Ordnance Survey Name Book* during the survey of the area in 1858. The large scale map of the first edition of the Ordnance Survey shows Fisher Row as a single rectangular block some 6m x 26m due north west of the Nether Baillie of Stirling Castle and at the foot of the Castle Hill itself (Grid Reference NS788943); and see Figures 1, 2 and 3, pp 114-5 and 124.

The block was all that remained of a group of houses built following a decision of the town council of Stirling on 30th May 1696 that some 14 acres of the Raploch lands should be divided into two acre plots and a house built on each –

'being ane house and two aikres for accomodating of each fisher . . . the howssis to be built in such places and after such manner as the dean of gild and conveiner shall think fitt.' (Extracts from the Records of the Burgh of Stirling, volume II p 81 – hereafter referenced as – Extracts . . . Stirling).

Despite this initial decision to build seven houses probably only six were built and on 21st November of the same year it was reported to the council that the houses were ready and that five people had been found ready to take leases, their rents to be payable in grain grown on the land (Central Region Archives, Council Record of the Burgh of Stirling B66/20/6 – hereafter referenced as – CRA – Council Record . . .).

The houses were substantial structures by the general rural standards of the time. They were built by specialised craftsmen rather than by the tenants themselves and clearly represented an important investment. The whole development cost rather over £900. (Note that all sums of money referred to in this paper are in £'s Scots; at this period £12 Scots were equal to £1 Sterling). This was one of the biggest public building projects in seventeenth century Stirling.

The basic structure was a couple-(i.e. cruck-)frame with stone walls incorporating substantial amounts of lime into the clay-based mortar. There is no evidence of floor boards but the use of window panes is indicative of the rather superior level of the housing. A detailed account of the construction will be presented elsewhere.

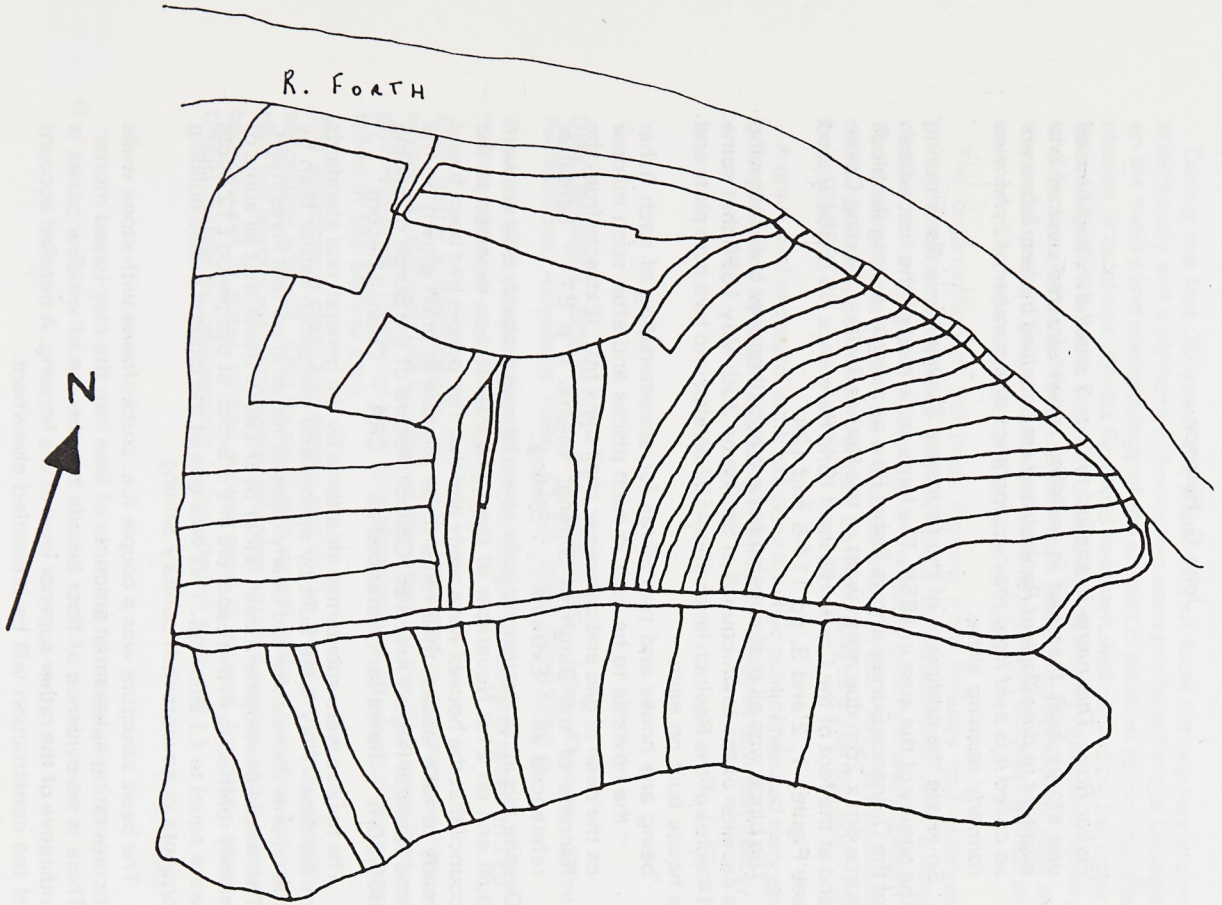


Figure 1 Lands of Raploch in 1759, redrawn from CRA MP/SB/35. The layout was still traditional and similar to that at the beginning of the century. The Millars had five plots dispersed over the western and central parts of the area. From 1779 the lands were redivided into only eight plots of which the Millars had two adjoining ones. From 1798 the whole area was amalgamated into a single farm. So over the century some 20 tenants and 40 plots had been replaced by a single tenant and eight fields. From then on the inhabitants of Fisher Row were labourers rather than tenant farmers.

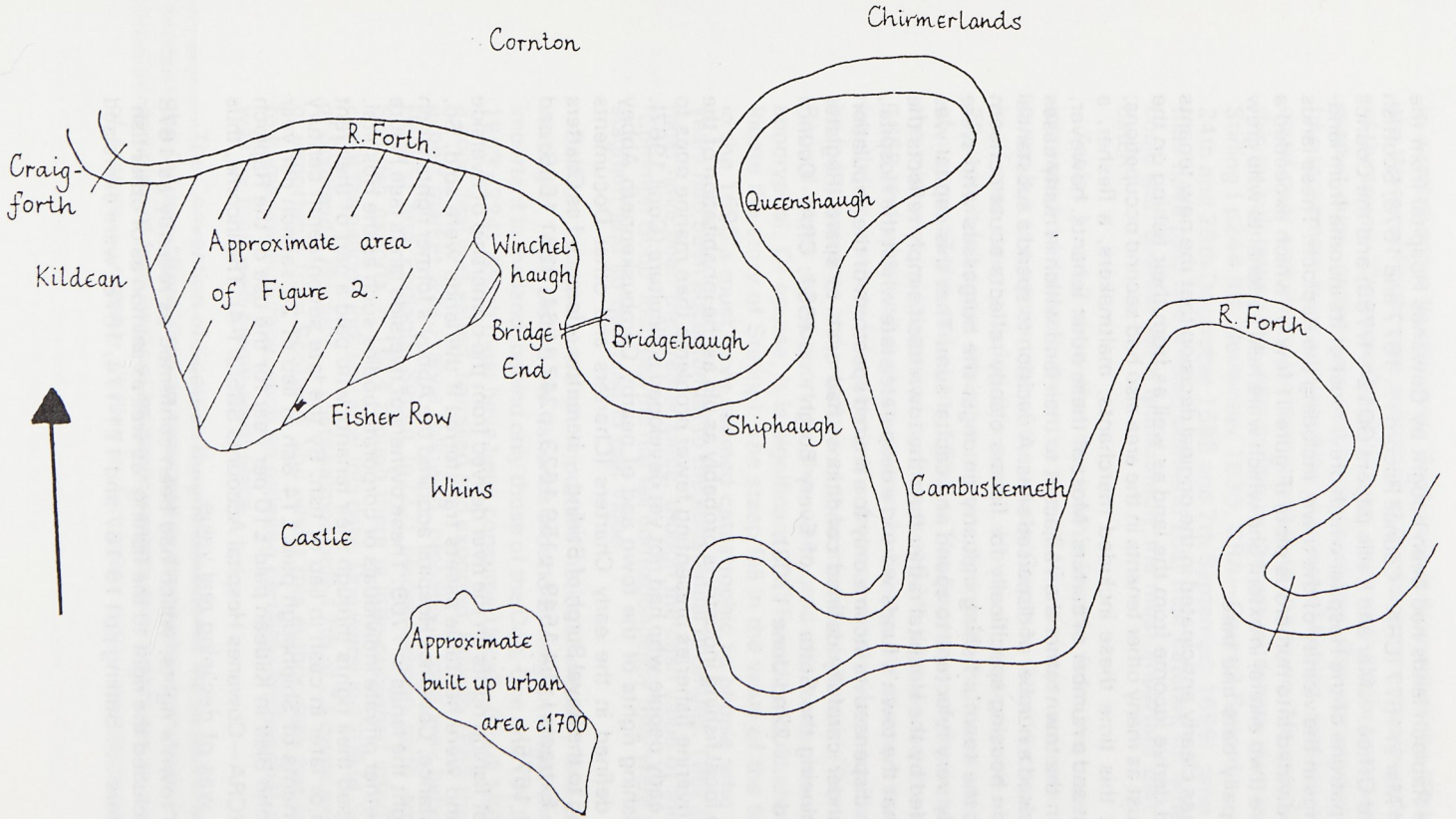


Figure 2 Map showing riverside lands, some places mentioned in the text and the upper and lower limits of the towns and Hospitals Fishings. The length of river covered totals about 10Km. Based on CRA – MP/SB 35 and MP/SC 188.

The Raploch lands had been bought by Cowanes Hospital from the Earl of Mar in 1677 (CRA – Council Record . . . 1677 and 1678; Scottish Record Office – Mar and Kellie papers GD124/1/789) and the Council were patrons of the Hospital which drew most of its income from land-holdings in the vicinity of the town, including the Raploch. These lands were divided into numerous plots (Figure 1) few of which exceeded a hectare (two aikers) in extent and which were held by tenants who grew principally oats and bere.

It was clearly anticipated in the original decision that the new tenants would derive income from the land as well as from their fishing on the river just as many other tenants in the area also had second occupations; about this time these included merchants, maltmakers, a flesher, a wright and a number of carters. Most of these other tenants, however, lived in the town rather than adjacent to their land which in many cases comprised a number of dispersed sites. A decision to spend a substantial sum on housing specifically for fishers clearly reflects acute concern about the town's fishing industry amongst the burgesses who were usually very reluctant to spend any capital sum. That this capital was provided by the Hospital rather than the town itself simply reflects the fact that the town's funds were in a desperate state whilst the Hospital, which dispensed its income only to a limited spectrum of the population and under carefully defined conditions, had cash to spare (Register Containeing the State . . . of Every Burgh . . . 1881; CRA – Council Record . . . 22nd June 1708).

The local fishing industry is probably as old as the inhabitation of the area, riverine fisheries presenting fewer problems than marine ones to those early people who had not yet developed agriculture (Coull 1967). The fishing rights of the town and of nearby Cambuskenneth Abbey were defined in the early Charters (Charters and other Documents relating to the Royal Burgh of Stirling – hereafter referenced as Charters . . . – Extracts I p54 1549, p159 1623, p247 1664, p251 1666; and II p18 1675).

Most fishing rights on the river derived from the ownership of riverside land and were heritable assets transferred if the lands were sold. So, for instance, Cowanes Hospital acquired the Abbey's former rights when it bought the lands in 1709. These owners of riverside lands (see Figure 2) whether private individuals or corporate bodies such as the Hospital, exercised their rights through their tenants who paid a part of their rent in fish or later in cash in lieu of fish. By the late seventeenth century the tenants of Shiphaugh paid £14 8sh in lieu of 24 salmon per year and John Blair in Kildean paid £10 per year for the use of the Raploch boat. (CRA – Cowanes Hospital Accounts SB5/3/1-4). The income, thus fixed, was of declining real value.

The town's rights, which had been confirmed as recently as 1678 and included the right to the fishing 'as well as salmon as of other fish' (Charters . . . Stirling pp116-167 and 171-174, 1678) were exercised

in a rather more flexible way. Each year in November the 'Fishing of the Water of Forth' was auctioned at the same time as other elements of the towns 'Common Good' income, such as the right to collect meal market dues, or the gate and bridge customs. The successful bidder (the tacksman) then organised the business of fishing, making what he could over and above the sum payable to the town. He probably did this by sub-letting the right to fish to the actual fishers (Extracts . . . Stirling I p244 9th November 1633; CRA—Council Record . . . 14th, 24th and 26th December 1696 and 7th September 1699), who would thus have paid him a fixed sum and sold their catches for what they could get. Salmon were undoubtedly the most important part of the catch.

Tables 1 and 2 show that the town's income from this source had increased dramatically from the late 1640's onward, not only in cash terms but as a percentage of the whole 'Common Good' income which itself rose steeply during this period. However, after a peak of about 25 years it fell again, though it remained generally high as a proportion of income till the end of the 1680's. The bouyancy of the industry in the mid century is attested by Franck (1821) who visited the area in 1658 and who had a great interest in fishing. He claimed that local legislation restricted the eating of salmon as otherwise so much would be fed to servants and prentices as to be injurious to health! (The Council Record gives no support to this claim and the story is probably apocryphal. Of course, it is significant that Franck should choose to locate the story of Stirling). The steep fall in the value of the fishings in the 1690's must have seemed catastrophic to people who for 50 years had been accustomed to the substantial revenues. Their dismay must have been the greater since, though the cash value of the other 'Common Good' incomes did not fall correspondingly they were at best stagnant and so declining in real value.

Salmon fisheries were an important national industry and Sibbald writing in 1698 placed the fisheries around Stirling amongst the most important in the land, behind only those of the Don, Dee and Tay (Smout 1963 p224). Much must have been consumed locally (Coull 1967) but a good deal was salted, barrelled and exported. Prior to 1689 the major export market was France followed, probably a long way behind, by Holland and England. Smout (p237) places salmon sixth amongst Scottish exports in 1614 though there is little published information about the national industry after this date. One writer in 1706 (*A Scheme of Scotland's Product . . .*) lists salmon only 17th of 24 items exported or exportable from Scotland, and whilst this author does not pretend to numerical accuracy, such an ordering certainly implies that salmon was by then well below sixth place.

The Convention of Scottish Burghs considered the export branch of the industry from time to time and in the early eighteenth century complained frequently of its decline which they attributed to a variety of factors – notably, 'killing in forbidden time', the destruction of

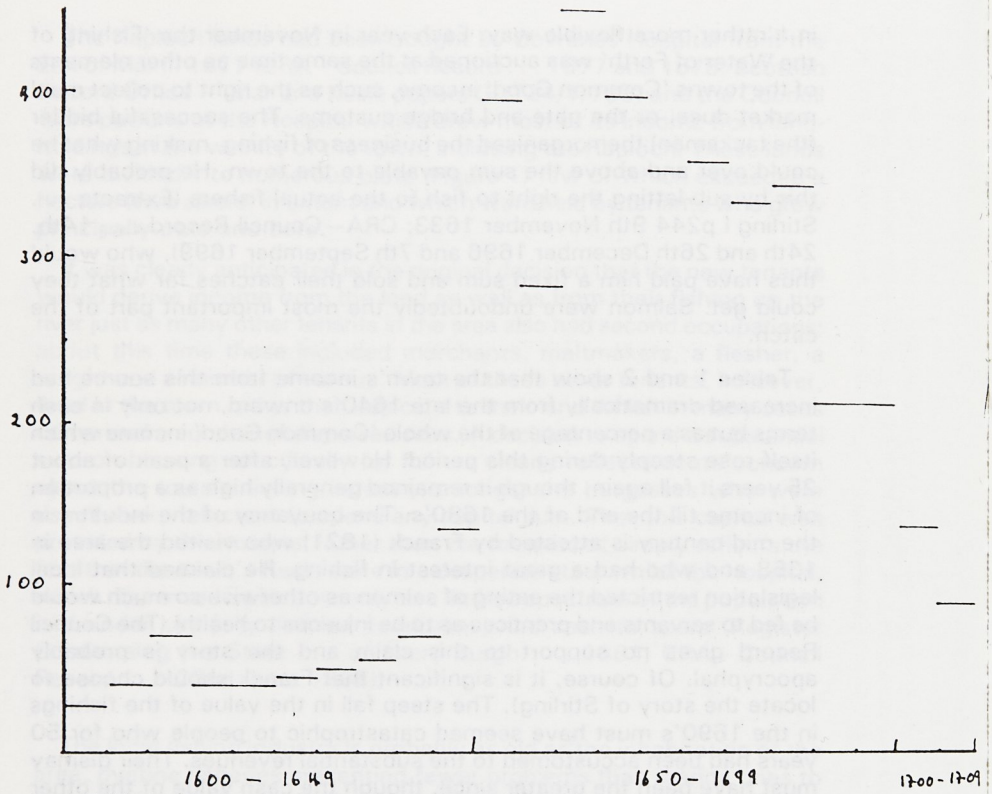


Table 1 Cash value of Fishing of Water of Forth in £s Scots averaged over five year periods from 1600-1709 (Based on *Extracts* . . . I and II Appendix V and VII respectively)

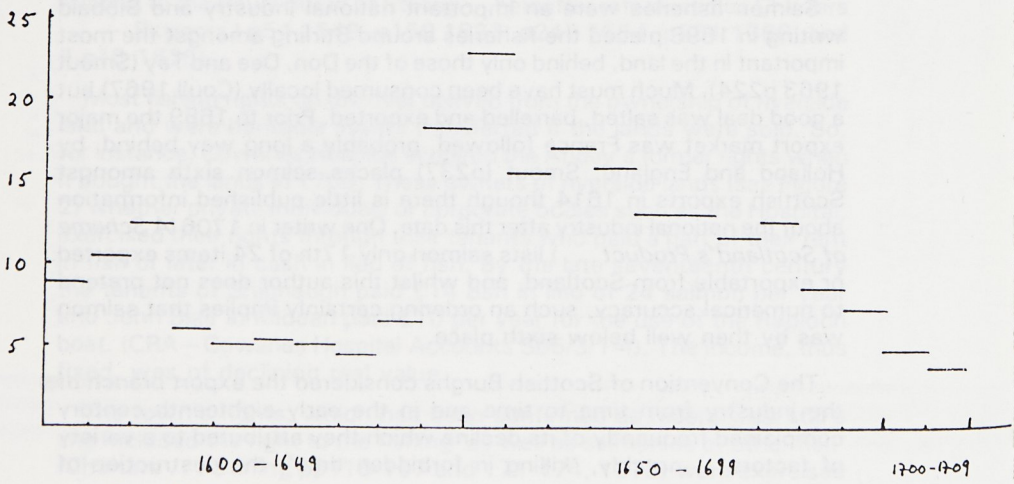


Table 2 Revenue of the Fishing expressed as a percentage of the other principal 'Common Good' revenues and averaged over five year periods from 1600-1709 (source as Table I)

immature fish, the high tax on the good quality imported salt needed for the industry, the difficulty in obtaining the salt in sufficient quantity, and the high tariffs imposed by the French after 1689. In 1707 they claimed that exports had fallen from 10,000 barrels per year before 1689 to less than a quarter of that (Extracts from the Records of the Convention of the Royal Burghs of Scotland, pp427 and 432-433 1707, p491 1709, p500 1710, and p516 1711).

Unfortunately the Convention, a lobbying organisation representing primarily the merchants in the burghs, gives no realistic assessment of the relative importance of these factors. When they want increased numbers of troops to patrol the headwaters of the Dee and Don to prevent poaching they emphasise lack of protection of the stocks as a cause of the decline, but when they hope to have the French tariff barrier reduced they imply that this is the most important factor.

Nor does the Convention list exhaust the range of suggested culprits; the 1706 writer (A Scheme of Scotland's Product) blame water pollution caused by the steeping of lint in streams. The burgesses of Stirling suggest yet other factors as a cause of the decline of their own industry, notably the use of illegal fishing methods by other riparian owners, incursions on to their stretches of the river by adjoining tenants, and angling by private individuals. From 1693 onward they lobbied Parliament repeatedly and successfully for an Act to control the first of these and they also periodically prosecuted anglers (Extracts . . . Stirling I p247 1664, p251 1666, and II p18 1675, p68 1693, plp76-7 1695, p78 1696, p109 1706, p119 1709, p127 1712, p150 1717; Acts of the Parliament of Scotland IX p369 1695 and p149 1698; CRA – Burgh Court Books B66/25/458 1693; CRA – Burgh Court Record B66/16/19 5th July 1692, and B66/16/23 25th August 1709).

So much activity clearly attests the major importance of the industry to the town and its inhabitants and the lobbying of Parliament in the mid 1690's is evidence of acute concern at the time the fisher houses were built. In the absence of a study of the national industry (which would be hampered by lack of surviving central records) an extensive series of local studies would be needed to assess the importance of the various factors. At the moment, for instance, it is not even clear if the price of salmon rose or fell at the end of the century nor is it known if the value of the fishings on other rivers also declined.

Whatever the reasons for the decline, the town was severely hampered in any effort to enhance the value of the industry. They could – and along with other membrs of the Convention they did – lobby the government about the salt tax, the availability of salt and the high French taxes, recognising that these were political and national problems rather than merely local. Acts to control illegal fishing methods, the steeping of lint, or the taking of immature fish, were well intentioned but only spasmodically enforceable.

Even within the stretches of the river which the town controlled there

was a limit to what could be done. It was not practicable to increase the numbers of boats, which were rigidly controlled by custom and charter. Any move to do so would have been met by objections from other owners. Attempts to fish further up or down stream than their rights extended would have been met by the same objections which the town raised to the adjacent Craigforth tenants fishing in the Raploch reaches (Extracts . . . Stirling II p77 1695, p78 1696, p109 1706, p150 1717). Nor could the town's fishers encroach on the reaches claimed by the tenants of Cowanes Hospital lands, a particularly serious problem since, as we have seen, the income from the tenants' fishings were cash sums of declining real value.

In view of this it was vital that the tenants were carefully controlled to ensure that they did not encroach on the town's potentially more remunerative rights. An Act of the Fisher Court of 1664 prohibited fishers of the 'free cobles' (that is the fishers whose rights derived from land holding or tenancy) from fishing in the reaches which belonged to the town and stipulated that –

> 'the free cobles (are) to be fished by the tenants of the ground to whom they belong or their servants and none else'. (CRA – Burgh Court Papers B66/25/779/3 1721, Alexander Stewart against fishers and others)

Since the tenants and their servants obviously spent much of their time at agricultural work (and in many cases had other occupations as well) such an act, if enforced, would have limited their catch by preventing them from sub-letting their rights to others who could put more effort into fishing. Furthermore, part of the complaint in this 1721 case was that James Stewart and James Mentieth, who were town's fishers, had been fishing on behalf of adjacent tenants, a practice which would have increased the tenants' take whilst reducing the effort put into the town's fishing. Significantly, the only one of the original leases to the Fisher Row houses which has survived prohibits the tenant, George Millar, from taking a lease of any coble unless all the town's boats have been let. (CRA – Burgh Register of Deeds B66/9/11 Tack dated 1696 registered 1699). Clearly it was intended that the tenants of the houses were to fish the town's boats.

In another case before the burgh court in 1704 the Procurator Fiscal pursued the fishers, 'as well free fishers as fishers of the town's cobles' for a variety of misdemeanors including fishing in one another's reaches. But the principal interest of the case lies in the enclosed summons which is headed, 'Ane List of the persons who fishes upon the tounes watere'. There are 21 boats in all of which 11 seem to be 'town's boats' and ten are specified to be 'free boats'. These last include two boats belonging to Chirmerlands and 'the two free boats in the Abbey (i.e. Cambuskeneth)'; boats which were in competition with the town and its tenants but whose reaches overlapped with theirs. They derived their rights from the opposite (northern) bank of the river. (See Figure 2 for locations of the riverside lands mentioned). It is possible that others of the free boats were also competitors based, for instance, in Cornton

which is also on the opposite bank. Most of the boats are manned by a pair of fishers and even where a single name appears it is probably the name of the principal who would have worked with someone else as a team. In some cases several tenants may have had rights in a single boat – for instance there were sometimes three, sometimes four tenants of Shiphaugh, but only one boat. It seems that there were about 42 people fishing, at least on a part time basis, which may be compared with 130 men and 46 boats working on the Dee in the mid eighteenth century (Pennant, quoted by Coull 1967). Of course these 21 boats are only those which fished on the Forth close to the town and there would have been many more on the lower reaches as well as those of the Laird of Craigforth above the town.

This Procurator Fiscal's summons list also shows the extent to which fishing was a family occupation; the 31 names listed include three Willisons, three (or perhaps four) Blairs, two Patersons and two Glens.

As has been pointed out the fishers of the 'free boats' were tenants of riverside lands; interestingly whilst many tenants of the town and of the Hospitals lived in the town most of those who occupied lands with fishing rights lived in houses on or adjacent to their holdings and close to the river. The Shiphaugh and Queenshaugh tenants, for instance lived on their holdings; John Blair lived in Kildean in the early 1690's and leased the Raploch boat and Robert Christie, who worked the Winchelhaugh boat, lived at Bridge End and worked at the Bridge Mill. Presumably too, the fishers of the two competing boats from the Abbey of Cambuskenneth lived in that hamlet, and the Chirmerlands tenants seem also to have worked their own boat deriving their rights from their riverside tenancies. But what of the fishers of the town's boats?

Some of these men were certainly members of these same agricultural families but others have surnames which do not correspond to those of agricultural tenants; and some of both groups are elsewhere described as 'fishers'. This implies that the fishers of the town's boats, whatever their family background, were specialist fishers rather than farmers though this might exaggerate the contrast, the difference being only one of emphasis (c.f. Coull 1967 and 1969; Harrison in press; CRA – Council Record 10th November 1697).

Faced with a decline in the value of their catch from whatever reason the users of the 'free boats' may have reduced the effort they put into fishing. In any case they could fairly easily recoup the modest sums which they paid for their rights. The town however was in a rather different position. Not only did it face a fall in its income but at the same time it could have found it increasingly difficult to let its boats. If some boats were not used for an extended period they would have feared that their rights to them might lapse, even if the industry later recovered. This problem would have been particularly acute if a significant proportion of the town's fishers were traditionally specialists who in a recession might be tempted to leave the industry altogether.

Unfortunately the records give no indication of the thinking behind

the building of the houses, but it seems probable that the decline in the value of the fishing with the sort of consequences here outlined was the major factor. The provision of houses which were substantial by contemporary rural standards together with land which could supply a supplementary income and backed up by a prohibition on the tenants fishing any boat other than a town's boat would have made the lease of such a boat more attractive whilst at the same time perhaps raising the status of the fishers themselves. Paradoxically this would have meant that the building of specialised housing corresponded with a reduction in the degree of specialisation of the work.

Investment in housing was later to be a feature of the agricultural revolution of the later eighteenth century and as Whyte (1979) and others have pointed out there is at least some evidence of improvement in rural housing even in the late seventeenth century. But this development by a municipal authority seems to be rather unusual.

A glance at Tables 1 and 2 shows that if the intention was to increase the value of the town's fishing the scheme was a singular failure. The revenue continued to decline, reaching a low of a mere £72 in 1708, remaining below £200 in most years for which information is available up to 1739 and exceeding £300 in only three years during that period. (op. cit.) For this there must be many reasons, local, national and international. Such influences as the loss of foreign markets were not to be countered by the building of a few cottages, as the town council well knew, and a decline in the stocks may have been made even worse by an increased fishing effort. Nor was 1696 a propitious time to attempt to revive any Scottish industry. The harvest had failed in 1695, the local weather in the summer of 1696 was cold and wet and much of the grain was unharvested at Christmas. The closing years of the 1690's saw the last major famine in Scotland in which thousands died of starvation. Famine combined with other blows of a more directly human origin – wars, the massive failure of the Darien adventure and increasing difficulties in almost every area of international trade – brought disaster to the whole economy (Turnbull 1893; Masterton 1893; Smout 1963).

They brought disaster, too, to this small experiment. By 1704, the first year for which a complete rental of the Raploch is available, the fisher houses were leased to Robert Turnbull 'in Whins' who had two houses, George Miller a soldier in Raploch who had three and John Reid a weaver who had one. Each had the use of the attached ground (CRA – Rental of the Lands. . . B66/25/668) but none was a fisher. Almost certainly John Blair and William Ramsie, who appear as fishers 'in Fisher Row' in the 1704 list, were subtenants, deprived of the income from the land envisaged in the original plan.

Several fishers, some perhaps occupants of these houses, were imprisoned for debt in 1699 and many of the agricultural tenants remained indebted to the Hospital for years. The fishers, probably greatly under-financed and facing steadily falling incomes from fishing, entered farming at a time when failure was scarcely to be avoided.

By 1735 several of the cottages had been demolished and it was the Miller family, tenants for most of the eighteenth century, who were to watch the agricultural revolution unfold before the doors of the remaining block. The 1704 list provides the only evidence that fishers ever lived there at all.

GLOSSARY

Cruck or Couple – In Cruck frame construction the roof is supported by massive arched timbers usually resting on the wall bases and called Crucks. In Scotland, however, they were more usually called Couples or Siles and both these terms are used in connection with the Fisher Row houses.

Tack/Tacksman – In Scotland the word Tack usually corresponds closely to the English Lease. The tacksman is the lessee.

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CRA – MANUSCRIPTS in Central Region Archive

Council Record of the Burgh of Stirling B66/20/Series
Where a reference is reproduced in the published Extracts (q.v.) this has always been preferred

Cowanes Hospital Accounts SB5/3/Series
There is some overlap between the coverage of the various volumes in this series, and some gaps. The form in which the accounts are presented is very variable.

Burgh Court Books B66/16/Series

Burgh Court Papers B66/25/779/1
A box of unsorted papers which have now been formed into bundles

Burgh Court Papers B66/25/779/3
These are loose unsorted papers not in organised bundles

Burgh Register of Deeds B66/9/11

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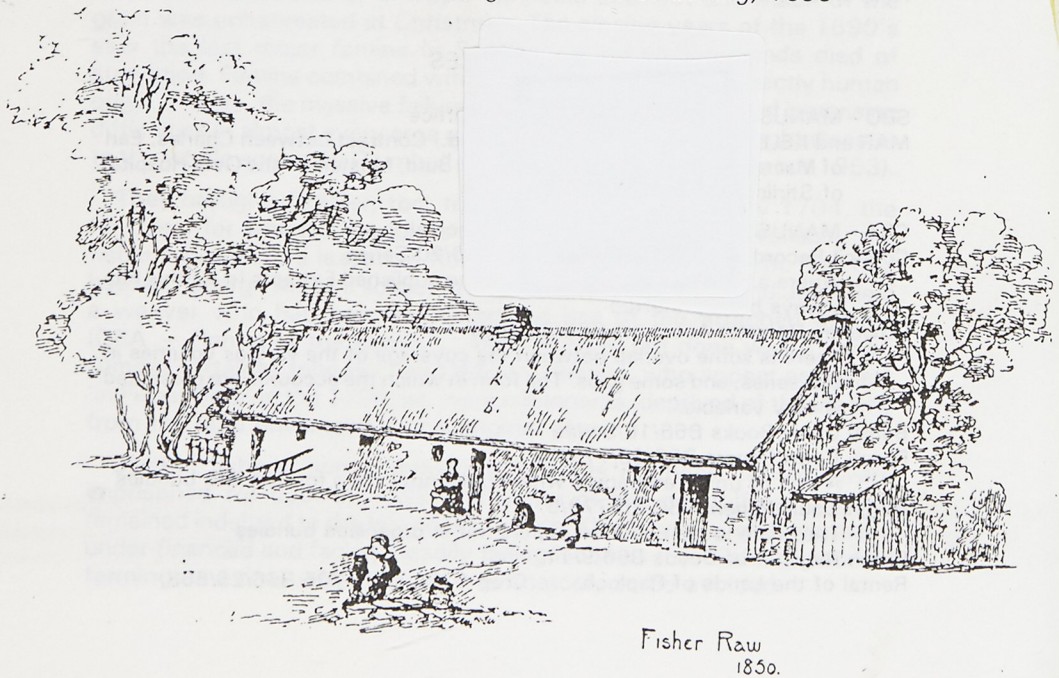
Figure 3 From J. S. Fleming *Old Nooks of Stirling, 1898*



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