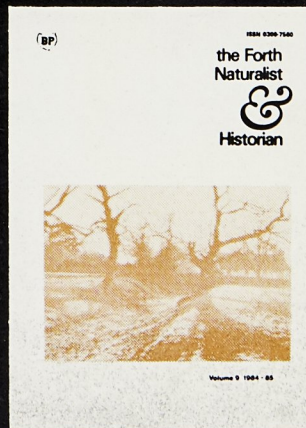
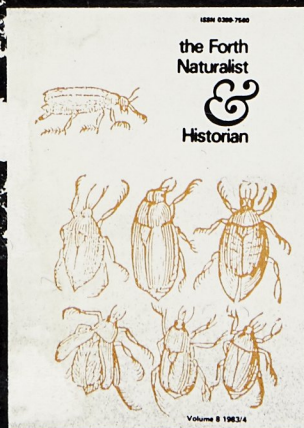
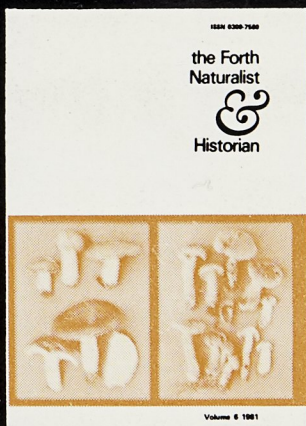
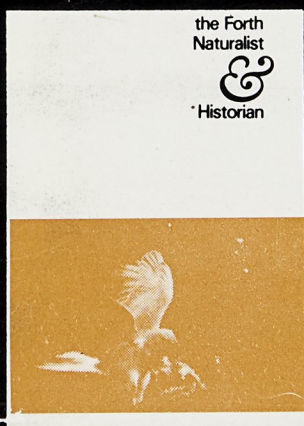


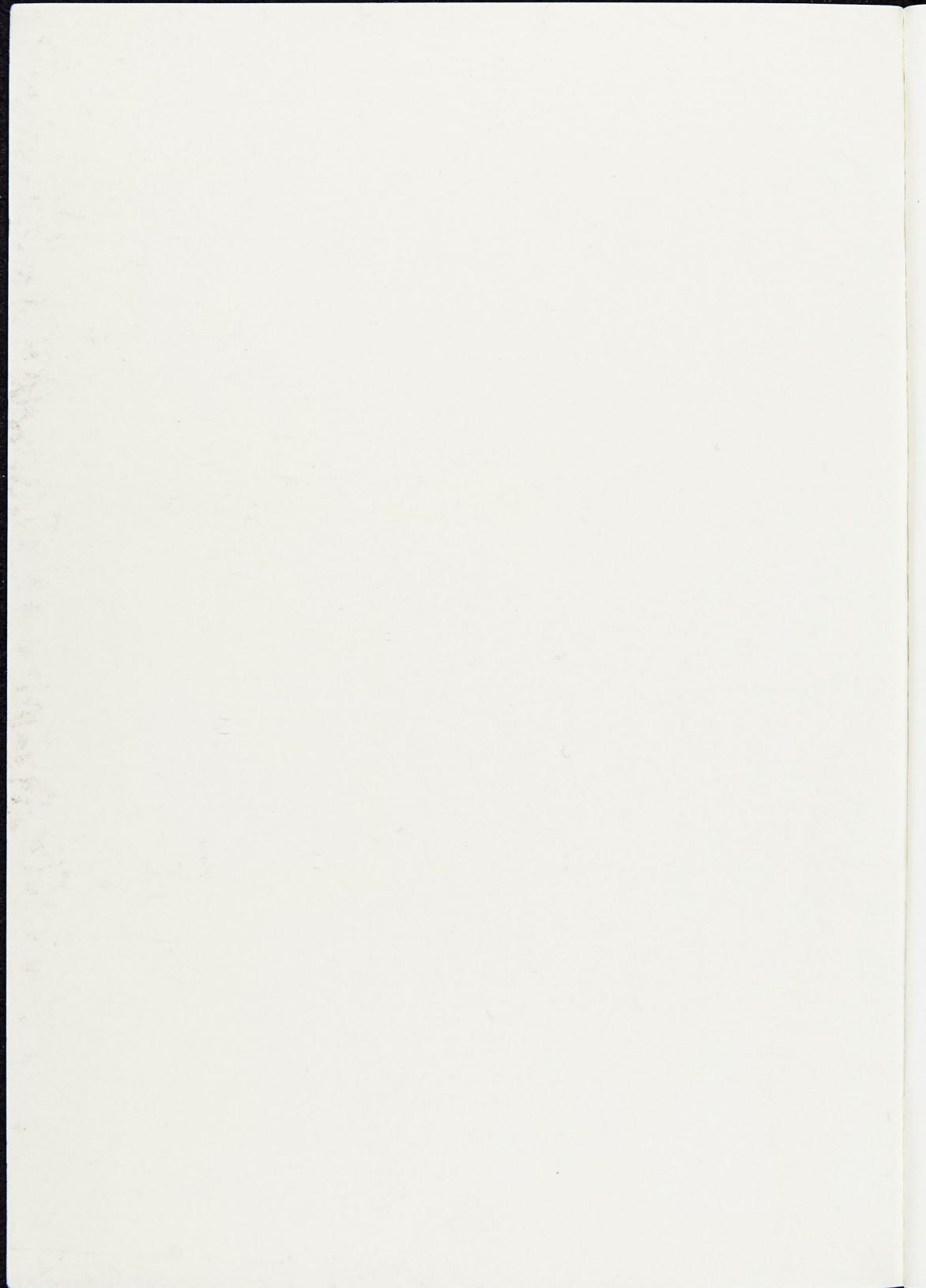
ISSN 0309-7560



the Forth Naturalist & Historian



10th volume



Volume 10 1985/86

- 3 Annual Climatological Bulletin No. 7 1985 – S. J. Harrison
- 25 Forth Area Bird Report (Clacks, Stirling, Southwest Perth)
 1985 and 1986 – C. J. Henty and M. V. Bell
- 53 A Provisional List of Vascular Plants Growing in Falkirk
 District – N. F. Stewart – with fold-out map at 54a
- 80 Advertisements
- 83 The Stirling Women's Oral History Project
 – Jayne D. Stephenson
- 88 The Hearth Tax and the Population of Stirling in 1691
 – John G. Harrison – with fold-out map at 92a
- 110 F N & H and Associated Publications
- 111 Coming Shortly from F N & H
- 112 Some Recent Local Publications
- 113 Alloa and the Hillfoots Textile Industry – 1985 to 1987
 events and historical background – Garry Scobie
- 121 Book Review – William Wallace by Andrew Fisher
 – J. M. Gilbert
- 124 Authors' Addresses

Forth Naturalist and Historian, volume 10 1985/86

Published by the Forth Naturalist and Historian Editorial Board,
The University, Stirling, 1988
The Board is a University/Central Regional Council collaboration.

ISSN 0309-7560

EDITORIAL BOARD

Stirling University — D. Bryant and J. Proctor, Biology: B. J. Elliott,
Education: S. J. Harrison, Environmental Science: R. Innes,
Continuing Education.
Central Region — M. Dickie and D. Murphy, Education Advisers:
K. J. H. Mackay, Stirling High School: J. Sanderson, Falkirk
Museums.

Editor/Secretary

Lindsay Corbett,
The University Library, Stirling.

Graphics Adviser

George Thomson
College of Art and Design
Cumbria, Carlisle

Single copies may be taken of single articles in this journal provided due
acknowledgement is made and the copies are for non-profit education or private
use.

Cost of production assisted by the BP Group of Companies in Scotland
Cover designed by G. Thomson

Printed by Meigle Printers, Galashiels
Set in Univers Medium on Sequel Matt Art Paper

ANNUAL CLIMATOLOGICAL BULLETIN No. 7, 1985

S. J. Harrison
University of Stirling

THE WEATHER OF 1985

1985 will go down in the record books as a year without a summer. After a cold but relatively dry first three months, April gave us a foretaste of the rain which the summer was going to bring. The following five months were cool and wet. Not until the second week of October was there any significant break in the rainy weather patterns, by which time we were into the characteristically cold and wet late autumn.

January. Cold but relatively dry.

Although England and much of Europe down to the Mediterranean coast experienced one of their most severe winters on record, and northern Scotland also suffered blizzards, much of central Scotland had exceptionally cold but dry weather. Night-time temperatures were very low and air frosts were registered on 23 occasions at Parkhead (28 at Carim). Over the first five days a ridge of high pressure extended southwards across the British Isles. Cloud amounts were generally small giving sunny days but frosts at night. Between the 6th and 9th winds were cold relatively dry northerlies. England and much of Europe, however, experienced severe blizzards. An anticyclone drifting eastwards across Britain into Scandinavia between the 10th and 15th brought exceptionally cold conditions and generally poor visibility. Snow fell on the 14th and 15th. An Atlantic depression moved eastwards into France between the 16th and 18th bringing snow to southern Britain. Wet snow fell in the Stirling area on the 17th. Further Atlantic systems brought slightly milder weather with rain and snow from the 20th to 25th. Snow and strong winds on high ground resulted in drifting. As a ridge of high pressure extended northwards across Britain on the 26th and 27th temperatures fell very sharply, reaching -9.5°C at Parkhead on the 27th (-11.0°C at Carim). The cold weather ended abruptly on the 28th as troughs moved north-eastwards across Scotland, maximum temperatures reaching 9.0°C at Parkhead on the 30th.

February. Cold mid-month otherwise mild and dry.

Strong Atlantic westerlies continued into the 1st but as pressure began to build to the east, Britain was brought into a mild southerly

airstream until the 5th. An area of high pressure over southern Scandinavia pushed much colder air into Scotland from the 7th bringing fresh and very cold ESE winds and snow showers. By the 9th daytime air temperatures reached only 1.5°C at Parkhead (−3.8°C at Carim) and there were severe night frosts. The high drifted south-eastwards across Europe after the 11th to be replaced by another moving south from the Arctic. As this extended across Scotland winds were generally light but night-time temperatures fell below −10°C on the 15th, 16th and 17th in many sheltered areas (−9.0°C at Parkhead on the 16th). Pressure remained high over south-east Britain but milder air moved into Scotland on the 18th and 19th. A weak front crossed Britain on the 20th heralding the end to the cold weather. Pressure remained high for the rest of the month and fog was widespread. As skies cleared on the 24th and 25th night frosts returned but days were sunny and spring-like.

March. Generally cold and changeable.

The weather was dominated for the first seven days by Atlantic weather systems. A deep depression crossing Scotland on the 3rd and 4th brought heavy rain in strong westerly winds. A ridge of high pressure extended north-eastwards to affect England and Wales between the 7th and 9th. Although the 7th was warm and sunny in Scotland the 8th and 9th were cloudy and dull. High pressure over Scotland on the 10th and 11th brought two pleasantly sunny days with clearer skies. After a deep depression moved eastwards into Norway on the 12th high pressure became established to the west until the 16th. Temperatures fell very sharply in cold NNW winds. Showers, which fell as snow, were heavy in many places blocking roads. Amounts were generally small locally and snow didn't lie on low ground. High pressure extended into Scandinavia between the 17th and 19th bringing Britain into a cold easterly airstream. A deep depression moved southwards over Ireland on the 20th bringing further snow in strong winds. The depression had reached the English Channel by the 22nd and then moved northwards to reach Scotland by the 24th. The weather remained very dull with occasional rain until the 27th when a fresh north-westerly airflow developed. Vigorous Atlantic systems brought freshening winds and further snow late on the 28th and the next three days were mild and wet.

April. Warm and wet becoming cool and dry later.

The first thirteen days were dominated by vigorous Atlantic weather systems and rain was recorded on every day although quantities were often relatively small. The month's wettest day was the 6th when 12.00mm was collected at Parkhead. Pressure began

to rise in a strong cold NW airstream on the 13th and 14th and over the next four days remained relatively high. Temperatures rose very quickly, the minimum at Parkhead falling to only 9.0°C on the 16th (4.2°C at Carim) and the maximum reaching 20.0°C (13.4°C at Carim) on the 18th. As an anticyclone became established to the north-west cold air moved southwards over Scotland on the 19th when the maximum temperature at Parkhead was 12.3°C in contrast to the previous day. Winds remained NW-NE for the remainder of the month. A front moving south-eastwards across Scotland on the 28th brought heavy snow showers which eventually turned to rain. The maximum temperature at Parkhead on the 28th was only 5.3°C (2.3°C at Carim).

May. Cool and generally damp.

The first three days were cool as winds remained in the north-west. A complex area of low pressure persisted over Britain until the 6th bringing cloudy weather with poor visibility but no rain. As pressure rose the skies cleared giving two bright sunny days on the 7th and 8th. In contrast, a shallow low and associated weak fronts moved north-westwards from the Continent on the 9th bringing dull weather with drizzle. Pressure rose again on the 10th and the 11th and 12th were sunny but cool, a late frost occurring locally on the 12th. Complex lows affected Scotland until the 19th and the weather was generally dull with occasional rain. A ridge of high pressure extended south-eastwards on the 20th and 21st bringing an easterly wind and slightly fresher weather. Vigorous Atlantic depressions approached Britain on the 22nd and remained in the vicinity until the 27th. The weather was wet and windy 15.2mm being recorded at Parkhead (22.5mm at Carim). Severe thunderstorms and large hail occurred in England on the 26th. An anticyclone moved northwards into Britain on the 28th and the last four days were sunny and increasingly warm. The maximum temperature on the 31st reached 20.6°C at Parkhead (17.0°C at Carim).

June. Cool and wet.

Pressure remained high for the first three days and the weather was sunny and warm. The maximum temperature reached 22.3°C at Parkhead on the 3rd (19.1°C at Carim). The weather patterns became more unsettled on the 4th as a thundery trough moved in from France, but Scotland remained dry. A cold front moved southwards across Scotland on the 5th and the next four days were cool with winds from NE-NW. A further Atlantic depression approached Britain on the 10th and had moved into the North Sea by the 12th but amounts of rain were generally small. As pressure increased to the west of Ireland, Scotland came into a cold northerly

airstream on the 13th and 14th. The minimum temperature at Parkhead on the 14th was only 2.2°C (1.0°C at Carim). An anticyclone over Scotland brought two sunny but cool days on the 15th and 16th but further Atlantic depressions and associated fronts brought changeable weather until the 23rd. A shallow low became stationary over northern Scotland resulting in two dull wet days on the 24th and 26th. Further Atlantic frontal systems brought changeable weather for the remainder of the month.

July. Cool and wet; brief warm spells.

As high pressure retreated eastwards into the Baltic and was replaced by another extending north-eastwards across Britain, the weather in central Scotland was warm until the 6th, reaching 25.0°C at Parkhead on the 5th. Cloud amounts were, however, high and rain fell on the 3rd, 4th and 5th. A small Atlantic depression crossed Scotland on the 7th bringing cooler conditions and slight rainfall after which the weather improved for three days in a cool WNW airstream. After the 10th, for most of the remainder of the month, Scotland experienced dull wet and windy weather from a succession of vigorous depressions, while the weather south of the border was relatively warmer and drier. The weather became oppressively hot on the 25th, the temperature reaching 23.5°C at Parkhead. The 26th dawned misty and cool but torrential rain with thunder began at mid-day and peristed for the next 26 hours. The 24hr total (09-09) for the 26th was a remarkable 65.6mm which is approximately 135% of the 1972 – 84 average for July. Severe flooding was widespread. The wet weather broke briefly on the 30th and 31st which were bright and sunny.

August. Cool and very wet.

A procession of vigorous Atlantic depressions dominated the weather for the whole of the month. Winds were frequently fresh to strong SW-NW but reached gale force 8 at Carim only once, on the evening of the 27th. There were a few milder sunny interludes the most notable being between the 4th and 6th, and 17th and 19th. The month's highest maximum at Parkhead, 19.9°C, was reached on the 17th as pressure rose briefly in a short-lived ridge of high pressure. The wettest period of the month occurred between the 13th and 15th with a 72hr total of 55.3mm at Parkhead (79.5mm at Carim) which resulted from a depression which developed in the south-western approaches and deepened as it travelled northwards into the Irish Sea. While central and western Scotland received in excess of 200% of their usual August rainfall, parts of eastern and south-eastern England had less than average.

September. Cool and exceptionally wet in Scotland.

For much of the month the weather patterns remained similar to those experienced during August. Rainfall in central Scotland was again more than 200% of the average while parts of eastern England received less than 20%. The first five days were generally cool and changeable but as high pressure became established over south-western England on the 6th, the weather became dull with occasional light rain until the 9th. As the high drifted E-NE the weather improved and the 10th and 12th were both warm and sunny. However, as an extensive area of high pressure became established over southern Europe, which periodically embraced southern England, Scotland was brought into a strong wet westerly air-stream. Rain was registered on each day between the 13th and 22nd and winds were fresh to strong south-westerly. Gales occurred on the 14th. Intense cyclonic rainfall on the 18th resulted in a collected total (24hrs) of 44.2mm at Parkhead but in excess of 80mm elsewhere, in western Scotland. As pressure began to increase from the south-east, the weather began to show signs of improvement after the 23rd, although it remained rather dull. There were sunny periods between the 24th and 29th although each day started dull with poor visibility. Daytime temperatures managed to reach 20°C at Parkhead on the 27th. Pressure began to fall quite quickly on the 29th as high pressure retreated eastwards. A strong south-westerly airstream and active frontal systems affected Scotland on the 30th. Heavy rain in a strong south-westerly wind began in the early evening and by 0900 next day 42.1mm of rain had fallen at Parkhead (56.5mm at Carim). The River Allan overtopped its banks causing severe flooding in parts of Bridge of Allan. In Glasgow, September 1985 was the wettest month since records began in 1868.

October. Warm and wet at first, becoming cool and dry.

A complex area of low pressure to the north-west of Scotland brought strong southerly winds and intermittent rain over the first seven days. The wettest day during this period was the 2nd with 12.7mm recorded at Parkhead (15.0mm at Carim). As pressure began to increase over southern England the winds over Scotland changed to a cool showery westerly on the 8th and 9th. As an intense depression crossed Scotland on the 10th winds reached gale force SSW in the evening. This, the last rainfall event of the month, produced only 3.1mm at Parkhead (8.0mm at Carim). An anticyclone moved northwards into Britain on the 11th and pressure remained high for the remainder of the month. Visibility became poor and the first local ground frosts occurred on the 12th. Early morning fog occasionally cleared to give some pleasantly sunny weather, the warmest day of the month being the 14th (18.6°C at Parkhead). As

the anticyclone retreated westwards on the 18th the wind freshened northerly for a short while, and visibility improved behind a southwards moving cold front. The anticyclone drifted eastwards again on the 19th and by the 21st lay over eastern Europe, moving back to Shetland by the 26th. For much of this period the visibility was again poor with occasionally thick fog. Air temperatures in the cold continental air were low and ground frosts occurred in sheltered areas of Scotland. The anticyclone moved south then west/north-west after the 26th bringing in much clearer Atlantic air. Locally dense early morning fog on the 30th cleared in a freshening northerly wind.

November. Cold with frequent rain or snow.

While pressure remained high to the west of Britain for the first two days winds were fresh north-westerly and night-time temperatures fell very sharply under clear skies. As high pressure extended westwards out of Europe winds changed to southerly and air temperatures improved very quickly late on the 3rd. A complex low to the north-west of Britain brought continuous moderate rain on the 4th. The weather for the next five days was unsettled but generally milder, the minimum at Parkhead on the 9th being 9.0°C . As pressure increased to the west on the 9th the wind became northerly and temperatures began to fall. Winds remained in the north-west until the 12th when the ridge of high pressure moved eastwards to give two calm cold days. The ridge retreated eastwards on the 14th as Atlantic fronts moved in from the west bringing rain and milder air. A ridge of high pressure began to extend south-westwards from Scandinavia on the 17th which dominated the weather for the next six days. The wind moved from south to north-east bringing in cold snow-laden air from Europe although amounts of snowfall in central Scotland were slight. The ridge began to break on the 23rd and an area of high pressure moved westwards to Iceland. A cold front moved southwards across central Scotland on the 24th bringing cold clear arctic air. A complex low developed over the North Sea on the 26th which moved westwards over Britain to bring four days of dull and exceptionally cold weather with snow showers, and patches of freezing fog. As fronts approached from the south-west during the 30th wind became mild southerly in marked contrast to the 29th which had a maximum temperature of 1.4°C and a minimum of -7.6°C at Parkhead (-1.8°C and -7.2°C at Carim). Heavy rain began in the late evening and by 0900 on December 1st 40.5mm had fallen at Parkhead, nearly half of the month's total.

December. Mild and wet, becoming cold later.

Over the first four days an area of low pressure over the central

Atlantic maintained a mild and very wet south-westerly airstream over Scotland. The low deepened off the west coast on the 5th and the wind veered westerly. As a shallow low became slow moving over Northern Ireland the 6th and 7th were very dull and rain fell in a freshening easterly wind. Above 200m this fell as snow. The low moved very slowly across Scotland and filled on the 8th and 9th which were misty and cold. The overnight temperature between the 9th and 10th fell to -5.1°C at Parkhead before the wind began to freshen from the west as milder weather moved in from the Atlantic. A deep depression passing to the north of Scotland on the 12th brought heavy rain and gale force southerly winds in the late afternoon. As an anticyclone became established over central France on the 13th Britain was brought into a mild and wet south-westerly airstream until the 20th when a vigorous Atlantic system moved in from the west. Heavy rain fell in a strong SSW wind which reached gale force 9 in the early hours of the 21st. The 22nd and 23rd remained dull and wet but by the 24th, a slow moved to the south-west of Ireland, the winds changed to the north-east and became fresh to strong. As low pressure became established over the English Channel and Scandinavia by Christmas Day Scotland was brought into a bitterly cold but relatively dry northerly airstream until the 30th. Daytime temperatures on the 28th reached only 0.4°C at Parkhead (-3.8°C at Carim) and fell to the month's lowest at -7.5°C early on the 30th. Pressure began to fall on the 30th as Atlantic systems approached from the west. Fronts moving north-eastwards across Scotland brought a fresh easterly wind and snow on the 30th which had turned to rain by the 31st.

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. Data appear occasionally in the Journal of Meteorology.

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 to the
ruined Carim Lodge. Surrounded by open moorland.

Autographic recording. The station is visited on Mondays. The site was snowbound for only a few days in January. The autographic raingauge failed on several occasions and it will be necessary to replace it with a monthly storage gauge, and a new tipping bucket gauge linked to a solid-state logging system. The Automatic Weather

Station failed during the first part of the year which was due principally to power supply problems (see Notes : 3).

CLIMATOLOGICAL AVERAGES

Climatological averages are usually calculated for periods of 30 years (temperature) or 35 years (rainfall). This is because, in Britain, there is an in-built year to year variation in all the parameters which we use to define our climate. Averages based on a smaller number of years may be unduly biased by one extreme value. As there are only 15 years of records for Parkhead and 5 for Carim the averages listed in Tables 5 and 6 should be used with caution.

NOTES

1. The Summer of 1985

During the months July to September Stirling (Parkhead) received 529.6mm of rainfall which represents 265 per cent of the average (1972-84) for these months and 59 per cent of the average annual total. While much of Scotland had a wet summer the situation was probably at its worst in central and western areas. Wind speeds were also generally above normal and air temperature well below the seasonal average. However, the main problem was not simply that of a large amount of rain combined with low temperatures but rather the persistence of dull wet weather. Over the three months, daily rainfall totals of 0.2mm or more were recorded on 68 out of the 92 days. The longest sequence of rain-free days was only *three*. It was this persistence which provided one of the main problems for farmers and which was so depressing for residents and visitors in Scotland.

The question 'why' has already been asked many times and no doubt there will be many different answers. The analysis of barometric pressures and wind direction in Table 7 provides us with an indication of the possible weather patterns which caused the problem. In comparison to the dry summer of 1984, barometric pressures were considerably lower during July and August 1985 and winds were more frequently from S – SW. These are indicative of the higher frequency of vigorous Atlantic weather systems with their associated fronts.

Whilst discussing rainfall it is worthwhile referring back to the comments in Bulletin No.5 (Section D.4) relating to long term trends in annual totals. The trends observed in the data up to 1983 have been continued in 1984 and 1985 (Figure 3) so since 1972 we have seen a 40 per cent increase in annual rainfall in Stirling.

2. Effects of Elevation

During 1985 the average difference in daily maximum air temperature between Stirling (Parkhead) and Ochil Hills (Carim) was 3.2°C which is equivalent to a lapse-rate of $10.9^{\circ}\text{C}/1000\text{m}$. The average difference in minimum temperature was 1.4°C , a lapse-rate of $4.9^{\circ}\text{C}/1000\text{m}$. A difference in mean temperatures of 2.3°C (Table 2) represents a lapse-rate of $7.8^{\circ}\text{C}/1000\text{m}$. The marked seasonal change in lapse-rate from a maximum in early summer ($9.4^{\circ}\text{C}/1000\text{m}$) to an autumn and winter minimum ($6.1^{\circ}\text{C}/1000\text{m}$) has been observed in several other locations (Harrison 1974). The difference in annual precipitation between the two stations was 611.8mm giving a gradient of 2.06mm/m for 1985 and a five-year average annual gradient of 1.81mm/m.

HARRISON, S. J. 1974. Problems in the measurement and evaluation of the climatic resources of upland Britain. *In* TAYLOR, J. A. Climatic Resources and Economic Activity. David and Charles.

3. Automatic Weather Station

The Didcot Automatic Weather Station (AWS) and CR21 logging system have provided some problems during 1985 and data for much of January, March and May were lost. The principal problem was one of power supply to the storage unit which appears to have a maximum reliable operational time of less than three weeks. From June onwards there was 100 per cent data retrieval although the relative humidity/temperature sensor failed early in the year and was not replaced until October 7th. Maximum and minimum temperatures (09 – 09 hrs) were checked against conventional observations during August and re-checked in December. On both occasions there was close agreement (Figure 4) but the characteristics of the new sensor fitted in October were clearly different.

4. Stream Temperatures : Howietoun Fish Farm

During 1985 temperatures were measured in the Auchenbowie Burn near Stirling with the object of determining the characteristics of diurnal temperature variation in a turbulent upland stream, and the nature of heat exchanges with the atmospheric boundary layer. Two monitoring stations were established, at the outfall of Loch Coulter (NS 761865) and Howietoun Fish Hatchery (NS 784877), and a small weather station was constructed at the latter. The burn falls from 213m to 96m over a distance of 2.5km. Temperatures were sampled hourly using a Grant Miniature Temperature Recorder which records on pressure paper charts. There is a characteristic difference in amplitude and phase in the diurnal temperature waves for air and water (Figure 5). Stream temperatures exhibit more

subdued diurnal fluctuation and maximum temperatures are reached an hour or more later than in the overlying air.

5. Airflow over a Barley Crop

An MSc thesis entitled "Physical aspects of growing barley crop and implications for energy exchange" was submitted in November 1985 by Mr Aston Chipanshi (awarded December 1985). The study involved the monitoring of wind velocity, air temperature and humidity profiles above a barley field on the campus of the University of Stirling, during five stages . . . bare earth, active growth (x3) and ripened crop. There was a relationship between wind speed and the aerodynamic characteristics of the crop. In the active growth stages most available energy was consumed in evapotranspiration while the drying out of surfaces in the bare earth stage, and limited transpiration from the ripened crop, increased the contribution of sensible heat flux.

Having successfully completed his studies, Aston has now returned to the University of Zambia.

6. Weather Station Exposure Project

Local shelter features may have a considerable influence on the minimum temperatures recorded at weather stations. Methods of assessing site shelter based on the interpretation of topographic maps can not evaluate successfully the nature of local shelter from hedges, trees and buildings. A more effective method is currently being developed at Stirling University. This method is based on the inclination of immediate horizons relative to the weather station and the derivation of 'sheltergrams' (Bulletin No. 5 Section D.5). A pilot study using 40 stations from the Climatological Observers Link lists has already been undertaken and during 1986 this will be extended to cover Met. Office Climatological stations.

It is expected that the new method of site assessment will not only be a major aid to standardisation of weather stations but will also lead towards the correction of minimum temperature observations for local shelter bias. The project is being supported by a small grant from the Royal Meteorological Society.

7. Scottish Environmental Hazards Unit

A unit is in the process of being established in the Department of Environmental Science at the University of Stirling which will offer a range of consultancy and other services. The principal aims are to heighten awareness of the social and economic impact of climatic conditions in Scotland, and to offer site-specific investigations of hazard risk. The unit is managed jointly by Dr S. J. Harrison (Stirling) and Professor K. Smith (University of Strathclyde).

8. Undergraduate Dissertations

JOYCE CARLTON: Temperatures in and evaporation loss from a small hill stream: Auchenbowie Burn, Stirling

IAN SIMPSON: The effect of fauna on rapid non-diffusive temperature changes in estuarine muddy sediments Kincardine-on-Forth.

CLAIRE TOPALIAN: Temperature distribution over intertidal mudflats Forth Estuary.

9. Publications

HARRISON, S. J. 1984. Temperature observations in Chichester Harbour, Southern England. *Weather* 39, 166-73.

HARRISON, S.J. and PHIZACKLEA, A.P. 1985. Tide and the climatology of fog occurrence in the Forth Estuary *Scottish Geographical Magazine* 101, 28-36.

HARRISON, S. J. 1985. Heat energy transfer over intertidal surfaces. In: Cracknell AP *Remote Sensing Applications to Coastal Processes* (slides and commentary) NRSC Farnborough.

HARRISON, S. J. 1985. Heat exchanges in muddy intertidal sediments: Chichester Harbour, West Sussex. *Estuarine Coastal and Shelf Science* 20, 447-90.

HARRISON, S. J. 1985. *Climatic Hazards in Scotland* Proceedings of RSGS/RMetS Symposium, Geobooks. Norwich.

HARRISON, S. J. and PHIZACKLEA, A. P. 1985. Seasonal changes in heat flux and heat storage in the intertidal mudflats of the Forth Estuary, Scotland. *Journal of Climatology* 5, 473-85.

10. Reference Material

The Microclimatology Laboratory (4B125) in the Cottrell Building of the University contains an increasing amount of reference material including climatological data (local, national and global), synoptic weather data, and scientific reports. For a full list contact Dr Harrison in the Department of Environmental Science.

	Mean Maximum °C	Difference from Average	Highest Maximum	Lowest Maximum	Mean Minimum °C	Difference from Average	Highest Minimum	Lowest Minimum	Mean °C	No. days ≤ 0°C	Mean Soil Temp. °C (0.3m at 09)
January	3.6	-2.3	9.0	-1.8	-1.8	-1.9	4.4	-9.5	0.9	23	1.1
February	5.7	-0.7	10.6	0.3	-0.2	-0.8	7.3	-9.0	2.8	15	0.8
March	7.6	-1.0	11.3	2.1	1.0	-0.6	4.7	-4.3	4.3	11	3.5
April	10.9	-0.8	16.5	5.3	3.8	+0.7	8.1	-1.5	7.4	3	7.6
May	14.6	-0.4	20.6	10.0	6.1	+0.7	12.4	0.3	10.4	0	11.2
June	16.1	-1.3	22.3	11.5	7.6	-0.6	11.3	3.5	11.9	0	14.7
July	18.3	-1.5	25.0	14.6	11.5	+0.7	14.5	6.9	14.9	0	16.3
August	16.6	-2.6	19.9	13.1	9.6	-0.5	12.9	4.2	13.1	0	15.3
September	15.1	-0.8	20.0	10.0	8.9	+0.5	13.0	3.9	12.0	0	13.3
October	13.1	+0.4	18.6	9.0	6.6	+1.1	15.2	0.1	9.8	0	11.1
November	6.3	-2.5	11.2	-1.4	-0.4	-2.9	7.0	-7.6	2.9	19	4.7
December	7.4	+0.5	13.6	0.4	2.4	+1.1	9.3	-7.5	4.9	8	4.4
YEAR	11.3	-1.1	25.0	-1.8	4.6	-0.2	15.2	-9.5	7.9	79	8.7

Table 1 Monthly Temperatures (Stirling, Parkhead) 1985

	Mean Maximum °C	Difference from Average	Highest Maximum	Lowest Maximum	Mean Minimum °C	Difference from Average	Highest Minimum	Lowest Minimum	Mean °C	Difference Parkhead to Carim	No. days < 0°C
January	1.0	-1.7	6.6	-3.7	-2.7	-1.6	2.8	-11.0	-0.9	1.8	28
February	2.5	-0.3	7.2	-3.8	-1.4	-0.3	5.0	-9.2	0.5	2.3	16
March	4.2	-1.0	8.0	-1.5	0.8	-1.2	4.7	-7.1	1.7	2.5	15
April	8.2	-0.5	13.4	2.3	2.3	+0.9	6.9	-2.8	5.2	2.2	6
May	11.5	-0.1	17.0	7.5	4.6	+0.4	11.0	-1.0	8.0	2.4	1
June	12.2	-1.4	19.1	8.4	6.0	-1.3	9.6	1.0	9.1	2.8	0
July	14.7	-2.0	21.2	11.7	9.4	0.0	13.0	6.2	12.1	2.8	0
August	13.4	-2.8	16.0	11.2	8.2	-1.2	11.2	5.8	10.8	2.3	0
September	11.5	-0.9	16.3	6.0	7.2	-0.2	12.2	2.9	9.3	2.7	0
October	10.2	+1.1	16.2	5.6	5.6	+1.1	10.0	1.0	7.9	1.9	0
November	3.4	-2.6	9.6	-2.0	-1.5	-3.3	5.0	-7.7	1.0	1.9	22
December	4.6	+0.8	10.0	-3.8	0.9	+0.9	8.2	-8.7	2.7	2.2	12
YEAR	8.1	-1.0	21.2	-3.8	3.1	-0.5	13.0	-11.0	5.6	2.3	100

Table 2 Monthly Temperatures (Ochil Hills: Carim) 1985

	Total Precipitation mm	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	48.7	47.8	47.8	15.1	21st	12	10	7	5
February	12.0	21.4	38.4	4.3	1st	8	8	5	0
March	52.3	66.4	47.7	11.4	3rd	18	16	8	5
April	75.5	206.3	68.9	12.0	6th	19	19	15	7
May	47.0	80.2	70.9	15.2	23rd	15	13	7	3
June	45.8	85.6	73.0	6.9	14th	20	17	13	3
July	171.1	299.1	102.2	65.6	26th	22	21	18	11
August	171.9	268.2	123.2	26.4	14th	27	26	22	11
September	186.6	177.5	132.5	44.2	18th	22	21	17	9
October	40.6	58.2	121.3	12.7	2nd	10	10	10	2
November	85.6	78.1	115.5	40.5	30th	16	15	9	4
December	140.9	146.3	118.8	15.0	20th	26	25	21	11
Year	1078.0	118.8	—	65.6	26th/27th	215	201	152	71

Table 3 Monthly Precipitation (Stirling: Parkhead) 1985

	Total Precipitation mm	Percent. of Average	Percent. of Accum. Average	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	320 350
January	47.8	34.3	34.3	-	-	-	-	-	-	-	-	-	-	-	-
February	55.6	78.2	49.1	2.7	6.3	10.7	15.6	12.9	11.2	15.2	15.2	7.1	0.9	1.3	0.9
March	106.4	73.0	58.9	-	-	-	-	-	-	-	-	-	-	-	-
April	106.9	206.0	77.6	11.7	10.7	2.9	0.0	5.8	2.9	12.6	15.5	7.8	7.8	6.8	15.5
May	71.6	75.4	77.2	-	-	-	-	-	-	-	-	-	-	-	-
June	88.6	115.7	82.3	7.8	6.6	6.6	7.8	12.7	4.5	9.4	14.3	13.9	9.0	3.7	3.9
July	199.7	280.1	103.9	3.2	7.6	5.6	1.6	3.6	7.2	1.4	32.9	14.9	6.8	1.6	0.0
August	317.2	272.5	129.5	0.8	1.2	1.6	2.8	6.9	15.7	21.8	28.6	12.1	2.8	1.6	4.2
September	267.7	132.9	130.2	5.0	10.8	2.5	6.3	5.4	6.3	18.8	22.1	12.5	5.4	2.1	2.1
October	83.8	50.6	118.6	1.6	3.2	4.9	3.6	5.7	13.4	33.2	23.9	7.3	2.0	0.0	1.2
November	117.4	86.8	115.2	2.6	8.6	8.2	6.5	14.7	11.6	12.9	8.6	4.3	7.8	6.9	7.8
December	(227.1)	129.1	116.9	1.2	6.9	6.0	4.8	6.9	9.7	27.4	25.8	8.1	1.6	0.8	0.8
Year	1689.8	116.9	-												

Table 4 Monthly Precipitation and Wind Direction (Ochil Hills: Carim) 1985

November	Maximum Temperature °C	Minimum Temperature °C	Soil Temperature (0.3m at 09) °C	Total Precipitation mm
January	5.9	0.1	2.8	101.9
February	6.4	0.6	2.6	56.2
March	8.6	1.6	4.4	78.8
April	11.7	3.1	7.6	36.6
May	15.0	5.4	11.4	58.6
June	17.4	8.2	14.6	53.5
July	19.8	10.8	16.6	57.2
August	19.2	10.1	16.3	64.1
September	15.9	8.4	13.6	105.1
October	12.7	5.5	10.1	89.8
November	8.8	2.5	6.1	109.6
December	6.9	1.3	3.7	96.3
Year	12.4	4.8	9.2	907.7

Table 5 Climatological Averages for Stirling (Parkhead) 1971-1985.

	Maximum Temperature °C	Minimum Temperature °C	Total Precipitation mm
January	2.7	-1.1	139.3
February	2.8	-1.1	71.1
March	5.2	0.4	145.8
April	8.7	1.4	51.9
May	11.6	4.2	94.9
June	13.6	7.3	76.6
July	16.7	9.4	116.4
August	16.2	9.4	116.4
September	12.4	7.4	201.4
October	9.1	4.5	165.6
November	6.0	1.8	135.3
December	3.8	0.0	175.9
Year	9.1	3.6	1445.6

Table 6 Climatological Averages for Ochil Hills (Carim) 1981-85

Climatic data (Parkhead)			Wind direction (Carim)											
			N	-NE-	E	-SE-	S	-SW-	W	-NW-				
Mean	Mean s.l		350°	020°	050°	080°	110°	140°	170°	200°	230°	260°	290°	320°
Air	Rain		010	040	070	100	130	160	190	220	250	280	310	340
Temp	mm													
°C	mb													

Table 7 Climatological Data for Summers 1984 and 1985

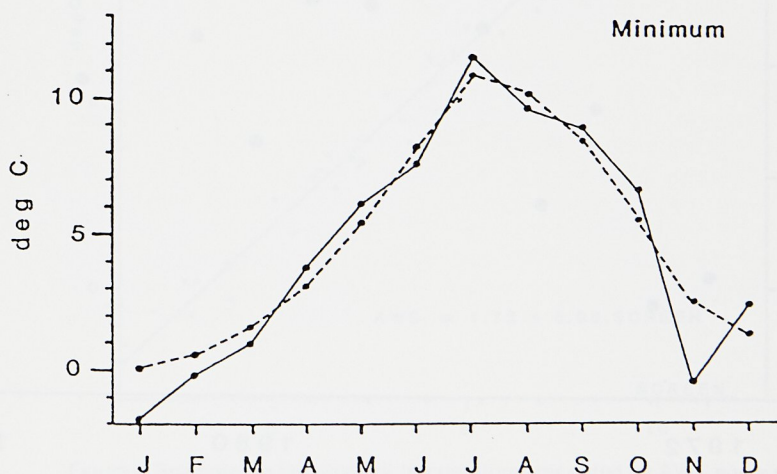
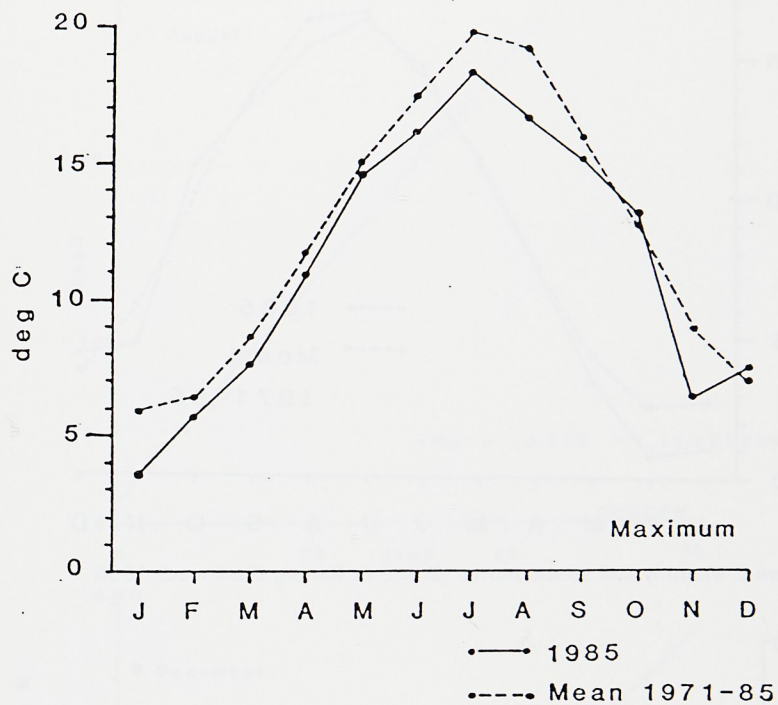


Figure 1 Monthly maximum and minimum air temperature at Stirling (Parkhead) 1985

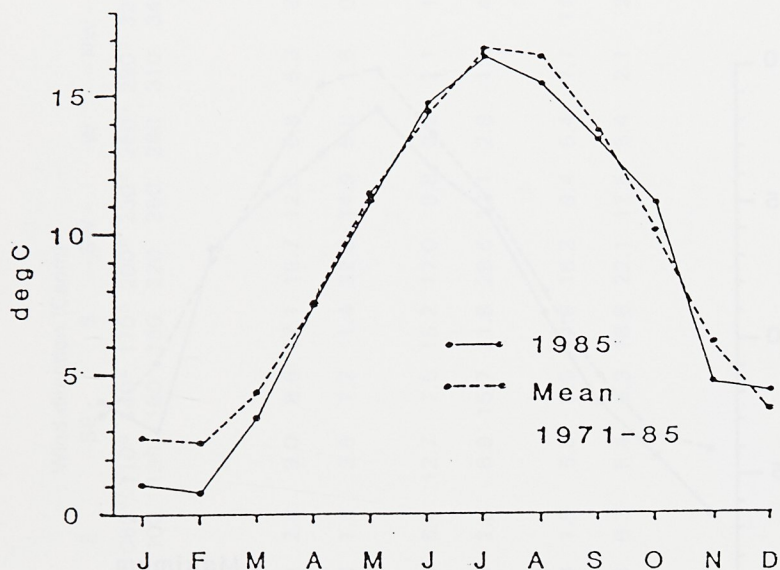


Figure 2 Monthly soil temperatures (0.3m) at Stirling (Parkhead) 1985

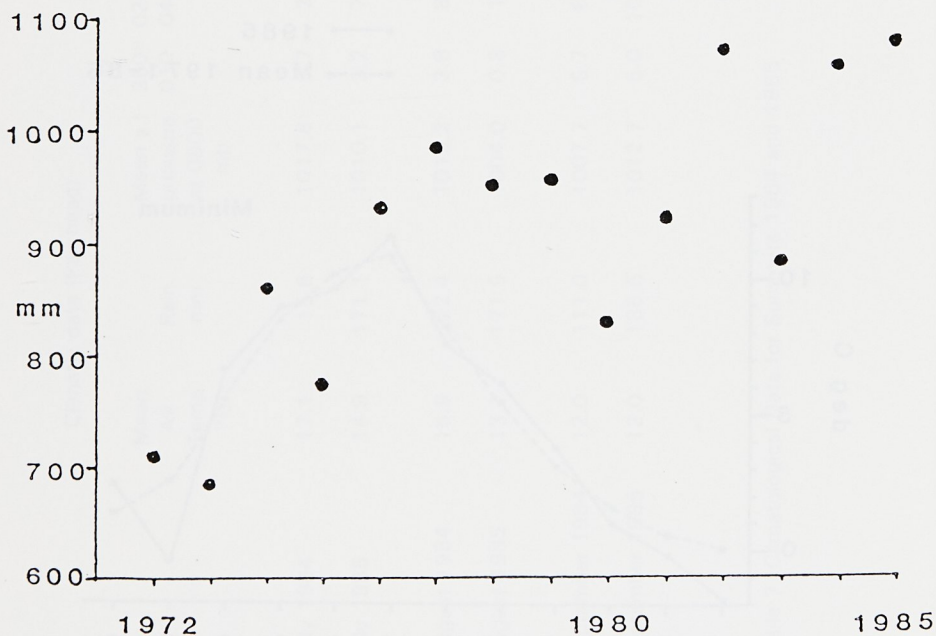


Figure 3 Trend in annual precipitation at Stirling (Parkhead) 1972-85

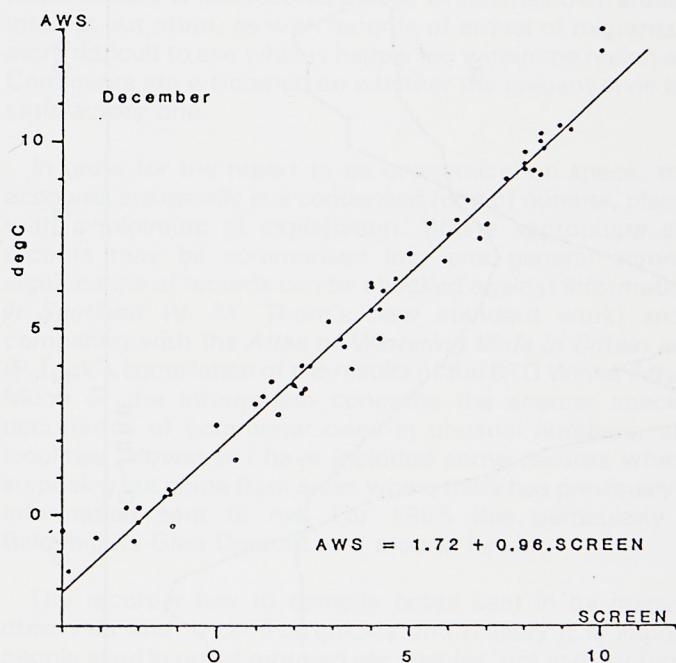
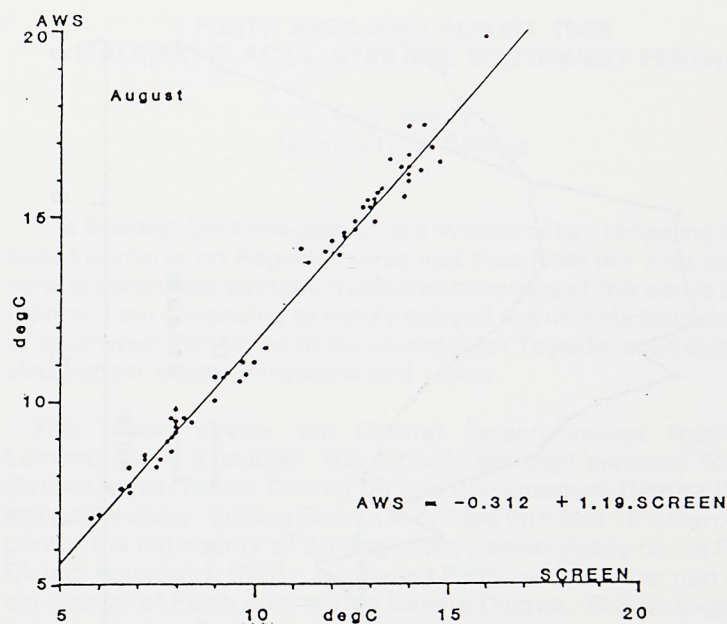


Figure 4 Relationship between air temperatures recorded by AWS and a standard thermometer screen

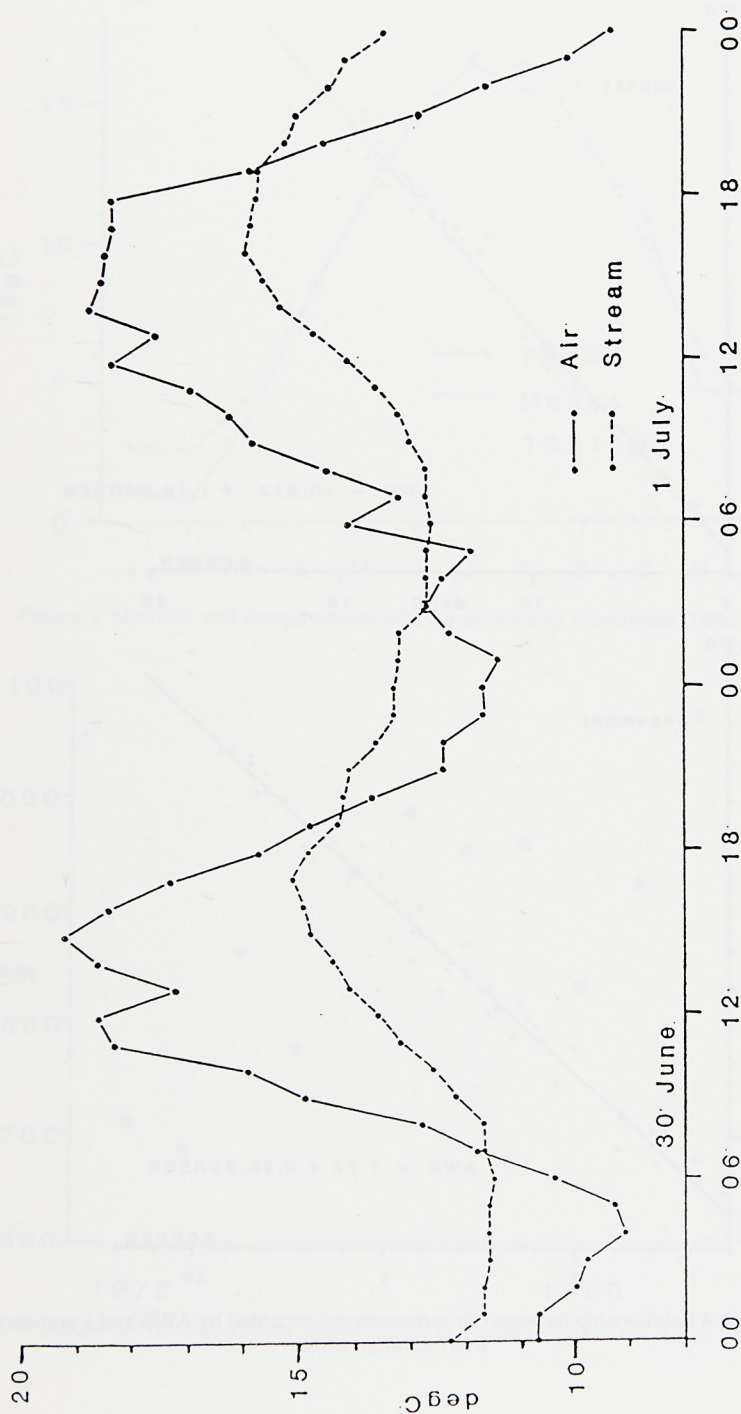


Figure 5 Stream and air temperatures at Howietown fish hatchery

**FORTH AREA BIRD REPORT 1985
(FALKIRK, CLACKS, STIRLING, SOUTHWEST PERTH)**

C. J. Henty
University of Stirling

The Scottish Ornithologists Club's system of bird recording is now based primarily on Regional areas and thus from our own point of view is consistent with the traditional coverage of this series of bird reports. I am continuing to send a copy of the records from the area of southwest Perthshire to the recorder for Tayside, such data may also appear in any Perthshire bird report.

This report covers the Central Region except that Loch Lomondside is excluded. The records are kept separate for four distinct areas. Falkirk District (F) and Clackmannan District (C) are self explanatory. Stirling District is divided into two : S – the central part of the old county of Stirling (from Carron Valley to the Falkirk District boundary); SWP – southwest Perth, which is that part of the old county of Perth now within Stirling District. This arrangement helps readers to find records that lie within their own areas of special interest but often, as with records of arrival of migrants, makes it more difficult to see what is happening within the region as a whole. Comments are welcomed on whether the present style is the most satisfactory one.

In order for the report to be economical on space, the species accounts are usually in a condensed form of number, place and date with a minimum of explanation. Where appropriate a group of records may be summarised into one general comment. The significance of records can be checked against information in *Birds in Scotland* (V. M. Thom's new standard work) and also by comparing with the *Atlas of Wintering Birds in Britain and Ireland* (P. Lack's compilation of the results of the BTO Winter Atlas Survey). Much of the information concerns the scarcer species or the occurrence of commoner ones in unusual numbers, seasons or localities. However I have included some records which are not surprising but come from areas where there has previously been little information sent to me. For 1985 this particularly concerns Balquhidder-Glen Dochart and around Falkirk.

The recorder has to compile notes sent in by many different observers and to do this quickly and reliably it is important that people send in notes grouped per species, not in diary form in order of date. Please put your name and the year at the top of every sheet

and send in the accumulated notes for a year as soon as possible after the end of the year, indeed where many records are involved it would greatly help if the bulk of them were sent off in November. If notes do not reach me by mid-February – at the very latest – it may well be impossible to include them in either this local report or the yearly summary sent to the editors of the Scottish Bird Report.

I would like to receive and publish more information on behaviour and on the particular habitats in which birds have occurred, so please do not feel restricted to details of number and date. It may be important to mention a very specific locality (eg a farm or hill) but do include an indication of the general area – eg Monachylemore (Balquhiddier).

One new species has been added to the area list this year following the discovery of an immature female Two-barred Crossbill amongst Common Crossbills at Carron Valley Forest. There have been reports also of an adult male of this species in the same area but these have not so far been accepted by the Scottish Rare Birds Committee.

The following observers contributed to the records published here:

K.P. Anderson, R.S. Atkins, P.W. Atkinson, W.R. Brackenridge, R. Broad, A.W. Brown, E.D. Cameron, R.L. Calder, M. Feltham, I. Findlay, C.J. Henty, A. Hogg, D. Irving, R. Jones, J. Kirk, Mrs P. Lee, D.W. Napier, H. Robb, R. Shand, A. Stewart, P. Stirling-Aird, D. Thorogood, A.D. Wood, A. Young.

Falkirk and Clackmannan Districts are indicated by the marginal F and C, S refers to the old Stirling county part of Stirling District and SWP refers to the Perth part of Stirling District.

SYSTEMATIC LIST

RED-THROATED DIVER

F 6 Kinneil 20th January (DMB), 3 Blackness 15 April (AS)

SWP 1 Lake of Menteith 16th February (RB)

BLACK-THROATED DIVER

SWP 1 on a western loch 17th March and 4th May (DT), brood of 2 hatched, 1 fledged, 1 died probably due to disturbance (RB)

LITTLE GREBE

- F 3 Kinneil pond 10th March, 2 through year, ? bred (RS)
- S 1 Fauchlin Dam 8th July, no evidence breeding (ADW AY), 11+ brood of 2 Airthrey late August (AWB)

GREAT CRESTED GREBE

- F 90 Kinneil 25th August (DT)
- S Carron Valley Reservoir 6 on 23rd March (DT), 4 pairs and 2 young reared (ADW AY), 6 on 26th September (ADW). Pair Loch Coulter (WRB)
- SWP Lake of Menteith 2 pairs, 1st on 16th February 13 (2 immature) on 11th August (WRB DT RB). Loch Watston 2 on 17th March, 2 (1 immature) on 11th August (DT). 1 Loch Mahaick 30th April (WRB).

RED-NECKED GREBE

- SWP 1 Loch Watston 4th and 5th March, assuming breeding plumage (MF DI CJH)

FULMAR

- F 16 W along Forth, returned E, 17th May (WRB)

GANNET

- S Juvenile grounded in Bridge of Allan 9th October, released Helensburgh (RB)

CORMORANT

- 256 on Forth Estuary 21st January

GREY HERON

- C 1 dead Tillicoultry 11th February – ringed Dollar 7th August 1984 (per C Page)
- S Reported nesting Castlerankine Glen (per WRB) 15 Carron Valley Reservoir 23rd December (ADW AY)
- SWP 11 pairs Lake of Menteith, 10 pairs Blairdrummond Moss, 1 dead Ashfield, 6th April ringed Devilla Forest 1984 (WRB)

MUTE SWAN

- S Brood of 6 Airthrey 26th August (AWB)

WHOOPEE SWAN

- F 3 Grangemouth 11th November (DT)
- C 1st Gartmorn 17th October (IF), 1 Cambus 26th October (WRB)
- S Carron Valley Reservoir 15 on 12th January, 6 on 27th March (DT AW AY), 4 on 15th December (PWA), 4 Stirling on 24th November (DT). 17 Flanders Moss 23rd November (RLC)
- SWP Lake of Menteith 12 on 5th January and 16 on 26th March (DT). 3 Loch Katrine 24th February (RB). Loch Achray 10 (3 juveniles) on 16th February and 10 adults on 16th March (DT). Loch Dochart 14 on 1st and 25 (4 juveniles) on 5th

March, 20 (2 juveniles) on 1st November (JK DT). Ashfield 8 on 15th December (WRB) Thornhill/Kippen (W. Frew) 45 on 16th March, 6 on 5th May, 10 on 9th November, mainly family parties until late November (DT), 113 on 10th December (WRB), 124 on 24th (RJ) and 140 on 26th (EDC)

PINK-FOOTED GOOSE

- F 200 Muiravonside 9th December (seen from 2nd December) (DWN)
- S 33 on Forth Cambus-Kincardine Bridge on 17th March (WFC), 5750 on carse Kippen-Stirling 16th March (DT, J. Gearing), 75 and 70 over Killearn 24th September (RB)
- SWP 4000 Blairdrummond Moss 31st March (DT) 700 Thornhill and 2000 Cromlix 8th October, Lake of Menteith 3250 (roost) on 5th February (RB) and 800 on 18th November (WRB), Loch Watston 1000 on 19th October (RB)

GREYLAG GOOSE

- S 1600 Gargunnock 17th March (DT), 38 over Killearn 16th October (RB), 220 Loch Coulter 16th December (WRB), 71 Carron Valley Reservoir on 24th November (AY)
- SWP 600 Lake of Menteith 18th November (WRB)

BEAN GOOSE

- F 12 Skinflats 27th November (IF)
- S 2 Carron Valley Reservoir 29th September (AH) and 58 on 26th (ADW)

CANADA GOOSE

- C 15 Gartmorn 2nd June (IF)
- S 15 N Bridge of Allan at 16.45 2nd June (CJH), probably from Gartmorn. 11 with Whoopers at Kippen 10th December (WRB)
- SWP Pair clutch of 5 Braes of Doune 30th April. Heard over Ashfield after dusk 12th June (WRB)

BARNACLE GOOSE

- SWP 4 Blairdrummond Moss 19th January and 1 on 31st March (DT), 3 Lake of Menteith 24th February (RB) and 7th December (RSA)

BRENT GOOSE

- SWP 1 immature Loch Venachar 13th October (WRB)

SHELDUCK

- C 2 pairs Cambus April – June (WRB)
- F 12 pairs Blackness 15th April (AS), 240 Kinneil 17th February (ADW AY), 300 Skinflats 27th November (WRB), 2328 on Forth estuary on 14th December

WIGEON

- S Carron Valley Reservoir 54 on 12th January, 82 on 17th March, 28 on 26th September, 70 on 13th October, 28 on 23rd December (ADW AY)
SWP Pair Ardoch Burn 30th April (WRB)

TEAL

- C Female at Upper Glendevon Reservoir on 14th July (CJH)
F Kinneil 650 on 27th January, 800 on 17th February (ADW AY RS), 700 on 6th October (DT)
S Forth Cambus-Kincardine Bridge 161 on 20th January (WFC), 39 at Touch Reservoir on 13th January (DT), 20 Stirling 29th January (WRB), Carron Valley Reservoir 161 on 12th January, 58 on 17th March, 271 on 26th September, 335 on 13th October, 211 on 24th November, 310 on 23rd December (ADW AY)
SWP 3 pairs Cromlix in May, 2 pairs Loch Mahaick 30th April (WRB)

MALLARD

- F 780 Grangemouth 20th January (DMB). Bred Muiravonside, Callendar Park (4 broods), Kinneil Estate (DWN)
S 94 Touch Reservoir 13th January (DT), 50 Stirling 29th January (WRB), 113 Airthrey 26th August (AWB), 105 Gargunnock-Craigforth and 458 Cambus-Kincardine Bridge 17th February (WFC DT), 112 Loch Coulter 13th October (WRB)
SWP Loch Achray and Loch Venachar 166 on 13th January and 392 on 16th February (DT), Loch Watston 215 on 11th August (DT), Loch Laggan 107 on 22nd December (DT)

PINTAIL

- F Skinflats 20 on 6th January (WRB), 49 on 20th February (DWN), 7 on 27th November (WRB), Kinneil 15 on 27th January (DT)

SHOVELER

- C 2 males Gartmorn 13th October (IF)

POCHARD

- S 37 Stirling 29th January (WRB). Male at Airthrey 29th August (AWB)
SWP 18 Loch Katrine 24th February, 41 Loch Achray and Venachar 13th January (DT), 14 on Venachar 16th October (RJ)

TUFTED DUCK

- F Kincardine Bridge-Skinflats 22 on 27th November (WRB), brood of 3 at Callendar Park on 10th July (DWN)

- S 54 Stirling 29th January (WRB) and 70 on 17th February (CJH). Cambus-Kincardine Bridge 41 on 17th February (DT). 19 + 3 broods Airthrey 29th August (AWB)

SCAUP

- F 7 Bo'ness 15th February and 5 (2 males) on 5th May (DWN). 4 (1 male) Kinneil 17th February (DT). 2 Kincardine Bridge 27th November. Female at Skinflats 8th September (AH)
- C 3 females Gartmorn 23rd October (IF)
- S 4 Stirling 29th January (WRB)
- SWP Pair Kinlochard 27th April (RB)

EIDER

- F 21 Blackness 15th April (AS)

LONG-TAILED DUCK

- F 1 Skinflats pool 27th November (WRB)

GOLDENEYE

- C 31 Alloa on 2nd February and 25 on 22nd December (CJH)
- S 55 Cambuskenneth 29th January (WRB) and 110 on 17th February (CJH). 102 Cambuskenneth-Kincardine Bridge 20th January, 1st at Loch Coulter 24th October (WRB)
- F 25 Bo'ness 15th February (DWN) and 2 on 15th April (AS). Female at Muiravonside 7th and 19th January
- SWP 50 Lake of Menteith 17th March (RB) and 28 on 26th March (WRB)

SMEW

- F Male at Bo'ness 15th February (DWN). Female Grangemouth 3rd November (DT)

RED-BREASTED MERGANSER

- F 8 Bo'ness 15th February (DWN). 11 Blackness 15th April (AS)
- S Male at Gartmorn 19th January (IF)

GOOSANDER

- C 5 Cambus 21st January (IF). Pair Vicars Bridge 1st April (IF)
- S 23 Stirling 29th January (WRB), 70 at 4 sites 17th February (WFC) Gargunnock-Craigforth 17 on 13th January (WFC), Cambus-Kincardine Bridge 23 on 17th February and 27 on 17th March (WFC), 19 Loch Coulter 24th February, 18 N Third Reservoir 24th February, 13 Loch Laggan 9th February (WFC), 15 Carron Valley Reservoir 15th December (PWA)

SWP 45 Loch Macanrie 5th February (RB), female with brood of 3 at Loch Arklet 29th June (RB)

HEN HARRIER

S 1 Kippen 9th February (DT), male Loss Burn 7th July (WRB), male Earlsburn Reservoir 29th September (AH), male and female juvenile at Carron Valley Reservoir 26th September, 1 on 6th October (ADW AY), male Balfron 13th October (RB)

SWP 1 Glen Gyle 18th May (RB), pair displaying Braes of Doune 30th April, 1 high SW Lochearnhead 31st May (WRB), pair Flanders Moss 28th September (RLC)

SPARROWHAWK

F Regular Muiravonside and around Falkirk (DWN)

S Regular over Bridge of Allan, most easily detected by the 'tchik' alarm call of Starlings (CJH)

SWP Of 3 sites near Dunblane, 2 hatched 3 and 5, 1 only partly built (P SA)

BUZZARD

F 1 Muiravonside 2nd February (DWN)

C 1 Woodhill 14th February (IF)

S 1 WNW Stirling 12th October (DT)

KESTREL

F 2 young reared Muiravonside (DWN)

MERLIN

F 1 Kinneil 27th January (DT RS). 1 Bo'ness 15th February (DWN)

C 1 Gartmorn 17th November (IF)

S 1 Stirling 11th January (WRB), 1 Airthrey 4th March (CJH), 1 Kippenmuir 10th November (DT)

SWP 1 Blairdrummond Moss 17th March (DT)

PEREGRINE

Central Region 24 territories checked, 23 occupied, at least 20 pairs of which 17 were successful rearing 33+ young (per P S-A)

RED GROUSE

SWP Widespread E of Glen Beich, scarce Flanders Moss (WRB)

PTARMIGAN

SWP 1 Stuc a Chroin 29th June (WRB)

BLACK GROUSE

SWP 12 males Grainston Moor Braes of Doune 1st January (WRB)

GREY PARTRIDGE

F occasional Muiravonside (DWN)

SWP maximum 15 Ashfield (WRB)

PHEASANT

F scarce Muiravonside (DWN)

COOT

F Bred Kinneil Estate 3 young on 13th June (DWN)
SWP Lake of Menteith 17 on 16th February (RB), 43 on 23rd
March (DT). 20 Loch Watston 11th August (DT)

OYSTERCATCHER

F 90 Kinneil 17th February (DT)
S 4 pairs Carron Valley Reservoir, Nest clutch 3 at
Castlebridge NCB (ADW AY)
SWP 3 Loch Venachar 16th March, 9 Loch Watston 17th
March (DT)
Bred by Keir roundabout, fewer around Doune (WRB)

RINGED PLOVER

C 3 sites Upper Glendevon Reservoir 14th July (CJH)
S Carron Valley Reservoir 1 on 17th March, 20 pairs
(previous record 7, ADW, AY). 2 at Castlebridge NCB
26th February, 2 young reared (ADW)

GOLDEN PLOVER

SWP Pair Cromlix moor, several Glen Beich (WRB), 160
Thornhill 17th March, 400 Blairdrummond Moss 16th
March, 50 on 23rd (DT)

GREY PLOVER

F 26 Skinflats 27th November (WRB)

LAPWING

F 800 Kinneil 23rd August (WRB)
C 2 pairs Cambus pool May (WRB)
S 900 Gargunnock 27th October (DT)
SWP 1000 Drip 8th October (WRB)
2 pairs 1 young Keir roundabout (WRB)

KNOT

F 1000 Skinflats 27th November (WRB)

SANDERLING

F 1 Grangemouth 15th September (DMB)

LITTLE STINT

F 2 Grangemouth on 15th September (DMB) and 1 on
28th (RS)

CURLEW SANDPIPER

F Grangemouth 22 on 6th September, 50 on 15th and 12
on 28th (RS DMB), 4 Kinneil 6th October (DT)
SWP 1 Drip 20th September (WRB)

DUNLIN

F 1250 Skinflats 27th November (WRB)

S 2 Carron Valley Reservoir on 17th March and 6 on 4th July (ADW AY)

RUFF

F Kinneil 30th July to 6th October, maximum 13 on 25th August (DT), 23 on 31st August (RS), 17 on 15th September (DMB)

SWP 1 Drip 26th August – 20th September (WRB)

JACK SNIPE

F 1 Grangemouth 20th January (DMB)

SNIPE

C 20 Cambus 26th October, 1 pair spring (WRB)

SWP 40 Cromlix late August (WRB)

WOODCOCK

F Roding Muiravonside Country Park May/June, 1 on 11th December (DWN)

BLACK-TAILED GODWIT

F Kinneil 3 on 27th January (RS), 6 on 17th February (DT), in August 2 on 19th (RS), 3 on 23rd (WRB), 6 on 25th (DT)

WHIMBREL

F 6 Kinneil 19th August (RS)

CURLEW

F 42 NE Muiravonside Country Park 31st October (DWN)

S Carron Valley Reservoir 1 on 3rd March, 147 on 17th and 246 on 27th, 26 on 11th April, 4 pairs in summer.

SPOTTED REDSHANK

F 1 Kinneil 21st August (DMB)

REDSHANK

F 500 Skinflats 27th November (WRB)

C 2 pairs Cambus (WRB)

S 6 pairs Carron Valley Reservoir (ADW AY)

GREENSHANK

C 1 Cambus late July (WRB)

F 1 Grangemouth 6th January (WRB). Skinflats 1 on 20th January (DMB), 2 on 1st September (DT), 1 on 8th (AH). Kinneil 30th July to 6th October, maximum 3 25th August (DT), 6 on 18th August (RS)

SWP 1 at Drip 26th August and 3 on 28th (WRB)

GREEN SANDPIPER

F 1 Kinneil 18th and 19th August (RS)

WOOD SANDPIPER

C 1 Cambus 11th May (CJH)

COMMON SANDPIPER

- C 1 Cambus 14th April (WRB)
- F 1 Kinneil 20th April (RS), 7 on 18th August (RS), 9 on 25th (DT)
- SWP clutch of 4 at 2000' Balquhidder 30th June (WRB)

POMARINE SKUA

- F 1 immature Skinflats 27th November (WRB)

ARCTIC SKUA

- F 1 Kinneil 25th August (DT), 1 Skinflats 27th November (WRB)

BLACK-HEADED GULL

- S Carron Valley Reservoir — 105 pairs at 7 sites, poor season due to low water, at the roost 150 on 17th March, 1150 on 11th April and 1165 on 23rd (ADW AY)
- SWP 300 pairs (1200 birds) Cromlix early June (WRB)

COMMON GULL

- S 3 pairs at Carron Valley Reservoir (ADW AY)

LESSER BLACK-BACKED GULL

- C 1 Gartmorn 6th January (WRB)
- F 1 Grangemouth 6th January (WRB)
- S 1 wintered Stirling (WRB). Carron Valley Reservoir roost 8 on 17th March, 77 on 11th April, 294 on 4th July (ADW AY)

ICELAND GULL

- S 1 white immature Stirling 14th January (WRB). 1 immature Carron Valley Reservoir 3rd February (DT)

GLAUCOUS GULL

- F 1 adult Kinneil 17th February (DT ADW AY)

KITTIWAKE

- F 1 Skinflats 27th November (WRB)
- S 26 + 65 Carron Valley Reservoir 25th October (WRB)
- SWP 1 immature Loch Katrine 16th August (WRB)

SANDWICH TERN

- F 2 Blackness 15th April (AS), 100 Kinneil 25th August (DT)

COMMON TERN

- F 2 Kinneil 11th May (DT), 30 pairs Grangemouth Docks mid June (WRB), 1 Falkirk 16th July (DWN)
- C 5 fishing Cambus pool 25th June (WRB)
- S 1 pair Carron Valley Reservoir (ADW AY)

GUILLEMOT

- C 5 Cambus 24th November (PL)

- S Inland reports from Stirling, Gargunnock, Plean, around 25th November (WRB), 1 flying with Feral Rockdoves Stirling 24th November, fell to ground (RLC)
- SWP Inland reports from Callander, Thornhill, Glen Gyle, around 25th November, birds emaciated but unoled, some flying W (WRB)
- FERAL ROCK DOVE
- SWP 200 on roof of Dunblane Cathedral 19th January (CJH)
- STOCK DOVE
- C 16 Longcarse 27th January (CJH)
- F 32 Kinneil 23rd August (WRB), 4 Muiravonside March-May (DWN), and Country Park 30th June (DWN)
- WOODPIGEON
- S 350 Abbey Craig 24th November (WRB)
- SWP 700 Callander 19th January (CJH)
- CUCKOO
- SWP 1st Lake of Menteith and Loch Ard 4th May (DT), frequent calling Flanders Moss and Glen Beich (WRB)
- LONG-EARED OWL
- S 1 pair Carron Valley Reservoir (Faughlin Dam) (ADW AY)
- SWP Pair bred Dalbrack, 3 juveniles 8th — 11th July (WRB)
- SHORT-EARED OWL
- C 1 Tullibody Inch 2nd February (CJH)
- F 1 Kinneil 1st October, 1 Grangemouth 3rd November, 2 Skinflats 27th November (WRB DT)
- SWP 3 pairs Grainston-Cromlix 8th July (WRB)
- SWIFT
- F 3 Muiravonside Country Park 6th May (DWN)
- S 1 Stirling and 3 Bridge of Allan 8th May (WRB CJH), not numerous till 22nd May (DT). Last 28th August (DT)
- SWP More (18) Ashfield in July (WRB)
- KINGFISHER
- C 1 Cambus 26th October (WRB), 2 on 24th November (PL). At Crook of Devon October-November
- SWP 1 Lecropt 11th May (CJH). 1 Forth-Teith 25th May (WRB)
- GREEN WOODPECKER
- F 1 Kinneil Estate 31st January (DWN). 1 Muiravonside Country Park 2nd April and 20th October (DWN)
- S at Blairlogie, Airthrey, Carron Bridge (WRB). Cambusbarron 14th October (RJ). Only records at Carron Valley Reservoir 17th March and 26th September (ADW AY)

SWP at Port of Menteith, Doune, Strathyre (WRB)

GREAT SPOTTED WOODPECKER

F Bred Muiravonside Country Park, drumming Callendar Park, Parkhill Estate (DWN)

S at Abbey Craig, Carron Bridge (WRB), Airthrey 26th, 29th August (AWB)

SWP at Doune (WRB)

SKYLARK

F 300 Kinneil 27th January (DT RS)

S 400 Cambuskenneth 25th January, picking leaves off oilseed rape in hard frost (KPA)

SWP 300 Lecropt 9th February (DT)

SANDMARTIN

C 1st Gartmorn 10th April (IF)

F 1st Muiravonside Country Park 21st April (DWN)

SWP At Cambusmore (Callander) only 5 on 25th May; generally scarce (DT)

SWALLOW

C 1st Gartmorn 12th April (IF). 2 Cambus 14th April (WRB)

F 1st Falkirk 14th April. Bred Muiravonside Country Park 5 young, last 24th September (DWN). Last Kinneil 5th October (RS)

S 1 Stronend 18th April (RB), last Stirling 7th October (DT)

SWP 1 Ashfield 5th April (WRB)

HOUSE MARTIN

F 1st Muiravonside Country Park 29th April, last 24th August (DWN)

S 1 Killearn 18th April (RB). 1st Airthrey 8th May, last 2 on 15th October (CJH DMB)

TREE PIPIT

F at Muiravonside Country Park 2nd May to 1st July (DWN)

S 1 Castlebridge 23rd April. 4 Carron Valley Reservoir 28th May (ADW). 3 Plean 10th September (WRB)

SWP Several singing Loch Chon 4th May (DT). 6 Glen Beich 31st May (WRB)

MEADOW PIPIT

F Parties Muiravonside Country Park late March-early April, maximum 20 on 31st March, also in autumn 6th-17th November (DWN)

SWP 10 north Glen Ample 9th January (WRB). 40 Barbush 5th April (WRB). Frequent Glen Kendrum 7th April (CJH)

GREY WAGTAIL

- F 2 pairs failed River Avon, Muiravonside Country Park, due to high water in May (DWN). Regular in Polmont Wood, Carron Glen (Fankerton) 19th May (DWN)
- S 2 in Stirling town 7th October – end December (DT)

PIED WAGTAIL

- F 2 pairs bred Muiravonside Country Park (DWN)
- S 67 Airthrey 29th August (AWB)

WAXWING

- C 1 Menstrie 9th – 12th December, tame, fed on guelder rose (PL)

DIPPER

- F Bred on River Avon at Muiravonside Country Park, maximum 4 on 15th January, and on River Carron at Carron Glen and Fankerton on 19th May (DWN)
- S 1 Airthrey Loch 15th October (DMB) – 1st record here

REDSTART

- F 2 Skinflats 1st September (DT)
- SWP Male Loch Ard 4th May (DT), 4 males Pass of Leny 12th May, 2 pairs Kinlochard 21st June (WRB)

WHINCHAT

- SWP 3 males Flanders Moss early June (WRB)

WHEATEAR

- C 1 Dumyat 7th April (WRB)
- F 2 Muiravonside 13th April (DWN)
- S 1 North Third Reservoir 29th September (DT)
- SWP female at Barbush 5th April, 1 Doune 6th April, usual numbers in summer (WRB). 12 (widespread) Glen Kendrum 7th April (CJH)

RING OUZEL

- S Pair Stronend 18th April (RB)
- SWP Pair Glen Lochay 13th April, 4 (1 female) Upper Glen Gyle 18th May, 2 pairs Glen Ogle 31st May, pair Meall Ghlas (Dochart) (RB WRB)

FIELDFARE

- S Carron Valley Reservoir 1 on 29th September (AH) and 200 to west 19th October (DT), 600 Kippen 27th October (DT)
- SWP 40 Lake of Menteith 13th October (RB), 45 W Loch Venachar 20th October (DT), hundreds Ashfield 20th-31st October (WRB)

REDWING

- F Muiravonside Country Park 50 on 10th January and 42 on 12th March (NWN)

S 1 Airthrey 24th April, (CJH), 400 Kippen 27th October (DT)

SWP 1st Ashfield 17th October (WRB)

MISTLE THRUSH

F Regular Callendar Park, Kinneil Estate, Muiravonside Country Park (9 on 13th July) (DWN)

C 25 Muckhart 22nd September (DMB)

WHITETHROAT

F Union Canal 3 singing Polmont-Muiravonside, pair at Almond (DWN)

GARDEN WARBLER

F singing Muiravonside Country Park from 24th May and Callendar Park 27th and 30th May (DWN)

S 2 singing Airthrey 15th May

SWP Lake of Menteith 1 on 4th and 2 on 8th May (DT), 1 Old Keir 25th May, 1 Cobleland 15th June (DT), 2 pairs Doune Ponds (WRB)

BLACKCAP

C female at Menstrie at birdtable winter 84/85 (PL)

F 1st at Muiravonside Country Park and Polmont 7th May and 3+ pairs Muiravonside Country Park (DWN)

S male at Bridge of Allan 20th February – 20th March, ate boiled rice and maize from compost, occasionally chased by Robin (CJH), 1 singing Airthrey 7th April, 2 on 15th May (WRB)

SWP 1 at Doune in winter (per WRB)

WOOD WARBLER

F singing Muiravonside Country Park 18th May, 22nd-25th June (DWN)

SWP 2 singing Kilmahog 12th May (WRB)

CHIFF CHAFF

F Muiravonside Country Park several singing, 1st 20th April, last 5th October, 3 territories in Callendar Woods (DWN)

S 1 Pleau 6th June (DT) and 10th September (WRB), 1 Stirling 9th January and 9th March feeding in gardens (DI)

SWP 1 singing Loch Arklet dam 22nd April (RB)

WILLOW WARBLER

F Muiravonside 1 on 12th April, main arrival 20th April 13 territories (DWN)

C 1 Muckhart 6th April (DMB)

S singing Balfron 18th April (RB)

SPOTTED FLYCATCHER

- F Muiravonside Country Park 3 territories, 1st 27th May, last 11th August (DWN)
- S 4 Carron Valley Forest 28th May (WRB)

PIED FLYCATCHER

- SWP 2 males Pass of Leny 12th May, at Glen Beich and Glen Lochay 31st May (WRB), Balquhidder (Rhuveag) 5 (1 female) 25th May mainly at boxes, 1 male displaying by woodpecker hole (DT)

LONG-TAILED TIT

- F Several Muiravonside Country Park, February-April, 6 on 11th December (DWN)

JAY

- F Resident (maximum 4 10th April) Callendar Woods. In June at Muiravonside Country Park and Kinneil Estate (DWN), often seen in gardens by Kinneil Woods (per RS)

MAGPIE

- F Frequent Muiravonside, 18 Polmont woods 22nd January (DWN)

JACKDAW

- F Roost 1200 Muiravonside Country Park 9th December (DWN)

ROOK

- C Rookeries 78 Myretoun 24th April, 308 Menstrie 25th April (CJH)
- S Rookeries 20 Witches Craig 24th April, Bridge of Allan N 36 and S 105 + 8 Kenilworth Road on 29th April (CJH)
- F Roost 1200 Muiravonside Country Park 9th December (DWN)

CARRION CROW

- F 80 Callendar Park 30th January, 1 hybrid Polmont 21st February (DWN)

RAVEN

- SWP 10 Loch Rusky 17th March (DT), 6 Cromlix 1st January, regular Glen Ogle and Stuc a'Chroin (WRB)

STARLING

- C 300 juveniles Upper Glendevon Reservoir 14th July (CJH)

TREE SPARROW

- F 16 Bo'ness 24th January (RS), 5 Manor Powis 31st October (WRB)
- SWP 17 Lecropt 2nd February (DT), 10 Thornhill 18th

November (WRB)

BRAMBLING

- S 50 Balfron 11th November (RB), 50 Carron Valley Forest 2nd November (PWA)
- SWP 1st Ashfield 17th October (WRB)

GOLDFINCH

- F Resident and bred Muiravonside Country Park, maximum 20 on 17th February (DWN)

SISKIN

- F 50 Falkirk 22nd January, 50 Muiravonside Country Park 17th December (DWN)
- S 50 Carron Valley Forest 15th December (PWA), 8 in Stirling garden (birch) 14th December (RJ)
- SWP 40 Loch Achray 20th October (DT)

TWITE

- F 60 Kinneil 27th January (DT RS), 8 in Dunipace 20th January (WRB)
- SWP Balquhiddar 2nd June, 3 pairs in sheepfank at Monachyle Farm and 2 above wood in Monachyle Glen (CJH), 2 at 2000' Kirkton Glen 8th January (WRB)

REDPOLL

- F 3 Falkirk (Dorrator Bridge) 16th July (DWN), 18 Muiravonside Country Park 19th January (DWN)

CROSSBILL

- F 12 Muiravonside Country Park 9th and 21st October (DWN)
- S Carron Valley Forest 70 on 29th September (AH), 30 on 19th and 60 on 26th October (DT), 30 on 2nd November and 100 on 15th December (PWA)
- SWP Achray Forest 16 on 13th January, 7 (1 immature) on 16th February, 10 on 10th November (DT). 4 (1 immature) Cobleland 15th June, 8 Torrie Forest 24th November (DT), 8 Auchtertyre 3rd May (RB), 1 Loch Macanrie 13th October (RB). Small flocks at Doune in late summer (WRB)

TWO-BARRED CROSSBILL

- S 1st winter female at Carron Valley Forest from 14th October to 23rd December and into 1986 (AP Barr, P Gordon et al). The bird associated with flocks of Common Crossbills, tending to feed lower and more into the middle of trees (larch and spruce), but was also often seen by itself. The flight call was noted as thinner than that of Common Crossbill and written as 'chit' or 'peet'; the call when perched was a plaintive 'peu'. Full

descriptions have been sent to the British Birds Rarities Committee who have accepted the record.

BULLFINCH

- F 2 pairs Muiravonside Country Park and 6 on 24th September. Regular at Callendar Park, Haining Wood, South Bantaskine Estate (DWN)

SNOW BUNTING

- S 2 Earlsburn Moor 13th November (WRB)

YELLOWHAMMER

- S 14 in roots stubble, Longcarse 20th January (CJH), 20 at roost in pyracantha Airthrey 18th February (CJH)
SWP 45 Thornhill 16th February (DT)

CORN BUNTING

- S 1 Airth 11th May, 1 Pleau 15th July (DT)

**FORTH AREA BIRD REPORT 1986
(FALKIRK, CLACKS, STIRLING, SOUTHWEST PERTH)**

C. J. Henty and M. V. Bell
University of Stirling

The usual editor was away in the winter and spring of 1987 and the task of compiling records for the 1986 submission to the Scottish Ornithologists Club was undertaken by Dr M. V. Bell. That manuscript was retyped and edited by Dr Henty on his return but for the original purpose does not include full acknowledgement of every record by the observer's initials. It was felt that priority should be given to getting the bird reports up to date by including both 1985 and 1986 in the next volume of the *Forth Naturalist*. Thus the following account is not as complete as usual as far as observer's initials are concerned.

The following observers contributed notes –

P. Atkinson, D.J. Bates, M.V. Bell, W.R. Brackenridge, R.A. Broad, D.M. Bryant, E.D. Cameron, D.L. Clugston, J. Cunningham, M. Feltham, G.J. Fitchett, A. Henty, C.J. Henty, D.C. Jardine, A.J. Knox, D. MacCaskill, D. Matthews, W.A. Mattingley, D. Mitchell, J. Mitchell, D.W. Napier, S. Newton, K. Paterson, S. Payne, R. Shand, M.E. Shimeld, S. Shimeld, P. Stirling-Aird, P. Tatner, D. Thorogood, M. Trubridge, A. VanBeest.

Falkirk & Clackmannan Districts are indicated by F and C; S refers to the old Stirling county part of Stirling District and SWP refers to the Perth part of Stirling District.

SYSTEMATIC LIST

RED-THROATED DIVER

SWP A pair with clutch 2 on 21st June, outcome unknown.
3 Loch Venachar 15th February, 2 Lake of Menteith 1st and 16th February

BLACK-THROATED DIVER

SWP Pair at usual site (western loch) 4th April to 31st July,
3rd bird 31st May to 2nd June and 5th to 31st July.
Nest site flooded before laying and no further attempt

LITTLE GREBE

S 1st Airthrey 16th March, 3 pairs bred, 8+ young
reared including 1 double brood, 15 on 10th September

GREAT CRESTED GREBE

- C 4 summered Gartmorn
- F 476 Kinneil 25th January (RS), 12 on 12th July, 120 by 20th August, 287 on 14th December
- S 2 pairs summered Carron Valley Reservoir, 4 on 4th October
- SWP 2 pairs summered Lake of Menteith

RED-NECKED GREBE

- F 1 Kinneil 25th October (DCJ)

FULMAR

- F 16 W up Forth estuary returned E 17th May (WRB)

CORMORANT

- 256 on Forth estuary 21st January
- F Grangemouth 93 on 16th November and 90 on 14th December
- C 114 at S Alloa roost 23rd February, 40 on 13th September

MUTE SWAN

- C 62 Gartmorn Dam 16th November
- SWP pair + 5 young Loch Watston, female of pair at Doune ponds died of lead poisoning

WHOOPEE SWAN

- C 5 Gartmorn 11th October and 40 on 14th December. 12-50 Alva—Tillicoultry from 9th November – 14th December
- S 2 Kippen Muir 4th October
- SWP 73 adults 38 juveniles in census 11th – 12th January, with 98 Thornhill 11th January, 53 Lake of Menteith 24th January, 11 Loch Watston 16th March (6 found poisoned 16th April), 7 Loch Voil 26th April (DT)
55 Blairdrummond 9th November, 86 Blairdrummond/Thornhill 6th December

BEAN GOOSE

- F 95 Slamannan 2nd January (PRG), 95-100 Loch Elrig 14th January (RAB), 28 Fannyside on 19th January (DJB) – just outside regional boundary. These records are all close together and may well represent a regular wintering area. This discovery is particularly important since the site at Carron Valley may be flooded now that the reservoir dams have been made higher

PINK-FOOTED GOOSE

- F Local farmers reported many more than usual at Skinflats in December
- S 80 N Bridge of Allan 30th March (CJH), 20 over Stirling 24th September (DT)
- SWP 3145 (roost) Lake of Menteith 27th January. On carse 3500 on 25th January, 4350 23rd – 28th March and 2900 20th

December, 2100 Loch Watston 20th December

GREYLAG GOOSE

- S 1200 N Inversnaid 24th April, 6 Kippen 5th October (DT)
- SWP 900 Thornhill 1st November

CANADA GOOSE

- S 2 Loch Voil 12th April, 1 Doune Ponds 18th April, 3 Loch Mahaick 3rd July (WRB)

BARNACLE GOOSE

- S 2 Gargunnock 26th February (RAB)
- SWP 3 Blairdrummond 23rd March, 3 Sheriffmuir 5th October (DM)

BRENT GOOSE

- F 1 Kinneil 3rd January (RS)

SHELDUCK

- 2328 on Forth estuary on 14th December
- F 2313 Kinneil 20th August

WIGEON

- 376 Forth estuary, 23rd February
- C 380 Gartmorn dam 12th January and 650 14th December. Upper Glendevon Reservoir 2 males, 1 female on 17th and 14th May, male on 15th June
- SWP pair Loch Mahaick and 2 pairs Cromlix in June (WRB)

GADWALL

- F 5 Skinflats 27th August (DCJ), 1 Grangemouth Burn 7th September (DCJ)

TEAL

- 1290 on Forth estuary 14th December
- F Kinneil 300 on 9th February, 214 on 6th September, 552 on 4th November
- C Gartmorn 500 on 12th January, 240 on 16th November Upper Glendevon Reservoir 7 males on 17th May, 1 male on 15th June
- S 312 Carron Valley Reservoir on 16th November
- SWP 3 pairs Creag Mhor (Killin) on 21st June

MALLARD

- 954 Forth estuary 12th January
- F 655 Grangemouth 14th December
- C Gartmorn Dam 1215 on 12th January and 900 on 14th December
- S Airthrey 200 on 20th February and 280 on 9th December, 274 Carron Valley Reservoir and 140 Mill Dam Kippen on 4th October
- SWP Lake of Menteith 333 on 12th January and 300 on 11th October, Loch Venachar 308 on 25 January and 380 on 20th December

PINTAIL

- F 39 Grangemouth 21st January, Kinneil 22 on 23rd October
and 18 on 25th, 17 Skinflats 14th December

GARGANEY

- F male at Skinflats 15th May (RS)

SHOVELER

- F 9 Kinneil 20th August (DMB)
C 1 Cambus 27th June
SWP 1 Lake of Menteith 2nd May

POCHARD

- C 190 Gartmorn Dam 14th December

TUFTED DUCK

- S 135 Gartmorn Dam 12th January, 102 Carron Valley
Reservoir 4th October, broods of 4 and 7 at Airthrey in July

SCAUP

- F Kinneil 4 on 30th August, 13 on 25th October, 6 on 30th
November (DCJ), 5 on 14th December (MVB SN)

LONG TAILED DUCK

- SWP 1 Lake of Menteith 5th January to 16th February (RAB)

GOLDEN EYE

- Forth estuary 32 Cambuskenneth, 52 Manor Powis,
360 Cambus-Grangemouth on 23rd February, 209 on
14th December
C 36 Gartmorn 16th March
S female/immature killed by Peregrine at Cambuskenneth
14th December
SWP 49 Lake of Menteith 16th March

RED-BREASTED MERGANSER

- F 15 Grangemouth 4th January
S 3 North Third Reservoir 1st May, pair Carron Valley
Reservoir 1st June
SWP pair Lake of Menteith 14th December (late date)

GOOSANDER

- C 7 Tullibody Inch 23rd February
SWP 24 Loch Macanrie 16th February

MARSH HARRIER

- SWP sub adult male at Lake of Menteith 5th May (RAB)

MERLIN

- F 1 Grangemouth 7th September (sole record)

PEREGRINE

- Of 29 pairs only 7 succeed rearing 17 young (PS-A JM)
F 1 Kinneil 19th January and 25th October, 1 Skinflats
26th October
S 1 Cambuskenneth 14th December

BLACK GROUSE

- S 3 Carron Valley Reservoir 15th February, 6 Campsie Muir 31st March
- SWP 12 Callander Crag 5th January and 6 on 18th February, 6 Tom Dubh (Callander) 22nd February, 5 Cromlix mid-July

CAPERCAILLIE

- SWP female Stank Glen 15th May (WRB DW) (sole record)

WATER RAIL

- F 1 Kinneil 30th November (DCJ), 2 Carron Dam 9th February (RS)

COOT

- C 680 Gartmorn Dam 14th December
- S Airthrey 95 on 20th February, 53 on 14th August, 60 on 28th November
- SWP Lake of Menteith 244 on 4th January, 249 on 14th December

OYSTERCATCHER

- 706 on Forth estuary 23rd February
- S 1st over Stirling 3rd March
- SWP 1st Loch Watston 23rd February, 130 on 16th March, 60 Ashfield in March-April

GOLDEN PLOVER

- 467 Forth estuary 14th December
- F 400 Kincardine Bridge 2nd October, 120 Kinneil 26th October

GREY PLOVER

- F 20 Skinflats 8th March

LAPWING

- 1990 Forth estuary 14th December
- F 500 Grangemouth 17th-23rd August, 950 Kinneil 4th October
- SWP 600 Lecropt 15th November

KNOT

- 1273 Forth estuary 21st January
- F 600 Kinneil 29th November (continuing fall in numbers)

SANDERLING

- F Grangemouth 2 on 26th August, 3 on 6th September, 1 on 7th September, 12 Skinflats 27th August

LITTLE STINT

- F 1 Kinneil 17th August (DT MVB CJH)

CURLEW SANDPIPER

- F Kinneil 3 on 20th August, 1 on 7th and 5 on 15th September, 1 on 26th October, 1 on 4th November (DMB DCJ RS GJF), 2 Skinflats 2nd October (WRB)

DUNLIN

2164 Forth estuary 21st January

RUFF

F Kinneil 10 on 10th, 31 on 16th, 27 on 24th August,
last 3 on 15th September (RS et al)

C 4 Cambus 21st August and 1 on 17th September

JACK SNIBE

F Kinneil 1 on 3rd January (RS), 1 on 25th October and 4
on 15th November (DCJ)

SWP 1 Doune Ponds 27th February (WRB)

SNIBE

F 21-32 at Kinneil 20th-24th August

BLACK-TAILED GODWIT

F Kinneil 4 on 12th January and 1 on 9th February; 20th July
to 15th September, max 7 on 10th August and 5 on 5th
to 7th September; 16th November to end of year, maximum
3 on 26th December, 1 Skinflats 18th September

C 3 Cambus 21st August

BAR-TAILED GODWIT

402 on Forth estuary 21st January

WHIMBREL

F Kinneil 1 on 20th July, 10th August to 14th
September. 1 at Skinflats 17th and 24th August

CURLEW

556 on Forth estuary 14th December

F 500 Kinneil 7th September

S 1st Sheriffmuir 16th March. Over Bridge of Allan 30th
June — 8th July (presumably departure from moors)

SWP 45 Drip Moss 16th March, 125 Blairdrummond Moss
23rd March

SPOTTED REDSHANK

F Kinneil 5 on 20th August (DMB) and 1 on 6th
September (RS), 1 Skinflats 18th September (RS)

C Cambus 2 on 21st August and 1 on 17th September

REDSHANK

1741 on Forth estuary 14th December

GREENSHANK

F Kinneil 4 on 10th August, last on 6th September
Skinflats 6 on 17th and 4 on 23rd August, 1 on 14th
December

C 2 Cambus 21st August, 1 on 17th September

SWP 1 Upper Glendevon Reservoir 17th May

GREEN SANDPIPER

F 1 Kinneil 16th August, 1 Skinflats 27th August (DCJ)

COMMON SANDPIPER

F Kinneil 1 on 29th March, Skinflats 1 on 13th March (DM)

TURNSTONE

119 Forth estuary on 21st January

POMARINE SKUA

F 1 Kinneil 25th August, 1 Skinflats 26th October (DCJ)

LITTLE GULL

F 1 immature Kinneil 9th February (RS DT) and 1
immature on 20th August

LESSER BLACK-BACKED GULL

S 1 wintered Stirling, 1st of spring at Stirling 8th March

GLAUCOUS GULL

F adult Kinneil 9th February (RS DT)

KITTIWAKE

F West movements at Kinneil 10th May and 25th August

BLACK TERN

F Kinneil 1 on 16, 2 on 17th August (RS MVB CJH DT)

GUILLEMOT

A large wreck from 1st February with birds being found from estuary to Loch Lomond. Between 2nd and 8th February at least 140 live birds found inland. Many corpses were also found in this period and also subsequently with 50 dead on the Forth below Stirling in mid-February, 40 at Cambus on 9th February and 97 between Carronmouth and Kincardine Bridge on 13th March, smaller numbers found inland (RAB WRB DM *et al*)

1 dead at Grangemouth 13th March had been ringed as a nestling at the Ord of Caithness (230 km N) on 26th June 1985 (DM)

RAZORBILL

F 1 dead Kinneil on 9th February

WOODPIGEON

SWP 1500 Lecropt 20th December

COLLARED DOVE

S 30 Cambuskenneth 23rd February

SWP 16 at winter roost at Ashfield

CUCKOO

SWP 1st in Menteith Hills and Loch Lubnaig 4th May (WRB)

BARN OWL

SWP 1 near Doune, twice in year

LONG-EARED OWL

SWP adult with 2-3 juveniles at Ashfield 27th July (WRB)

SHORT-EARED OWL

- F Kinneil 1 on 19th January, 2 on 9th February, 1 on 10th August, 1 Loch Elrig 24th January and 20th May
- C 1 Tullibody Inch 23rd February
- S 1 Denny Muir 1st June, 1 Meikle Bin 10th January
- SWP 4 Menteith Hills 26th April, 3 Lecropt 8th February

SWIFT

- C 6 Muckhart 11th May
- S 1 Stirling 4th May (DT), 8 Bridge of Allan 11th May, maximum 40 on 5th August, last 6 on 15th August. 100 Airthrey Loch 24th June, last there on 7th September (DMB)

KINGFISHER

- C 1 Cambus 17th September and 1st October (WRB). 1 Crook of Devon 27th September (DMB)
- S 1 Airthrey 12th January, 9th and 15th December (CJH MVB)

SANDMARTIN

- S last 1 Stirling 20th September (DT)
- SWP 8 Ashfield 29th April (WRB) (a very late arrival!), c150 pairs Barbush (DMB), c20 pairs Cambusmore (Callander)

SWALLOW

- S 1 Kippen 13th April (JM) – c 2 weeks ahead of main arrival. 2 Carron Valley Reservoir 11th October (DT)

HOUSE MARTIN

- SWP 6 Doune Ponds 1st May (WRB)

TREE PIPIT

- SWP 1 Doune Ponds 1st May (WRB)

MEADOW PIPIT

- SWP 200 Glen Lochay 24th August

YELLOW WAGTAIL

- F male near Skinflats village 17th May (WRB)

WAXWING

- S 2 Bannockburn in January, 1 Cowie and 5 Cornton in February, 4 Drymen 2nd February
- SWP 1 Thornhill 25th January and 26th February (per J. Turner)

REDSTART

- SWP Trossachs nestbox colony 35 pairs, 7 2nd broods (6 successful, HR)

WHINCHAT

- SWP 1st Loch Mahaick 3rd May (RAB)

STONECHAT

- SWP female Loch Venachar 25th January (DT)

WHEATEAR

- S 1 Sheriffmuir 9th April (CJH), 9 pairs in 3.6 km of
Gargunnoch scarp April—May
- SWP 3 Druim Mhor (Callander) 6th April (WRB)

FIELDFARE

- S 1st Kippen 26th October (DT) — scarce
- SWP 40 SW Dunblane 18th November, 300 Loch Rusky 6th
December

REDWING

- F 100 Falkirk 28th January
- S 30 Kippen 1st November
- SWP 1 Ashfield 5th October (WRB), 20 Doune Ponds 6th
October, 40 SW Dunblane at dawn 11th October

MISTLE THRUSH

- C 19 Muckhart 16th August
- S 31 Drymen 23rd August

SEDGE WARBLER

- C 4 Cambus Pool 19th May

GARDEN WARBLER

- SWP 1 singing Doune Ponds 6th May (WRB)

CHIFFCHAFF

- S 1 Cowie in February, Airthrey 1 on 19th April and 1
singing on 2nd October

WILLOW WARBLER

- S 2 Stirling 25th April (DT)
- SWP many Aberfoyle 26th April

PIED FLYCATCHER

- SWP 2 male and female Pass of Leny 25th May, Trossachs
nestbox study 66 pairs (HR)

JAY

- F 6 Kinneil 19th September
- C 2 Crook of Devon 9th March — scarce in E of region

MAGPIE

- F 25 Slamannan 2nd and 18 Muiravonside 30th January,
35 Upper Kinneil 16th November

RAVEN

- SWP 7 (out of 11) territories occupied, 6 pairs reared 12 +
young, 24 at a gralloch Strathyre Forest in mid-October

TREE SPARROW

- F 20 Standburn (Falkirk) 28th January, 3 pairs Powfowlis
17th May
- C 3 pairs Alva 5th April

CHAFFINCH

- C 300 Gartmorn Dam 18th January
- SWP 150 Doune Ponds 19th February, 200 Dunblane 29th November

BRAMBLING

- F 300 Standburn (Falkirk) 28th January, 50 Banknock (Denny) 13th April
- S at Arnprior from 23rd February, maximum 400 on 9th March, 50 on 5th December. 8 Airthrey 21st October
- SWP 250 Burnbank (Thornhill) 25th January. Small numbers at Ashfield and Doune. 30 Dunblane 29th November, small numbers Lake of Menteith

GREENFINCH

- SWP 100 Lecropt 2nd October, 100 Kinbuck 6th December

GOLDFINCH

- F 13 Muiravonside County Park 27th January

SISKIN

- S 30 Carron Valley Reservoir 25th January, 100 Stronend 16 September
- SWP 20 Glen Ogle 25th January, 20 Aberfoyle 4th May

LINNET

- F 100 Kinneil 27th September, 180 Grangemouth 16th November
- SWP 100 Burnbank (Thornhill) 25th January

TWITE

- S 4-6 pairs in 5.3 km of Campsie-Gargunnock scarp May-June
- SWP 5 Balquhidder 20th June, 8 Glen Lochay 24th August, 10 Lecropt 8th February, 120 Kinbuck 6th December - large flocks unusual in winter inland

CROSSBILL

- S large numbers Carron Valley Reservoir January - March, maximum 150 29th March
- SWP 25 Lake of Menteith 16th February, 20 Strathyre 18th April

TWO-BARRED CROSSBILL

- S female with common Crossbills, Carron Valley Reservoir, present from 1985, remained until 31st March (PA DJB DCL RS DT)

HAWFINCH

- SWP 2-3 Laighills Park (Dunblane) 15th February, 4 Doune 19th February. Old remains at Sparrowhawk plucking site Dunblane 10th August, pair Lochearnhead 16th July (WRB)

LAPLAND BUNTING

- F female Kinneil 25th October (DCJ)

SNOW BUNTING

S 150 Spout of Ballochlean 17th December

YELLOWHAMMER

C 30 Gartmorn 18th January

SWP 80 Thornhill 26th December

REED BUNTING

F 18 Kinneil 15th November

CORN BUNTING

F 6 Bo'ness 28th February, 4 (probably 3 territories) on
31st July and 1st August (RS). 1 singing Skinflats 29th
March (DCJ)

The following species have occurred in 1985/6 within our area but either no notes have been submitted or any that have are not worth publication in isolation. All these latter records are kept in the archive and may well be useful when reviewed in the future. Records of all these regular species are welcomed by Bird Reports editor, C. J. Henty.

Herring Gull, Great Black-backed Gull, Tawny Owl, Wren, Dunnock, Robin, Blackbird, Song Thrush, Grasshopper Warbler, Goldcrest, Coal Tit, Blue Tit, Great Tit, Treecreeper, House Sparrow.

AREA BIRD REPORTS

The following area Bird Reports have been published in this journal –
Stirling and Clackmannan 1974 and 1975, volume 1 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 pp49-73
Forth Area (Clacks, Stirling, SW Perth) 1980, volume 5 pp46-65
Forth Area (Clacks, Stirling, SW Perth) 1981, volume 6 pp25-33
Forth Area (Clacks, Stirling, SW Perth) 1982, volume 7 pp45-56
Forth Area (Clacks, Stirling, SW Perth) 1983, volume 8 pp51-54
Forth Area (Clacks, Stirling, SW Perth) 1984, volume 9 pp39-47
Forth Area (Clacks, Stirling, SW Perth) 1985 and 1986, volume 10
pp25-52

Some pre 1974 information is in *Scottish Birds*, Rintoul and Baxter, and Thom's *Birds in Scotland*, 1986 (reviewed in this Journal volume 9).

A PROVISIONAL LIST OF VASCULAR PLANTS GROWING IN FALKIRK DISTRICT

N. F. Stewart

Conservation Association of Botanical Societies (CABS)

ABSTRACT

A provisional check-list of the vascular plants occurring in Falkirk District has been drawn up, based on survey work in 1983 supplemented by data from specimens in Falkirk Museum collected between 1978 and 1981. The frequency of each species, excluding those typically occurring on waste ground, has been noted, together with lists of sites for the rarer species. A short description of the geography of the District, as it relates to the flora, has been given.

INTRODUCTION

The following list was compiled from survey data collected by the author for the Nature Conservancy Council during the summer of 1983. During this survey about 55 sites were visited, many of which were either 'Sites of Special Scientific Interest' or proposed by the Scottish Wildlife Trust as 'Listed Wildlife Sites'. The sites encompassed a very broad selection of habitats, but were strongly biased towards the longer-established, wild habitats. Thus in particular, waste ground areas were not well studied, and this has implications regarding the completeness of the following list.

For the plants of less disturbed habitats, it is thought that a sufficient cross-section of suitable sites has been visited to make an assessment of the frequency of occurrence of each species. The categories used in this assessment are as follows –

Rare	Occurring in 5 sites or less
Local	Occurring in 6 to 15 sites
Frequent	Occurring in 16 to 30 sites
Common	Occurring in more than 30 sites

These groupings should, however, be taken as approximate only, and in many cases they have been qualified as appropriate by further remarks including comments on local variations within the District.

For the species of more disturbed habitats, it would be inappropriate to make any assessment of frequency on the basis of this survey. These species are all marked with a '+' in the following list.

A list of sites where each species was recorded, has been given for all those in the rare category, and for a few in the occasional category. For those species lacking a status assessment, sites have been listed if it is considered that further survey would be unlikely to yield many other localities. This subjective choice is based largely on the author's knowledge of the distribution of the species concerned, elsewhere in south-east Scotland.

The inclusion of deliberately planted species in this sort of list is always somewhat of a problem. In an area like Falkirk District where so few areas have escaped the effect of man, many such species, not least the trees, are significant members of the local flora. The decision over what to include in this list is necessarily arbitrary, but has usually been in favour of inclusion, with some indication of the probable status attached.

Falkirk District originated as a unit in the local government reorganisation that occurred in 1973. Previously, much of the area belonged to the County of Stirlingshire, but all the ground to the north-east of the River Avon around Bo'ness belonged to the County of West Lothian. The recording units used by botanists, called vice-counties, are based on this county system, and at the end of each species entry there is a note indicating in which of these Vice-counties the plant was seen. Thus '84' represents Vice-county 84 – West Lothian, and '86' represents Vice-county 86 – Stirlingshire.

The list has been supplemented by information gained from specimens in the herbarium at Falkirk Museum. This herbarium was compiled during surveys of wildlife sites conducted by the Museum in 1978, 1980 and 1981. The members of these survey teams were K. S. Bayes, K. M. Black, P. M. Holmes, S. Martin and C. Wishart. The information from these specimens, all of which have been seen by the author, is enclosed in parentheses '()' in the following list.

Although this list is undoubtedly incomplete, there are no existing published lists for the area, and it is hoped that this paper will provide a foundation on which those interested in the flora of the District can base further studies.

ECOLOGICAL SETTING

Falkirk District is a roughly-diamond shaped area situated on the south side of the Firth of Forth in the central part of the Midland Valley of Scotland (see fold out map p.54a). The north and north-east part is therefore predominantly low-lying ground that would once have been part of the flood plain of the River Forth. Two areas of higher ground occupy the southern and western parts of the District – respectively, the Slamannan Plateau and the hills around Denny.



The most significant factor influencing plant distribution in the District is the geology and particularly the very limited extent of rocks that are base-rich: the great majority of the area is underlain by rocks belonging to the Passage Group and Productive Coal Measures of the Carboniferous Period. These are dominated by acid sandstones and shales and the effects of these are seen most clearly on the Slamannan Plateau, occupying most of the southern part of the District and extending southwards into the adjacent Districts. Although the ground lies at altitudes between 90 and 220 metres it has a generally upland character and there are extensive areas of peat bog and sour grassland.

Along the northern edge of the Slamannan Plateau area the slopes are generally steeper, and, apart from isolated pockets, more freely drained. Because of this, a higher proportion of the ground is improved, and the remaining wild areas are principally areas of acid woodland and heathland, though there are a number of bogs and poor fen areas in the undrained hollows.

The hilly areas east of Denny and around Dunnipace are underlain by similar rocks and the principal features of the vegetation are similar to the northern edge of the Slamannan Plateau. West of Denny, however, a varied suite of rocks extends into the District from the west. Most extensive are areas of Devonian andesitic lavas, but there are also mixed lower Carboniferous sedimentary rocks and Permo-Carboniferous basic igneous rocks. These all have a higher base-rich content than those of most of the rest of the District, and this is reflected in the comparative richness of the flora, which has greater affinities to that of the Stirlingshire hills to the west than to the rest of the District. Denny Muir, which includes the highest point of the District – Darroch Hill 360 metres – is largely underlain by andesitic lavas. This is a hard rock and it is only in the wet habitats, particularly the flush mires, that the basic influence is marked. However, the better soils have meant that land improvement has occurred higher than in the Slamannan area and extends up to about 220 metres.

Similar mixed rocks, though without the andesites, extend into the District along the eastern edge. However, compared to much of the Midland Valley, the igneous rocks are rather local and this is exemplified by the rarity of species such as Thyme (*Thymus praecox*). This plant often grows in the short turf around basic igneous rock outcrops which are frequent in the surrounding Districts. Examples of these areas do however occur, as at Blackness Castle.

Cutting through the higher areas are several large streams and rivers which in places have cut some quite deep valleys. These valleys are perhaps the most interesting areas in the District from

the flora point of view. Often they contain a patchwork of wood, grass and marsh lands which have been protected from drainage and improvement by the steepness of the valley sides. The woodlands are all planted, but many of the characteristic old-woodland indicator species are common in these valley woods, and it is likely that many have had a continuous history of woodland cover.

Away from the valleys, woodland is quite frequent, but all appear to be secondary, and many of the larger areas are coniferous or mixed. Some of the older sites are the policies of the various old estates that are scattered round the area, but botanically these are less rich than the valley woods.

The northern part of the District, extending along the River Forth, is an extensive area of low ground underlain by coarse sands and clays. The majority of this area is either urban, industrial or arable ground, although there are some remnant areas of raised bog at the north end of the District, and a few pockets of marshland and woodland.

The upstream half of the Forth shore is backed by a band of saltmarsh, although this is truncated on the landward side by a sea-bank so that natural transitions to non-saline vegetation, such as freshwater marsh, are almost always lacking. Much of the downstream part of the shore is made up of reclaimed ground protected by sea-defences, although brackish marsh and saltmarsh areas occur in a few places where reclamation is not yet complete. The only natural shore in the District is confined to a 3-mile stretch from Carriden eastwards.

Large areas of intertidal mud occur in Skinflats and Kinneil Bays but these have no vascular plant flora. Eel-grasses, the only British vascular plants that grow in this habitat, occur in the smaller bays east of Carriden.

Another feature of the District is connected with the geology: the extensive coal deposits at, or near the surface have resulted in numerous mines, mostly open-cast, and a long history of industry. The result is a large amount of waste-ground, which occurs throughout the area. However, some of the older areas of waste-ground are developing into noteable areas of wildlife habitat including woodland, scrub, heathland etc.

The District contains relatively few lochs and reservoirs and these are mostly restricted to the higher ground. Most are therefore oligotrophic and none have a particularly rich flora, even compared to those of a similar nutrient status in the surrounding Districts.

Few of the rivers have escaped from pollution, except in some of the upper reaches. However, of more interest are the two canals

which extend east-west across the middle of the District. Away from the towns, these are relatively unpolluted and have a rich aquatic and fringing marsh flora. These canals are an outpost for several species more typical of the English canals, though doubtless these have arrived here by other than natural means.

In summary, the main influences on the flora of the District are the predominantly acid nature of the ground and the mining and industrial disturbance. Though wild habitats are not uncommon, many of these areas are not of high quality in the context of central Scotland, because of these influences. However, of particular note are the valley woodlands, the peat bogs, the canals, and the estuarine saltmarshes. The most threatened of these are the peat bogs which are rapidly being reduced or are deteriorating due to the combination of afforestation, drainage, burning, peat extraction and open-cast mining.

THE CHECK LIST

KEY

- + Present, but distributional status not fully known.
 (...FLK) Information from specimens in Falkirk Museum herbarium.
 84 Seen in Vice-county 84 – West Lothian
 86 Seen in Vice-county 86 – Stirlingshire

Order and nomenclature follow Clapham, A.R., Tutin, T.G. and Warburg, E.F. *Excursion Flora of the British Isles*. 3rd ed. 1981. English names follow Dony, J.G., Jury, S.L. and Perring, F.H. *English Names of Wild Flowers* 2nd ed. 1986.

FERNS AND ALLIED GROUPS

- Lycopodium clavatum* (Stag's-horn Clubmoss): Rare: By Loch Ellrig; (Darnrig Moss **FLK**). 86
Equisetum fluviatile (Water Horsetail): Common. 84, 86
E. palustre (Marsh Horsetail): Local, though rare in the northern half of the District. 86
E. sylvaticum (Wood Horsetail): Frequent, though absent from the Slamannan area. 86
E. arvense (Field Horsetail): Common. 84, 86
Pteridium aquilinum (Bracken): Common. 84, 86
Oreopteris limbosperma (Lemon-scented Fern, Mountain Fern): Frequent, mostly in the southern and western parts of the District. 86

<i>Phegopteris connectilis</i> (Beech Fern): Rare: Denny Muir; Castlerankine Glen; Carron Glen; Torwood Glen.	86
<i>Asplenium trichomanes</i> (Maidenhair Spleenwort): Rare in natural rock habitats: Denny Muir; Castlerankine Glen; Carron Glen; Carriden Woods: +, on walls.	86
<i>Phyllitis scolopendrium</i> (Hart's-tongue Fern): Rare: Castlerankine Glen; Carriden Glen; (Union Canal, Stone Bridge FLK): Probably introduced in all these.	84, 86
<i>Athyrium filix-femina</i> (Lady-fern): Common.	84, 86
<i>Cystopteris fragilis</i> (Brittle Bladder-fern): Rare: Castlerankine Glen; Carron Glen; Muiravonside.	86
<i>Dryopteris filix-mas</i> (Male-fern): Common.	84, 86
<i>D. affinis</i> (Scaly Male-fern): Local.	84, 86
<i>D. carthusiana</i> (Narrow Buckler-fern): Local.	86
<i>D. dilatata</i> (Broad Buckler-fern): Common.	84, 86
<i>Polystichum aculeatum</i> (Hard Shield-fern): Local: Castlecary Glen; Castlerankine Glen; Carron Glen; Muiravonside; Kinneil Estate; Avon Banks Wood; Carriden Glen.	84, 86
<i>Gymnocarpium dryopteris</i> (Oak Fern): Rare: Castlerankine Glen; Carron Glen; Torwood Glen; Muiravonside.	86
<i>Blechnum spicant</i> (Hard Fern): Frequent.	84, 86
<i>Polypodium vulgare</i> ss: (Common Polypody): Rare in natural situations: Castlerankine Glen; Carron Glen: +, on walls.	86

CONIFERS

Various species of conifers have been planted in the District, particularly in the estate woodlands. Only the most common species are listed below. Those which were observed to have been self-seeding in some places are marked with an asterisk.

<i>Picea abies</i> (Norway Spruce)*	84, 86
<i>P. sitchensis</i> (Sitka Spruce)*	84, 86
<i>Larix decidua</i> (European Larch)*	84, 86
<i>L. x eurolepis</i> (Hybrid Larch)	86
<i>L. kaempferi</i> (Japanese Larch)	86
<i>Pinus sylvestris</i> (Scots Pine)*	84, 86
<i>Chamaecyparis lawsoniana</i> (Lawson's Cypress)	84, 86
<i>Taxus baccata</i> (Yew)	84, 86

ANGIOSPERMS – DICOTYLEDONS

<i>Caltha palustris</i> (Marsh-marigold): Frequent.	84, 86
<i>Trollius europaeus</i> (Globe Flower): Rare: Carron Glen.	86

- Aconitum napellus* agg. (Monk's-hood): Rare: Castlecary Glen: Introduced. 86
- Anemone nemorosa* (Wood Anemone): +, probably under-recorded due to the season of survey: Carron Glen; Braes Wood; near Glen Village; Muiravonside. 86
- Ranunculus acris* (Meadow Buttercup): Common. 84, 86
- R. repens* (Creeping Buttercup): Common. 84, 86
- R. bulbosus* (Bulbous Buttercup): Rare: Blackness. 84
- R. flammula* (Lesser Spearwort): Common. 84, 86
- R. sceleratus* (Celery-leaved Buttercup): Local: Parkfoot Marsh; Carron Dams; Kinneil Estate; Avon Banks Wood; And in several places near the Forth shore. 84, 86
- R. hederaceus* (Ivy-leaved Crowfoot): Rare: Kinneil Estate; Avon Banks Wood. 84
- R. omiophyllus* (Round-leaved Crowfoot): Rare: Ditch by Drumbowie Reservoir; Blackhill Moss near Castlecary. 84, 86
- R. peltatus* (Pond Water-crowfoot): Rare: Ponds at Muiravonside and Kinneil Estates: *R. aquatilis* agg. (Water-crowfoot) was also seen at Little Denny Reservoir and Kinneil Tip and may also be this species. 84, 86
- R. ficaria* (Lesser Celandine): +, probably under-recorded due to the season of survey: Near Glen Village; Muiravonside; Carriden Woods. 84, 86
- Mahonia aquifolium* (Oregon-grape): Rare: Muiravonside: Introduced. 86
- Nuphar lutea* (Yellow Water-lily): Rare: Pond in Braes Wood; Forth and Clyde Canal at Castlecary. 86
- Papaver rhoeas* (Common Poppy): (+, **FLK**).
- P. dubium* (Long-headed Poppy): +. 84, 86
- P. somniferum* (Opium Poppy): +: Carron Glen; Kinneil Timber Basin: Introduced. 84, 86
- Meconopsis cambrica* (Welsh Poppy): Rare: Carriden Glen: Introduced. 84
- Chelidonium majus* (Greater Celandine): Rare: Union Canal near Almond: Introduced. 86
- Corydalis claviculata* (Climbing Corydalis): Rare: Tor Wood; Torwood Glen; Wallacebank Wood; Dunmore Wood. 86
- Fumaria muralis* subsp. *boraiei* (Common Ramping-fumitory): +: Lochgreen Marsh; Bo'ness shore. 84, 86
- F. officinalis* (Common Fumitory): +: Bo'ness shore. 84
- Brassica napus* (Rape): (+: **FLK**): Introduced.
- B. rapa* (Turnip): +: Introduced. 84
- Sinapis arvensis* (Charlock): +. 84, 86
- Lepidium latifolium* (Dittander): +: Grangemouth Docks: Introduced. 86
- Cardaria draba* (Hoary Cress): +: Carriden. 84
- Iberis umbelata* (Garden Candytuft): (+: **FLK**):

Introduced.	
<i>Capsella bursa-pastoris</i> (Shepherd's purse): +.	84, 86
<i>Cochlearia officinalis</i> (Common Scurvygrass): Frequent along the Forth shore.	84, 86
<i>Lunaria annua</i> (Honesty): (+: FLK): Introduced.	
<i>Erophila verna</i> (Common Whitlowgrass): +, probably under-recorded due to the season of survey: Blackness.	84
<i>Cardamine pratensis</i> (Cuckoo Flower, Lady's Smock): Frequent.	84, 86
<i>C. amara</i> (Large Bitter-cress): Rare: Castlecary Glen; Castlerankine Glen; Carron Glen; Near Glen Village; Avon Banks Wood.	84, 86
<i>C. flexuosa</i> (Wavy Bitter-cress): Frequent.	84, 86
<i>C. hirsuta</i> (Hairy Bitter-cress): +, probably under-recorded due to the season of survey: Black Loch.	86
<i>Barbarea vulgaris</i> (Winter-cress): +: Union Canal at Glen Village.	86
<i>Nasturtium officinale</i> agg. (Water-cress): Local.	84, 86
<i>Rorippa palustris</i> (Marsh Yellow-cress): Local.	84, 86
<i>Erysimum cheiranthoides</i> (Treacle Mustard): (+: FLK): Introduced.	
<i>Alliaria petiolata</i> (Garlic Mustard, Jack-by-the-hedge): Local and confined to the eastern part of the District.	84, 86
<i>Sisymbrium officinale</i> (Hedge Mustard): +.	84, 86
<i>S. altissimum</i> (Tall Rocket): +: Various places between Grangemouth and Bo'ness: ? Introduced.	84, 86
<i>Arabidopsis thaliana</i> (Thale Cress): +: Darnrig; Blackness; Union Canal near Polmont.	84, 86
<i>Reseda luteola</i> (Weld): +.	84, 86
<i>R. lutea</i> (Wild Mignonette): +.	84
<i>Viola riviniana</i> (Common Dog-violet): Frequent.	84, 86
<i>V. palustris</i> (Marsh Violet): Frequent, but less common in the north-east.	86
<i>V. lutea</i> (Mountain Pansy): Rare: Denny Muir; Carron Glen.	86
<i>V. tricolor</i> (Wild Pansy): +: Parkfoot Marsh.	86
<i>V. arvensis</i> (Field Pansy): +.	84, 86
<i>Polygala serpyllifolia</i> (Heath Milkwort): Rare: Carron Glen; Braes Wood.	86
<i>Hypericum perforatum</i> (Common St. John's-wort): +.	84, 86
<i>H. maculatum</i> (Imperforate St. John's-wort): +: Sea banking near Airth.	86
<i>H. tetrapterum</i> (Square-stalked St. John's-wort): Rare: Carron Glen; Braes Wood; South Glen and the Avon Valley nearby.	86
<i>H. pulchrum</i> (Slender St. John's-wort): Frequent.	84, 86
<i>H. hirsutum</i> (Hairy St. John's-wort): Rare: South Glen.	86

- Silene dioica* (Red Campion): Fairly frequent, but seems to be absent from most of the Slamannan Plateau and from the northern part of the District. 84, 86
- S. alba* (White Campion): +. 84, 86
- S. vulgaris* (Bladder Campion): +: Grangemouth Docks; Carriden shore. 84, 86
- Lychnis flos-cuculi* (Ragged-Robin): Frequent. 86
- Saponaria officinalis* (Soapwort): Rare: Union Canal near Redding Muirhead: Introduced. 86
- Cerastium fontanum* subsp. *glabrescens* (Common Mouse-ear): Common. 84, 86
- C. glomeratum* (Sticky Mouse-ear): +. 86
- C. diffusum* (Sea Mouse-ear): Rare: Blackness; Grangemouth Docks.† 84, 86
- C. semidecandrum* (Little Mouse-ear): Rare: Carriden.† 84
- (†Note: Because of the dry season, these two species were dried up and difficult to separate with confidence)
- C. tomentosum* agg. (Snow-in-summer): Rare: Carriden. 84
- Stellaria nemorum* (Wood Stitchwort): Rare: Castlecary Glen; Castlerankine Glen; Carron Glen. 86
- S. media* (Common Chickweed): Common. 84, 86
- S. holostea* (Greater Stitchwort): Frequent. 84, 86
- S. graminea* (Lesser Stitchwort): Common. 84, 86
- S. alsine* (Bog Stitchwort): Common. 84, 86
- Sagina apetala* subsp. *erecta* (Annual Pearlwort): +: Kinneil Bing; Kinneil Timber Basin. 84
- S. maritima* (Sea Pearlwort): Rare: Grangemouth Docks; near Kincardine Bridge. 86
- S. procumbens* (Procumbent Pearlwort): Common. 84, 86
- S. nodosa* (Knotted Pearlwort): Rare: Polmont Burn near Shieldhill. 86
- Honkenya peploides* (Sea Sandwort): Rare: Carriden Bay. 84
- Moehringia trinervia* (Three-nerved Sandwort): Local, but absent from the Slamannan Plateau. 84, 86
- Arenaria serpyllifolia* (Thyme-leaved Sandwort): +: Callendar Park; Blackness; Grangemouth Docks; Kinneil Bing. 84, 86
- Spergula arvensis* (Corn Spurrey): +. 84, 86
- Spergularia rubra* (Sand Spurrey): +: Carriden shore; Kinneil Bing. 84
- S. media* (Greater Sea-spurrey): Frequent along the shore of the Forth, usually on the seaward side of the sea-wall/banking. 84, 86
- S. marina* (Lesser Sea-spurrey): Frequent along the shore of the Forth, but usually on the landward side of the sea-wall/banking or where subject to freshwater influence. 84, 86

<i>Montia fontana</i> (Blinks): Local.	86
<i>M. sibirica</i> (Pink Purslane): Local: Introduced.	84, 86
<i>Chenopodium album</i> (Fat-hen): +.	84, 86
<i>Atriplex littoralis</i> (Grass-leaved Orache): Frequent along the shores of the Forth: Particularly abundant at Kinneil Timber Basin and Grangemouth Settling Lagoons.	84, 86
<i>A. patula</i> (Common Orache): +.	84, 86
<i>A. prostrata</i> (Spear-leaved Orache): Frequent along the shores of the Forth.	84, 86
<i>Suaeda maritima</i> (Annual Sea-blite): Rare: Kinneil Timber Basin; East side of Kinneil Bing.	84
<i>Salicornia europaea</i> (Glasswort): Local along the shore of the Forth: Particularly abundant at Kinneil Timber Basin.	84, 86
<i>S. dolichostachya</i> (Glasswort): Local along the shore of the Forth, but less common than the last.	84, 86
<i>Tilia x vulgaris</i> (Lime): Locally planted.	84, 86
<i>Malva sylvestris</i> (Common Mallow): +: Kinneil Tip.	84
<i>Linum catharticum</i> (Fairy Flax): Local.	86
<i>Geranium pratense</i> (Meadow Crane's-bill): Rare: Several places along the Union Canal.	86
<i>G. sylvaticum</i> (Wood Crane's-bill): Rare: Carron Glen; Union Canal near Redding Muirhead; Avon Valley near South Glen; Muiravonside.	86
<i>G. dissectum</i> (Cut-leaved Crane's-bill): +.	84, 86
<i>G. molle</i> (Dove's-foot Crane's-bill): +: Blackness.	84
<i>G. lucidum</i> (Shining Crane's-bill): Rare: Blackness.	84
<i>G. robertianum</i> (Herb-Robert): Frequent.	84, 86
<i>Erodium cicutarium</i> (Common Stork's-bill): +: Bo'ness shore.	84
<i>Oxalis acetosella</i> (Wood-sorrel): Frequent.	84, 86
<i>Impatiens glandulifera</i> (Indian Balsam): +: Old bing near Almond; Avon Banks Wood: Introduced.	84, 86
<i>Acer pseudoplatanus</i> (Sycamore): Common: Introduced.	84, 86
<i>A. platanooides</i> (Norway Maple): Local: Introduced, and probably always planted.	84, 86
<i>Aesculus hippocastanum</i> (Horse-chestnut): Local: Introduced, and probably always planted.	84, 86
<i>Ilex aquifolium</i> (Holly): Frequent, but mostly introduced.	84, 86
<i>Lupinus polyphyllus</i> (Garden Lupin): +: Introduced.	84, 86
<i>Laburnum anagyroides</i> (Laburnum): +: Planted.	84, 86
<i>Ulex europaeus</i> (Gorse, Whin): Common.	84, 86
<i>Cytisus scoparius</i> subsp. <i>scoparius</i> (Broom): Common.	84, 86
<i>Ononis repens</i> (Common Restharrow): Rare: By Avon Banks Wood, and in a few places along the Union Canal.	84, 86
<i>Medicago lupulina</i> (Black Medick): +.	84, 86

- Melilotus officinalis* (Ribbed Melilot): + : Muiravonside;
 Several places between Grangemouth and Bo'ness. 84, 86
- M. alba* (White Melilot): + : Grangemouth Docks. 86
- Trifolium dubium* (Lesser Trefoil): + . 84, 86
- T. campestre* (Hop Trefoil): + . 84, 86
- T. hybridum* (Alsike Clover): + . 84, 86
- T. repens* (White Clover): Common. 84, 86
- T. medium* (Zig Zag Clover): Frequent: Mainly occurring
 in a band running across the District from Carron
 Bridge and Castlecary, to Linlithgow and Torphichen. 86
- T. arvense* (Hare's-foot Clover): + : Grangemouth Docks;
 Kinneil Bing. 84, 86
- T. striatum* (Knotted Clover): Rare: Blackness. 84
- T. pratense* (Red Clover): Frequent. 84, 86
- Anthyllis vulneraria* (Kidney Vetch): (Rare: Kinneil Timber
 Basin **FLK**). 84
- Lotus corniculatus* (Common Bird's-foot-trefoil):
 Frequent. 84, 86
- L. uliginosus* (Greater Bird's-foot-trefoil): Common. 84, 86
- Vicia hirsuta* (Hairy Vetch): + . 84, 86
- V. cracca* (Tufted Vetch): Common. 84, 86
- V. sepium* (Bush Vetch): Local. 84, 86
- V. sativa* subsp. *nigra* (Narrow-leaved Vetch): Rare:
 Muiravonside; Carriden; Blackness; Grangemouth
 Docks. 84, 86
- Lathyrus pratensis* (Meadow Vetchling): Common. 84, 86
- L. montanus* (Bitter-vetch): Local: Denny Muir;
 Castlerankine Glen; Carron Glen; Seabegs Wood;
 Muiravonside; Polmont Burn near Shieldhill. 86
- Spiraea douglasii* (Bridewort): Rare: Castlecary Glen;
 Carron Glen; Blaeberry Mair; Rough Castle Woods;
 Callendar Park: Introduced. 86
- Filipendula ulmaria* (Meadowsweet): Common. 84, 86
- Rubus saxatilis* (Stone Bramble): Rare: Auchenlillylinn
 Spout. 86
- R. idaeus* (Raspberry): Common. 84, 86
- R. spectabilis* (Salmonberry): Rare: Carriden Glen:
 Introduced. 84
- R. fruticosus* agg. (Bramble): Common. 84, 86
- Potentilla palustris* (Marsh Cinquefoil): Frequent, but
 rarely on ground below 100 metres altitude. 86
- P. sterilis* (Barren Strawberry): Local: Mainly in the richer
 wooded valleys. 84, 86
- P. anserina* (Silverweed): Frequent. 86
- P. norvegica* (Ternate-leaved Cinquefoil): + : Kinneil Tip:
 Introduced. 84
- P. erecta* (Tormentil): Common. 84, 86
- P. anglica* (Trailing Tormentil): Rare: Tor Wood;

Muiravonside.	86
<i>Fragaria vesca</i> (Wild Strawberry): Local.	84, 86
<i>Geum urbanum</i> (Wood Avens, Herb Bennet): Frequent.	84, 86
<i>G. rivale</i> (Water Avens): Local.	84, 86
<i>G. x intermedium</i> (Hybrid Avens): Rare: Kinneil Estate.	84
<i>Alchemilla filicaulis</i> subsp. <i>vestita</i> (Hairy Lady's-mantle): Rare: Muiravonside.	86
<i>A. xanthochlora</i> (Intermediate Lady's-mantle): Rare: Carron Glen; Muiravonside.	86
<i>A. glabra</i> (Smooth Lady's-mantle): Frequent.	84, 86
<i>Aphanes arvensis</i> ss. (Parsley-piert): Rare: Blackness (Note — because of the dry season, this plant was completely dried up, but was thought to be this segregate).	84
<i>A. microcarpa</i> (Slender Parsley-piert): Rare: Dunmore Wood.	86
<i>Sanguisorba minor</i> subsp. <i>muricata</i> (Fodder Burnet): + : Muiravonside: Introduced.	86
<i>Rosa multiflora</i> (Many-flowered Rose): + : Kenneil Tip: Introduced.	84
<i>R. rugosa</i> (Japanese Rose): Rare: Kinneil Estate: Introduced.	84
<i>R. pimpinellifolia</i> (Burnet Rose): Rare: South Glen.	86
<i>R. canina</i> agg. (Dog-rose): Common: Including, in order of decreasing frequency, <i>R. canina</i> ss., <i>R. afzeliana</i> and <i>R. coriifolia</i> .	84, 86
<i>R. villosa</i> agg. (Downy-rose): Frequent: Including <i>R.</i> <i>sherardii</i> .	84, 86
<i>Prunus spinosa</i> (Blackthorn, Sloe): Frequent.	84, 86
<i>P. avium</i> (Wild Cherry, Gean): Local: Often planted but perhaps native in some of the richer valley woods.	84, 86
<i>P. padus</i> (Bird Cherry): Local: Castlecary Glen; Castlerankine Glen; Carron Glen; Skipperton Glen; Torwood Glen; Wallacebank Wood; Muiravonside; Avon Banks Wood: Apparently native in most sites.	84, 86
<i>P. laurocerasus</i> (Cherry-laurel): Rare: Union Canal at Polmont and Redding Muirhead; Muiravonside; Kinneil Estate; Carriden Glen: Introduced.	84, 86
<i>Cotoneaster simonsii</i> (Himalayan Cotoneaster): Rare: Union Canal near Polmont; Callendar Park: Introduced, and probably planted.	86
<i>Crataegus monogyna</i> (Hawthorn): Common.	84, 86
<i>Sorbus aucuparia</i> (Rowan): Common.	84, 86
<i>S. aria</i> (Common White beam): Rare: Old bing near Almond; Muiravonside; Several places along the Union Canal: Introduced.	86
<i>Malus sylvestris</i> (Crab Apple): Rare: Old bing near Almond; Blackness: Introduced.	84, 86

- Sedum anglicum* (English Stonecrop): Rare: Braes Wood. 86
S. acre (Biting Stonecrop, Wall Pepper): +. 84, 86
Saxifraga umbrosa (Pyrenean Saxifrage): (+: **FLK**): Introduced.
S. x urbium (Londonpride): +: Union Canal near Redding Muirhead; North Glen; Muiravonside; Old bing near Almond: Introduced. 84, 86
S. granulata (Meadow Saxifrage): Rare: Carriden Woods. 84
S. rotundifolia (Round-leaved Saxifrage): Rare: Carron Glen: Introduced, but well naturalized. 86
S. hypnoides (Mossy Saxifrage): Rare: Auchenlillylenn Spout. 86
Chrysosplenium oppositifolium (Opposite-leaved Golden-saxifrage): Local. 84, 86
C. alternifolium (Alternate-leaved Golden-saxifrage): Rare: Castlecary Glen. 86
Peltiphyllum peltatum (Umbrella Plant): Rare: Carron Glen: Introduced. 86
Tolmeia menziesii (Pick-a-back-plant): Rare: River Avon near North Glen: Introduced. 86
Parnassia palustris (Grass-of-Parnassus): Rare: Denny Muir. 86
Ribes rubrum (Red Currant): Rare: Old bing near Almond: Introduced. 86
R. nigrum (Black Currant): Rare: Dunmore Wood; Candie Moss; Avon Valley near Torphichen Bridge; Kinneil Tip; Little Denny Reservoir: Introduced. 84, 86
R. alpinum (Mountain Currant): Rare: Muiravonside: Introduced. 86
R. uva-crispa (Gooseberry): Local. 84, 86
Drosera rotundifolia (Round-leaved Sundew): Local: Near Braes Wood; Darnrig Moss; Howierig Moss; Thorneydyke Marsh; Candie Moss; Blackhill Moss near Castlecary; Moss by Drum Wood. 86
Lythrum portula (Water-purslane): Rare: Drumbowie and Little Denny Reservoirs. 86
Daphne laureola (Spurge-laurel): Rare: Avon Banks Wood: Probably introduced. 84
Epilobium hirsutum (Great Willowherb): Frequent. 84, 86
E. parviflorum (Hoary Willowherb): Local. 86
E. montanum (Broad-leaved Willowherb): Frequent. 84, 86
E. ciliatum (American Willowherb): Frequent: Introduced. 84, 86
E. obscurum (Short-fruited Willowherb): Local. 86
E. palustre (Marsh Willowherb): Common. 84, 86
Chamerion angustifolium (Rosebay Willowherb): Common. 84, 86
Circaea lutetiana (Enchanter's-nightshade): Local: In most of the richer valley woodlands. 84, 86

<i>C. x intermedia</i> (Upland Enchanter's-nightshade): Rare: Carron Glen.	86
<i>Myriophyllum spicatum</i> (Spiked Water-milfoil): Rare: Both canals; Bonnybridge Dam; Skinflats Ponds; Grangemouth Docks.	86
<i>M. alterniflorum</i> (Alternate Water-milfoil): Rare: Drumbowie Reservoir; Black Loch; Bonnybridge Dam.	86
<i>Hippuris vulgaris</i> (Mare's-tail): Local: Little Black Loch; Limerigg Ponds; Loch Ellrig; Darnrig Moss; Parkfoot Marsh; Carron Dams; California Muir.	86
<i>Callitriche stagnalis</i> (Common Water-starwort): Frequent.	84, 86
<i>C. platycarpa</i> (Various-leaved Water-starwort): Local: Several places along the Union Canal; Carron Dams; Pineapple Ponds, Dunmore; Several other records may also be this species, but need confirmation.	86
<i>C. hamulata</i> (Intermediate Water-starwort): Local.	86
<i>C. hermaphroditica</i> (Autumnal Water-starwort): Rare: Bonnybridge Dam.	86
<i>Cornus sanguinea</i> (Dogwood): +: Muiravonside; Callendar Park: Introduced.	86
<i>Hedera helix</i> (Ivy): Frequent.	84, 86
<i>Hydrocotyle vulgaris</i> (Marsh Pennywort): Local.	86
<i>Sanicula europaea</i> (Sanicle): Local: Carron Glen; Castlerankine Glen; Kinneil Estate; Carriden Woods; Westquarter Burn; Several places along the Avon Valley and by the Union Canal nearby.	84, 86
<i>Astrantia major</i> (Astrantia, Pink Masterwort): +: Union Canal near Whitecross: Introduced.	86
<i>Chaerophyllum temulentum</i> (Rough Chervil): Rare: Blackness.	84
<i>Anthriscus sylvestris</i> (Cow Parsley, Keck): Common.	84, 86
<i>Myrrhis odorata</i> (Sweet Cicely): Frequent: Introduced.	84, 86
<i>Conopodium majus</i> (Pignut): Frequent.	84, 86
<i>Pimpinella saxifraga</i> (Burnet-saxifrage): Rare: Carron Glen.	86
<i>Aegopodium podagraria</i> (Ground-elder, Bishopweed, Goutweed): +: Introduced.	84, 86
<i>Oenanthe crocata</i> (Hemlock Water-dropwort): Rare: Blackness; In a few places along the upstream part of the Forth shore.	84, 86
<i>Aethusa cynapium</i> (Fool's Parsley): +: Seabegs Wood.	86
<i>Conium maculatum</i> (Hemlock): +.	84, 86
<i>Apium inundatum</i> (Lesser Marshwort): Rare: Bonnybridge Dam.	86
<i>Carum verticillatum</i> (Whorled Caraway): Rare: Denny Muir; Loch Ellrig; California Muir.	86
<i>Angelica sylvestris</i> (Wild Angelica): Common.	84, 86
<i>Peucedanum ostruthium</i> (Masterwort): Rare: Top of	

Carron Glen: Introduced.	86
<i>Pastinaca sativa</i> (Wild Parsnip): + : Grangemouth Docks: Introduced.	86
<i>Heracleum sphondylium</i> (Hogweed): Common.	84, 86
<i>H. mantegazzianum</i> (Giant Hogweed): + : Carron Dams: Introduced.	86
<i>Torilis japonica</i> (Upright Hedge-parsley): Local.	84, 86
<i>Mercurialis perennis</i> (Dog's Mercury): Local.	84, 86
<i>Euphorbia helioscopia</i> (Sun Spurge): (+ : FLK).	
<i>Polygonum aviculare</i> agg. (Knotgrass): Common: Including <i>P. aviculare</i> ss. and <i>P. arenastrum</i> .	84, 86
<i>P. amphibium</i> (Amphibious Bistort): Local.	84, 86
<i>P. persicaria</i> (Redshank): Common.	84, 86
<i>P. hydropiper</i> (Water-pepper): + .	84, 86
<i>Reynoutria japonica</i> (Japanese Knotweed): + : Introduced.	84, 86
<i>Fallopia convolvulus</i> (Black-bindweed): + : Kinneil Bing.	84
<i>Rumex tenuifolius</i> (Narrow-leaved Sorrel): (+ : FLK)	
<i>R. acetosella</i> ss. (Sheep's Sorrel): Common.	84, 86
<i>R. acetosa</i> (Common Sorrel): Common.	84, 86
<i>R. alpinus</i> (Monk's-rhubarb): Rare: Castlerankine Glen; Torwood Glen: Introduced.	86
<i>R. crispus</i> (Curled Dock): Common.	84, 86
<i>R. obtusifolius</i> (Broad-leaved Dock): Common.	84, 86
<i>R. sanguineus</i> (Blood-veined Dock): Local.	84, 86
<i>Rheum rabarbarum</i> (Rhubarb): + : Union Canal near Polmont; By Candie Moss: Introduced.	86
<i>Urtica dioica</i> (Common Nettle): Common.	84, 86
<i>Humulus lupulus</i> (Hop): Rare: Old bing near Almond; Union Canal near Whitecross: Introduced.	86
<i>Ulmus glabra</i> (Wych Elm): Common: Often planted.	84, 86
<i>Betula pendula</i> (Silver Birch): Common.	84, 86
<i>B. pubescens</i> (Downy Birch): Common.	84, 86
<i>Alnus glutinosa</i> (Alder): Frequent.	84, 86
<i>Carpinus betulus</i> (Hornbeam): Rare: Dunmore Wood; Muiravonside: Planted.	86
<i>Corylus avellana</i> (Hazel): Local: In most of the richer woodlands.	84, 86
<i>Fagus sylvatica</i> (Beech): Common: Normally planted, but sometimes self-seeding.	84, 86
<i>Castanea sativa</i> (Sweet Chestnut): Local: Probably always planted.	86
<i>Quercus cerris</i> (Turkey Oak): Rare: Callendar Park; Kinneil Estate; Skipperton Glen: Planted.	84, 86
<i>Q. robur</i> (Pedunculate Oak): Common: Generally planted.	84, 86
<i>Q. petraea</i> (Sessile Oak): Local: Generally planted.	84, 86
<i>Populus alba</i> (White Poplar): Rare: Union Canal near Redding Muirhead; Muiravonside; Callendar Park:	

- Planted, but often suckering. 86
- P. tremula* (Aspen): Rare: Old bing near Almond. 86
- P. nigra* agg. (Black Poplar): Local: Both *P. nigra* ss. and *P. x canadensis* occur, but the latter seems to be more frequent: Probably always planted. 84, 86
- P. trichocarpa* agg. (Balsam Poplar): Local: Both *P. trichocarpa* and *P. x gileadensis* occur: Probably always planted, but often suckering. 84, 86
- Salix pentandra* (Bay Willow): Local: River Avon west of Slamannan; Loch Ellrig; Lochgreen Marsh; Polmont Burn near Shieldhill; Skipperton Glen; Forth and Clyde Canal near Castlecary. 86
- S. alba* (White Willow): Local: Introduced. 86
- S. x rubens* (Hybrid Crack Willow): Rare: Carron Dams: Introduced. 86
- S. fragilis* (Crack Willow): Frequent, but absent from the southern part of the District: Introduced. 84, 86
- S. decipiens* (Welsh Willow): Rare: Near the east end of the Forth and Clyde Canal: Introduced. 86
- S. purpurea* (Purple Willow): Rare: Carron Glen; Loch Ellrig; Parkfoot Marsh; Polmont Burn near Shieldhill. 86
- S. viminalis* (Osier): Local. 84, 86
- S. x smithiana* (Hybrid Osier): Rare: Carron Glen; Carron Dams. 86
- S. caprea* (Goat Willow): Common. 84, 86
- S. cinerea* subsp. *oleifolia* (Rusty Willow): Common. 84, 86
- S. aurita* (Eared Willow): Frequent, but absent from the eastern part of the District. 86
- S. nigricans* (Dark-leaved Willow): Rare: Carron Glen. 86
- S. phyllicifolia* (Tea-leaved Willow): Rare: Denny Muir; Carron Glen; Darnrig Moss. 86
- Ledum groenlandicum* (Labrador-tea): Rare: A thriving colony in Dunmore Wood: Almost certainly introduced. 86
- Rhododendron ponticum* (Rhododendron): Local: Introduced. 84, 86
- Calluna vulgaris* (Heather, Ling): Common, particularly on the higher ground. 84, 86
- Erica tetralix* (Cross-leaved Heath): Frequent, but absent from the north-east part of the District. 86
- E. cinerea* (Bell Heather): Local: Denny Muir; Carron Glen; Braes Wood; Candie Moss; Drum Wood. 86
- Vaccinium vitis-idaea* (Cowberry): Rare: Braes Wood. 86
- V. myrtillus* (Bilberry, Blaeberry): Common. 84, 86
- V. oxycoccus* (Cranberry): Local: Often in quantity where it occurs. 86
- Pyrola minor* (Common Wintergreen): Rare: Old bing near Almond; A *Pyrola* without flowers was also seen by

- the Union Canal near the Avon aqueduct and was probably this species. 86
- Empetrum nigrum* (Crowberry): Local. 86
- Armeria maritima* (Thrift, Sea Pink): Fairly frequent along the upper Forth saltmarshes upstream to Dunmore; Also at Blackness. 84, 86
- Primula vulgaris* (Primrose): Local. 84, 86
- Lysimachia nemorum* (Yellow Pimpernel): Local. 84, 86
- L. punctata* (Dotted Loosestrife): + : Union Canal near Polmont; Wallacebank Wood: Introduced. 86
- L. thyrsiflora* (Tufted Loosestrife): Confined to the canals, where it is common. 86
- Trientalis europaea* (Chickweed Wintergreen): Rare: Tor Wood. 86
- Glaux maritima* (Sea-milkwort): Frequent along the more natural parts of the shore. 84, 86
- Fraxinus excelsior* (Ash): Common, but probably mostly planted or of planted origin. 84, 86
- Syringa vulgaris* (Lilac): + : Muiravonside: Planted, but sometimes suckering. 86
- Ligustrum vulgare* agg. (Privet): Local: Introduced. 84, 86
- Centaureum erythraea* (Common Centaury): Rare: Meadow at Rough Castle. 86
- Menyanthes trifoliata* (Bogbean): Local. 86
- Symphytum x uplandicum* (Russian Comfrey): + : Seabank near Skinflats: Introduced. 86
- S. tuberosum* (Tuberous Comfrey): Local. 84, 86
- Myosotis scorpioides* (Water Forget-me-not): Frequent. 84, 86
- M. secunda* (Creeping Forget-me-not): Local. 84, 86
- M. laxa* subsp. *caespitosa* (Lesser Water Forget-me-not): Frequent. 84, 86
- M. arvensis* (Field Forget-me-not): + . 84, 86
- M. discolor* (Changing Forget-me-not): + : Carron Glen; Wester Burnhead Wood; Muiravonside; Grangemouth Docks. 86
- Echium vulgare* (Viper's-bugloss): + : Kinneil Bing. 84
- Calystegia sepium* subsp. *sepium* (Hedge Bindweed): + . 84, 86
- C. sepium* subsp. *pulchra* (Hairy Bindweed): + : Union Canal at Polmont; Candie Moss: Introduced. 86
- Solanum dulcamara* (Bittersweet): + : Kinneil Timber Basin. 84
- S. tuberosum* (Potato): + : Introduced. 84
- Lycopersicum esulentum* (Tomato): + : Introduced. 84
- Verbascum thapsus* (Great Mullein): + : Kinneil Timber Basin. 84
- Antirrhinum majus* (Snapdragon): + : Carron Glen: Introduced. 86
- Linaria vulgaris* (Common Toadflax): + . 84, 86

<i>Scrophularia nodosa</i> (Common Figwort): Local.	84, 86
<i>Mimulus guttatus</i> agg. (Monkeyflower): Rare: Whitehill Reservoir; Castlerankine Glen; Carron Glen; Muiravonside; Avon Banks Wood.	84, 86
<i>M. moschatus</i> (Musk): Rare: Dunmore Wood: Introduced.	86
<i>Digitalis purpurea</i> (Foxglove): Frequent.	84, 86
<i>Veronica beccabunga</i> (Brooklime): Local.	84, 86
<i>V. scutellata</i> (Marsh Speedwell): Local, and absent from the north and east parts of the District.	86
<i>V. officinalis</i> (Heath Speedwell): Local, but rare in the south-west part of the District.	86
<i>V. montana</i> (Wood Speedwell): Rare: Castlecary Glen; Castlerankine Glen; Muiravonside.	86
<i>V. chamaedrys</i> (Germander Speedwell): Frequent, but rare in the southern part of the District.	84, 86
<i>V. serpyllifolia</i> (Thyme-leaved Speedwell): +.	84, 86
<i>V. arvensis</i> (Wall Speedwell): +.	84, 86
<i>V. persica</i> (Common Field-speedwell): +.	86
<i>V. filiformis</i> (Slender Speedwell): +: Blackness: Introduced.	84
<i>Pedicularis palustris</i> (Marsh Lousewort): Rare: Denny Muir; Black Loch; Loch Ellrig.	86
<i>P. sylvatica</i> (Lousewort): Local.	86
<i>Rhinanthus minor</i> (Yellow-rattle): Frequent.	84, 86
<i>Melampyrum pratense</i> (Common Cow-wheat): Rare: Seabegs Wood.	86
<i>Euphrasia officinalis</i> (Eyebright): Frequent: Most plants belong to <i>E. arctica</i> , but other species present include <i>E. scottica</i> on Denny Muir.	86
<i>Odontites verna</i> agg. (Red Bartsia): +.	84, 86
<i>Mentha arvensis</i> (Corn Mint): Rare: Dunmore Wood; Callendar Park.	86
<i>M. x verticillata</i> (Whorled Mint): Local.	86
<i>M. aquatica</i> (Water Mint): Frequent.	86
<i>M. x piperita</i> (Peppermint): Rare: Castlecary Glen; Castlerankine Glen; Carron Glen; Union Canal near Redding Muirhead: Introduced.	86
<i>M. spicata</i> (Spear Mint): Rare: Union Canal near Redding Muirhead: Introduced.	86
<i>M. x villosa</i> (Apple Mint): +: Carriden: Introduced.	84
<i>Lycopus europaeus</i> (Gipsywort): Local, but frequent along the canals; Also at Carron Dams and Callendar Park Pond.	86
<i>Thymus praecox</i> subsp. <i>arcticus</i> (Wild Thyme): Rare: Denny Muir; Carron Glen; Blackness.	84, 86
<i>Prunella vulgaris</i> (Selfheal): Common.	84, 86
<i>Stachys palustris</i> (Marsh Woundwort): Frequent.	84, 86

- S. sylvatica* (Hedge Woundwort): Frequent. 84, 86
S. x ambigua (Hybrid Woundwort): Rare: Castlecary Glen. 86
Lamium amplexicaule (Henbit Dead-nettle): +: Blackness. 84
L. album (White Dead-nettle): +: Muiravonside; Blackness. 84, 86
Galeopsis tetrahit agg. (Common Hemp-nettle): +: Both *G. tetrahit* ss. and *G. bifida* occur. 84, 86
G. speciosa (Large-flowered Hemp-nettle): +: Seabegs Wood; Kinneil Estate. 84, 86
Glechoma hederacea (Ground Ivy): Local. 84, 86
Scutellaria galericulata (Skullcap): Rare: Callendar Park Pond. 86
Teucrium scorodonia (Wood Sage): Frequent. 84, 86
Ajuga reptans (Bugle): Local. 84, 86
Plantago major (Greater Plantain): Common. 84, 86
P. lanceolata (Ribwort Plantain): Common. 84, 86
P. maritima (Sea Plantain): Common along the shore of the Forth. 84, 86
Littorella uniflora (Shoreweed): Local: Whitehill, Drumbowie, Little Denny, and Overton Reservoirs; Bonnybridge Dam; Black Loch; Loch Ellrig. 86
Campanula latifolia (Giant Bellflower): Rare: Carron Glen; In several places along or near to the Avon valley: Introduced. 84, 86
C. persicifolia (Peach-leaved Bellflower): +: Union Canal at Polmont: Introduced. 86
C. rotundifolia (Harebell, Bluebell): Apparently confined to, but frequent in a band running from Carronbridge and Castlecary to Polmont and Redding Muirhead. 86
Lobelia erinus (Garden Lobelia): +: Fankerton: Introduced. 86
Galium odoratum (Woodruff): Local: Castlerankine Glen; Carron Glen; In various places along, or close to the Avon valley. 86
G. cruciata (Crosswort): Local. 84, 86
G. mollugo agg. (Hedge Bedstraw): Rare: Parkfoot Marsh; Meadow at Rough Castle. 86
G. verum (Lady's Bedstraw): Local. 84, 86
G. saxatile (Heath Bedstraw): Common. 84, 86
G. palustre agg. (Marsh-bedstraw): Common. 84, 86
G. uliginosum (Fen Bedstraw): Rare: Denny Muir; Carron Glen; River Avon near Slamannan and near South Glen. 86
G. aparine (Cleavers, Goosegrass): Common. 84, 86
Sambucus nigra (Elder): Frequent. 84, 86
S. racemosa (Red-berried Elder): Rare: Castlecary Glen;

- Haining Wood; Avon Banks Wood: Introduced. 84, 86
- Viburnum opulus* (Guelder-rose): Rare: Castlecary Glen; Castlerankine Glen; Carron Glen; Torwood Glen; Kinneil Estate: Mostly appearing native. 84, 86
- Symphoricarpos rivularis* (Snowberry): Local: Introduced. 84, 86
- Lonicera periclymenum* (Honeysuckle): Frequent. 84, 86
- Adoxa moschatellina* (Moschatel): (Rare: Avon Banks Wood **FLK**).
- Valeriana officinalis* (Common Valerian): Frequent. 84, 86
- Succisa pratensis* (Devils'-bit Scabious): Common. 86
- Senecio jacobea* (Common Ragwort): Common. 84, 86
- S. aquaticus* (Marsh Ragwort): Frequent. 84, 86
- S. squalidus* (Oxford Ragwort): +: Introduced. 84, 86
- S. x londinensis* (Hybrid Oxford Ragwort): +: Kinneil Tip. 84
- S. sylvaticus* (Heath Groundsel): +: Dunmore Wood. 86
- S. viscosus* (Sticky Groundsel): +. 84, 86
- S. vulgaris* (Groundsel): +. 84, 86
- Doronicum pardalianches* (Leopard's-bane): Confined to, but frequent in the Avon Valley and at Carriden Woods: Introduced. 84, 86
- D. plantagineum* (Plantain-leaved Leopard's-bane): Rare: Carriden Glen: Introduced. 84
- Tussilago farfara* (Colt's-foot): Common. 84, 86
- Petasites hybridus* (Butterbur): Local: Castlecary Glen and along the Avon Valley: ? Introduced. 86
- P. albus* (White Butterbur): Rare: Castlerankine Glen; Union Canal near Glen Village; Callendar Park: Introduced. 86
- Inula helenium* (Elecampane): Rare: Planted on the sea-banking near Skinflats, as a transplant from a nearby road verge, by Mr Drysdale of Skinflats. 86
- Gnaphalium uliginosum* (Marsh Cudweed): Common. 84, 86
- Solidago virgaurea* (Goldenrod): Rare: Carron Glen; River Avon west of Slamannan. 86
- S. canadensis* (Canadian Goldenrod): +: Grangemouth Docks: Introduced. 86
- S. gigantea* (Early Goldenrod): +: Blaeberry Mair; Kinneil Tip: Introduced. 84, 86
- Aster tripolium* (Sea Aster): Frequent along the coast. 84, 86
- A. novi-belgii* (Michaelmas-daisy): +: Introduced. 84, 86
- Bellis perennis* (Daisy): Common. 84, 86
- Eupatorium cannabinum* (Hemp-agrimony): Rare: Avon Banks Wood. 84, 86
- Achillea millefolium* (Yarrow): Common. 84, 86
- A. ptarmica* (Sneezewort): Common. 86
- Tripleurospermum maritimum* agg. (Scentless Mayweed): +. 84, 86
- Matricaria matricarioides* (Pineappleweed): +. 84, 86

- Chrysanthemum segetum* (Corn Marigold): (+ : FLK).
Leucanthemum vulgare (Oxeye Daisy): Frequent . 84, 86
L. maximum (Shasta Daisy): + : Kinneil Tip; Union canal
 at Polmont: Introduced. 84, 86
Tanacetum parthenium (Feverfew): + : Union Canal near
 Almond: Introduced. 86
T. vulgare (Tansy): + . 84
Artemisia vulgaris (Mugwort): + . 84, 86
A. absinthium (Wormwood): + : Grangemouth Docks. 86
Arctium minus subsp. *nemorosum* (Lesser Burdock): + . 84, 86
Carduus nutans (Musk Thistle): + : Whitehill near
 Banknock. 86
C. acanthoides (Wetted Thistle): + . 84, 86
Cirsium vulgare (Spear Thistle): Common. 84, 86
C. palustre (Marsh Thistle): Common. 84, 86
C. arvense (Creeping Thistle): Common. 84, 86
C. helenioides (Melancholy Thistle): Rare: Carron Glen. 86
Onopordum acanthium (Cotton Thistle): + : Kinneil
 Timber Basin: Introduced. 84
Centaurea nigra (Common Knapweed, Hardhead):
 Common. 84, 86
Lapsana communis (Nipplewort): Local. 84, 86
Hypochaeris radicata (Cat's-ear): Common. 84, 86
Leontodon autumnalis (Autumn Hawkbit): Common. 84, 86
Tragopogon pratensis (Goat's-beard, Jack-go-to-bed-at-
 noon): + : Skinflats Bay; Grangemouth Docks. 86
Sonchus arvensis (Perennial Sow-thistle): + . 84, 86
S. oleraceus (Smooth Sow-thistle): + . 84, 86
S. asper (Prickly Sow-thistle): + . 84, 86
Hieracium murorum agg. (Common Hawkweed):
 Common: Including various sect. *Subaudea/Foliosa*
 (frequent), *H. vulgatum* (frequent) and another sect.
Vulgata (Rare, Castlerankine Glen). 84, 86
H. pilosella (Mouse-ear Hawkweed): Local. 84, 86
H. aurantiacum agg. (Fox-and-cubs): + : Carriden shore:
 Introduced. 84
Crepis capillaris (Smooth Hawk's-beard): + . 84, 86
C. paludosa (Marsh Hawk's-beard): Local. 84, 86
Taraxacum sect. *Spectabilia* (Red-veined Dandelion):
 Rare: Denny Muir; Carron Glen; Black Loch; Darnrig
 Moss. 86
T. sect. *Taraxacum* (Common Dandelion): Common. 84, 86

ANGIOSPERMS – MONOCOTYLEDONS

- Alisma plantago-aquatica* (Water-plantain): Local: The
 canals; Parkfoot Marsh; Drumbowie Reservoir; Carron
 Dams; River Avon west of Slamannan. 86

<i>Sagittaria sagittifolia</i> (Arrowhead): Rare: Scattered along the Forth and Clyde Canal: Presumably introduced.	86
<i>Hydrocharis morsus-ranae</i> (Frogbit): Rare, but in quantity along the Forth and Clyde Canal from Allandale to east of Bonnybridge: Presumably introduced.	86
<i>Elodea canadensis</i> (Canadian Waterweed): Local, but often abundant where it occurs: Introduced.	86
<i>E. nuttallii</i> (Nuttall's Waterweed): Rare: Forth and Clyde Canal west of the M80: Introduced.	86
<i>Triglochin palustris</i> (Marsh Arrowgrass): Local.	84, 86
<i>T. maritima</i> (Sea Arrowgrass): Common along the shore of the Forth.	84, 86
<i>Zostera angustifolia</i> (Narrow-leaved Eelgrass): Rare: Carriden Bay.	84
<i>Z. noltii</i> (Dwarf Eelgrass): Rare, but in fair quantity in Carriden Bay and the bay east of Blackness.	84
<i>Potamogeton natans</i> (Broad-leaved Pondweed): Frequent.	86
<i>P. polygonifolius</i> (Bog Pondweed): Local, and confined to ground above 100 metres.	86
<i>P. alpinus</i> (Red Pondweed): Rare: Faughlin Reservoir; Forth and Clyde Canal near Bonnybridge.	86
<i>P. perfoliatus</i> (Perfoliate Pondweed): Rare: Bonnybridge Dam; Several places on the Forth and Clyde Canal west of Rough Castle.	86
<i>P. obtusifolius</i> (Blunt-leaved Pondweed): Rare: Forth and Clyde Canal westwards from Camelon.	86
<i>P. berchtoldii</i> (Small Pondweed): Local.	86
<i>P. crispus</i> (Curled Pondweed): Rare: Several places along the Forth and Clyde Canal; Union Canal at the Avon aqueduct; Pond at Muiravonside; Skinflats Ponds.	86
<i>P. pectinatus</i> (Fennel Pondweed): Rare: Lathallan Sandpit.	86
<i>Narthecium ossifragum</i> (Bog Asphodel): Local.	86
<i>Convallaria majalis</i> (Lily-of-the-valley): Rare: Avon Banks Wood — confined to one patch, but appears to be native.	86
<i>Polygonatum x hybridum</i> (Hybrid Solomon's Seal): + : Blaeberry Mair; Muiravonside: Introduced.	86
<i>Lilium martagon</i> (Martagon Lily): Rare: Avon Banks Wood: Introduced.	84
<i>Ornithogalum umbellatum</i> (Star-of-Bethlehem): Rare: Carriden: Introduced.	84
<i>Hyacinthoides non-scriptus</i> (Bluebell, Wild Hyacinth): Local.	84, 86
<i>Allium ursinum</i> (Ramsons): Rare: Carron Glen; Kinneil Estate; (Avon Banks Wood FLK): Perhaps under-recorded due to the season of survey.	84, 86

- Juncus subulatus* (Subulate Rush): Rare: Grangemouth
Docks: Presumably introduced. 86
- J. squarrosus* (Heath Rush): Frequent in the south and
west parts of the District. 86
- J. tenuis* (Slender Rush): +. 86
- J. gerardii* (Saltmarsh Rush): Frequent along the coast. 84, 86
- J. bufonius* agg. (Toad Rush): Common. 84, 86
- J. inflexus* (Hard Rush): Local. 84, 86
- J. effusus* (Soft-rush): Common. 84, 86
- J. conglomeratus* (Compact Rush): Common. 84, 86
- J. acutiflorus* (Sharp-flowered Rush): Common. 86
- J. articulatus* (Jointed Rush): Common. 84, 86
- J. bulbosus* agg. (Bulbous Rush): Frequent. 86
- Luzula pilosa* (Hairy Wood-rush): Local. 84, 86
- L. sylvatica* (Great Wood-rush): Frequent. 84, 86
- L. campestris* (Field Wood-rush): Frequent. 84, 86
- L. multiflora* (Heath Wood-rush): Common. 86
- Galanthus nivalis* (Snowdrop): (+: **FLK**): Introduced.
- Iris pseudacorus* (Yellow Iris): Local. 84, 86
- Epipactis helleborine* (Broad-leaved Helleborine): Rare:
Old bing near Almond; River Avon near North Glen. 86
- Listera ovata* (Common Twayblade): Rare: Old bing near
Almond. 86
- L. cordata* (Lesser Twayblade): (Rare: Candie Moss **FLK**). 86
- Platanthera chlorantha* (Greater Butterfly-orchid): Rare:
Carron Glen; Braes Wood; Meadow at Rough Castle;
Candie Moss; Muiravonside. 86
- Dactylorhiza fuchsii* (Common Spotted-orchid): Frequent,
though local on the Slamannan Plateau. 86
- D. fuchsii* x *purpurella* (Hybrid Marsh-orchid): Rare:
Carron Glen; Parkfoot Marsh: Perhaps overlooked due
to the season of survey. 86
- D. maculata* subsp. *ericetorum* (Heath Spotted orchid):
Fairly frequent on the ground above 100 metres
altitude. 86
- D. purpurella* (Northern Marsh-orchid): Local. 86
- Arum maculatum* (Lords-and-Ladies): Rare: Avon Banks
Wood: Introduced. 84
- Lemna trisulca* (Ivy-leaved Duckweed): Local, but often
abundant where it occurs: The canals; Parkfoot
Marsh; Pineapple Ponds, Dunmore; California Muir. 86
- L. minor* (Common Duckweed): Frequent. 86
- L. gibba* (Fat Duckweed): Rare: Union Canal near
Almond, but perhaps overlooked elsewhere on the
Union Canal: Perhaps introduced. 86
- Sparganium erectum* (Branched Bur-reed): Frequent. 84, 86
- S. emersum* (Unbranched Bur-reed): Rare: River Avon
west of Slamannan; Forth and Clyde Canal near the

M80; Union Canal near Polmont; California Muir.	86
<i>S. minimum</i> (Least Bur-reed): Rare: Limerigg Ponds; California Muir.	86
<i>Typha latifolia</i> (Bulrush, Reedmace): Local.	84, 86
<i>Eriophorum angustifolium</i> (Common Cottongrass): Frequent, though rare in the north-east part of the District.	86
<i>E. vaginatum</i> (Hare's-tail Cottongrass): Frequent, though rare in the north-east part of the District.	86
<i>Trichophorum cespitosum</i> (Deergrass): Local, and confined to the south and west parts of the District.	86
<i>Eleocharis palustris</i> (Common Spike-rush): Frequent.	84, 86
<i>Scirpus maritimus</i> (Sea Club-rush): Local in brackish situations near the coast, but only on the shore of the Forth upstream of Dunmore.	86
<i>Schoenoplectus tabernaemontani</i> (Grey Club-rush, Grey Bulrush): Rare: Grangemouth Docks.	86
<i>Isolepis setacea</i> (Bristle Club-rush): Rare: Near Whitehill Reservoir; Carron Glen; Blackhill Moss near Castlecary; Muiravonside; Callendar Park.	86
<i>Carex laevigata</i> (Smooth-stalked Sedge): Rare: Carron Glen; (Callendar Wood FLK).	86
<i>C. hostiana</i> (Tawny Sedge): Rare: Denny Muir.	86
<i>C. binervis</i> (Green-ribbed Sedge): Frequent, mainly in the south and west parts of the District.	84, 86
<i>C. lepidocarpa</i> (Long-stalked Yellow-sedge): Rare: Carron Glen; Polmont Burn near Shieldhill; River Avon at South Glen.	86
<i>C. demissa</i> (Common Yellow-sedge): Local.	86
<i>C. sylvatica</i> (Wood-sedge): Rare: Castlecary Glen; Carron Glen; Torwood Glen; Muiravonside; Union Canal near River Avon.	86
<i>C. rostrata</i> (Bottle Sedge): Frequent .	84, 86
<i>C. pendula</i> (Pendulous Sedge): Rare: Avon Banks Wood, where it is frequent and appears native.	84, 86
<i>C. pallescens</i> (Pale Sedge): Rare: Carron Glen; South Glen.	86
<i>C. panicea</i> (Carnation Sedge): Frequent.	86
<i>C. limosa</i> (Bog-sedge): Rare: Bog by Drum Wood.	86
<i>C. flacca</i> (Glaucous Sedge): Local.	86
<i>C. hirta</i> (Hairy Sedge): Rare: Union Canal near Almond; Muiravonside; Blackness; Forth and Clyde Canal near Camelon.	84, 86
<i>C. pilulifera</i> (Pill Sedge): Local.	86
<i>C. caryophyllea</i> (Spring-sedge): Rare: Denny Muir; Carron Glen; Muiravonside: Perhaps overlooked due to the season of survey.	86
<i>C. aquatilis</i> (Winter Sedge): Rare: Faughlin Reservoir;	

- Carron Glen; Darnrig Moss. 86
- C. nigra* (Common Sedge): Common, particularly in the south and west parts of the District. 84, 86
- C. otrubae* (False Fox-sedge): Scattered along the coast, usually in brackish situations. 84, 86
- C. disticha* (Brown Sedge): Rare: River Avon at South Glen; Kinneil Estate. 84, 86
- C. echinata* (Star Sedge): Fairly frequent in the south and west parts of the District. 86
- C. remota* (Remote Sedge): Local. 84, 86
- C. curta* (White Sedge): Frequent on the ground above 100 metres altitude and on the mosses on the carse of the Forth. 86
- C. ovalis* (Oval Sedge): Common. 86
- C. pulicaris* (Flea Sedge): Rare: Denny Muir. 86
- Festuca pratensis* (Meadow Fescue): +. 84, 86
- F. arundinacea* (Tall Fescue): Local. 84, 86
- F. gigantea* (Giant Fescue): Local: In most of the richer valley woods. 84, 86
- F. rubra* (Red Fescue): Common: Both subsp. *rubra* and subsp. *commutata* occur. 84, 86
- F. ovina* (Sheep's-fescue): Common: Both *F. ovina* ss. and *F. tenuifolia* are widespread. 84, 86
- Lolium perenne* subsp. *perenne*: (Perennial Rye-grass): Common. 84, 86
- L. perenne* subsp. *multiflorum* (Italian Rye-grass): +. 86
- Vulpia bromoides* (Squirreldale Fescue): (+: **FLK**)
- V. myorus* (Rat's-tail Fescue): +: Kinneil Bing and Tip. 84
- Poa annua* (Annual Meadow-grass): Common. 84, 86
- P. nemoralis* (Wood Meadow-grass): Rare: Carron Glen; Carron Dams; Muiravonside; Kinneil Estate; Avon Banks Wood. 84, 86
- P. pratensis* agg. (Smooth Meadow-grass): Common. 84, 86
- P. trivialis* (Rough Meadow-grass): Common. 84, 86
- Puccinellia maritima* (Common Saltmarsh-grass): Common along the shore of the Forth. 84, 86
- P. distans* (Reflexed Saltmarsh-grass): Scattered along the shore of the Forth, usually in disturbed brackish situations. 84, 86
- Dactylis glomerata* (Cock's-foot): Common. 84, 86
- Cynosurus cristatus* (Crested Dog's-tail): Common. 84, 86
- Briza media* (Quaking-grass): Rare: Union Canal near Almond. 86
- Melica uniflora* (Wood Melick): Rare: Castlerankine Glen; Carron Glen; Muiravonside. 86
- Glyceria fluitans* (Floating Sweet-grass): Common. 84, 86
- G. declinata* (Small Sweet-grass): Local. 84, 86
- G. maxima* (Reed Sweet-grass): Local, but often

- abundant where it occurs: The canals; Carron Dams;
Along the River Avon. 84, 86
- Bromus sterilis* (Barren Brome): +: Near the shore from
Bo'ness eastwards. 84
- B. ramosus* (Hairy-brome): Local. 84, 86
- B. hordaceus* subsp. *hordaceus* (Soft-brome): +. 84, 86
- Brachypodium sylvaticum* (False Brome): Local: Carron
Glen; Various places along or close to the Avon Valley. 84, 86
- Elymus caninus* (Bearded Couch): Local: Castlecary Glen;
Castlerankine Glen; Carron Glen; Carriden Glen;
Various places along the Avon valley. 84, 86
- E. repens* (Common Couch, Twitch): Common. 84, 86
- E. farctus* (Sand Couch): Rare: Carriden Bay. 84
- Triticum aestivum* (Bread Wheat): +: Grangemouth
Docks: Introduced. 86
- Hordeum distichon* (Two-rowed Barley): +: Introduced. 84, 86
- Avena fatua* (Wild-oat): +: Introduced. 86
- A. sativa* (Oat): +: Introduced. 84, 86
- Avenula pubescens* (Downy Oat-grass): Rare: Carron
Glen. 86
- Arrhenatherum elatius* (False Oat-grass): Common. 84, 86
- Koeleria macrantha* agg. (Crested Hair-grass): Rare:
Blackness. 84
- Trisetum flavescens* (Yellow Oat-grass): Rare: Several
places along the Union Canal; Howierig Wood;
Blackness. 84, 86
- Deschampsia cespitosa* (Tufted Hair-grass): Common. 84, 86
- D. flexuosa* (Wavy Hair-grass): Common. 84, 86
- Aira praecox* (Early Hair-grass): +. 84, 86
- A. caryophyllea* (Silver Hair-grass): +: Blackness; By
Loch Ellrig. 84, 86
- Anthoxanthum odoratum* (Sweet Vernal-grass):
Common. 84, 86
- Holcus lanatus* (Yorkshire-fog): Common. 84, 86
- H. mollis* (Creeping Soft-grass): Common. 84, 86
- Agrostis canina* agg. (Brown Bent): Fairly frequent on
ground above 100 metres. 84, 86
- A. capillaris* (Common Bent): Common. 84, 86
- A. stolonifera* (Creeping Bent): Common. 84, 86
- Calamagrostis epigejos* (Wood Small-reed): +: Carron
Dams; Grangemouth Docks to Kinneil: Always in
disturbed situations. 84, 86
- Phleum pratense* subsp. *pratense* (Timothy): +. 84, 86
- P. pratense* subsp. *bertolonii* (Smaller Cat's-tail): (+:
FLK).
- Alopecurus pratensis* (Meadow Foxtail): Frequent. 84, 86
- A. geniculatus* (Marsh Foxtail): Frequent. 84, 86
- Phalaris arundinacea* (Reed Canary-grass): Frequent. 84, 86

<i>P. canariensis</i> (Canary-grass): (+ : FLK): Introduced.	
<i>Milium effusum</i> (Wood Millet): Local: Mainly in the richer valley woods, but also occurring in some coniferous and mixed woods in the northern part of the District.	84, 86
<i>Phragmites australis</i> (Common Reed): Local.	84, 86
<i>Danthonia decumbens</i> (Heath-grass): Fairly frequent, but absent from the coastal plain.	86
<i>Molinia caerulea</i> (Purple Moor-grass): Common on ground above 100 metres altitude.	86
<i>Nardus stricta</i> (Mat-grass): Common on ground above 100 metres, but rare elsewhere.	86
<i>Spartina anglica</i> agg. (Common Cord-grass): (Not seen by the author, but one small patch was recorded in Skinflats Bay in 1984 by H. E. Stace pers. comm.).	86

EDITORIAL NOTE

Further authoritative flora or provisional plants lists which we expect to publish in the next year or so are –

Stirlingshire – by R. J. Keymer

West Fife – by George Ballantyne

Clackmannanshire – by N. F. Stewart and H. Stace

We have also an intent to publish, or make available, schedules of species data on Flora and Fauna of the Forth stemming from the major symposium of the Royal Society of Edinburgh *The Natural Environment of the Estuary of the Forth*, editor D. S. McLusky of the University of Stirling.

Volume 11 will have a paper 'The Sticky Catchfly (*Lychnis viscaria* L.) on the Abbey Craig, Stirling', by N. F. Stewart; also 'Dutch Elm Disease in Central Scotland – 1987' by Ruth Neiland and J. W. Shepherd – a complement to Greensill's paper in volume 2, 71-78, 1977.

Papers are expected on Ferns in Bridge of Allan from J. Proctor, and Lichens in Kippenrate by P. W. James.

We may not be publishing but there is a paper on the 1978 Survey of Lichens along the South Bank of the Firth of Forth – an MSC supported project by Napier College, Edinburgh – S. Sharp and K. J. Anderson.

The University of Stirling

The Heritage of Scotland

INTERNATIONAL SUMMER SCHOOLS

Scottish Wildlife, Scottish Traditional Dancing, Clarsach playing, Roman Scotland, Scottish Folk Tradition, Highland Dancing, Scottish Culinary Tradition, Accordion playing, Scottish Singing, Calligraphy, Highland Bagpipe playing, Scottish Traditional fiddle playing, various crafts, including spinning and weaving, Tracing Your Ancestors, are all aspects of Scotland which are studied over a ten-week period each summer at the University of Stirling. Each course lasts one week and may be residential. These schools are now into their eleventh year, and an increasing number of Local Education Authorities help individuals with fees. Hundreds of people of all ages attend each year from more than a dozen countries around the world. Some return every year.

All tutors are experts in their field and tuition takes place in Airthrey Castle, which is a two hundred year old building situated on the university campus, designed by the celebrated Scottish architect, Robert Adam. Professionally accompanied bus tours into the area around Stirling — an area which is immensely important historically — are arranged each week.

New schools for 1988 include Flute Playing, Piano Accompaniment, Cauld Wind Piping and Scots and Oral History to be tutored by Billy Kay.

Further details may be obtained from

**Robert Innes, Director of Continuing Education, Airthrey Castle,
The University, Stirling, Scotland.**

Phone 0786 73171 extension 2025.

**If it's service
you want...
come and bank
with us.**



BANK OF SCOTLAND
A FRIEND FOR LIFE

Our Branch in the University
is situated at the MacRobert Centre

HAVING PROBLEMS ARRANGING MEETINGS ?

There is one clear **CENTRAL** location for Scotland and the North of England area: **STIRLING**. Ease of access by road, rail and from Turnhouse and Abbotsinch airports; beauty of setting, wide range of amenity, inexpensive pricing, all make **STIRLING** and its **UNIVERSITY** the national focus of any residential or non-residential meeting organiser's thoughts. The **UNIVERSITY'S** facilities are available in vacations and in term time (small resident groups only). Group sizes from 2 to 2000 considered in vacations!

The **UNIVERSITY OF STIRLING'S** beautiful Campus, the 5-person chalets and 6-person flats near Stirling Castle and Shopping Centre, offer wonderful family holiday potential, and a base from which to explore all Central Scotland in the summer. Good parking and recreation. Prices, which include electricity and Value Added Tax, are always moderate.

For further information contact: **JOHN RIDDY ESQ, M.A., SENIOR ASSISTANT SECRETARY, UNIVERSITY OF STIRLING, STIRLING FK9 4LA.** Telephone (0786) 73171 Ext. 2039. Telex: 777557 STUNIV G.

NEW BOOKS

COUNTRYSIDE PLANNING IN PRACTICE: THE SCOTTISH EXPERIENCE

— Paul Selman, editor. Stirling University Press. 1988. 240pp. £27.50
ISBN 0 948812 02 8

Fourteen commissioned papers, subjects include — Farming and forestry, Recreation, Conservation, Mineral use, Villages and housing, Employment, Coastal planning, The urban fringe, Land use integration — and a final chapter on future policies and proposals.

This is one of the first publications of the new Stirling University Press.

AN ILLUSTRATED HISTORY OF THE PARISH OF MUCKHART

— T. N. Johnston and R. Tullis. Muckhart and Glendevon Amenity Society, The Store, Muckhart, FK14. 96pp available July, c £2.95 plus p. & p.

THE FORTH NATURALIST AND HISTORIAN EDITORIAL BOARD

The Board is one facet of the numerous relationships of the University with the Community. It is a collaboration between some members of the University and some of the Central Regional Council's staff with particular interests in local studies, naturalist and historical.

1988 sees the publication of the 10th volume of our annual journal *The Forth Naturalist and Historian*. and the 14th annual *Man and the Landscape* symposium at the University. To the five books already published we have in preparation *Doune – postcards from the past* and probably jointly with the Clackmannanshire Field Studies Society (CFSS) *The Ochil Hills*. Last year's book was *Airthrey and Bridge of Allan*; plus cooperation with CFSS's *Alloa Tower*.

The Board continues to promote contacts with people and organisations with related projects or interests in Central Scotland.

COMING IN VOLUME 11

Expected reviews of the following recent books of relevance to our interests –

AGRICULTURAL IMPROVEMENT IN STRATHKELVIN – 1700-1850 – by Dorothy E. McGuire. Strathkelvin, Auld Kirk Museum Publications no. 15. 128 pp. ISBN 0 904966 20 8.

MERCAT CROSS AND TOLBOOTH – understanding Scotland's old burghs – by Craig Mair. John Donald, Edinburgh. 232 pp. £7.50. ISBN 0 85976 196 7.

THE PARISH OF KILLEARN – edited by Andrew Wilson. The Killearn Trust. May 1988. 160 pp. 100 illus. £7.50 paperback, £12.50 hardback.

PEOPLE OF THE FORTH (2)

THE STIRLING WOMEN'S ORAL HISTORY PROJECT

Jayne D. Stephenson

INTRODUCTION

Although women make up more than half the population, the documentary sources for writing their history are disappointingly poor in both quality and quantity. This results in part from traditional male dominance in many spheres of community life, and in part from women's distinctive patterns of work, recreation and popular culture.

Until the twentieth century – and in many cases until the *later* twentieth century – there were few positions of community leadership and responsibility open to women. Institutions like the town council, burgh incorporations, the kirk session, the school board and the parish council were male preserves until one hundred years ago. The first positions open to women were in new organisations of local government like the elected school boards and parish councils, and women started to stand and be elected to these in the 1880s and 1890s. Women's access to other institutions of public life was only really possible after the First World War. However, women still did not (and do not) achieve a representation equal to their presence in the population at large. Moreover, whilst civil institutions (like local and national government) became open to women in the first three decades of this century, many other organisations remained closed for much longer. In the Church of Scotland, for instance, women were only admitted as elders and ministers in the later 1960s.

This 'closed male world' has limited our understanding of women's history, since women's experiences have until recently been confined largely to activities which have gone unrecorded in institutional history. Moreover, women's access to many occupations has been limited. Women's work has traditionally been low-status: either unskilled or semi-skilled, and almost entirely low-paid in comparison to men. Women's trades unions have had a patchy history. They really only emerged in the 1890s and early decades of this century, but the proportion of women in unions has remained consistently much lower than the proportion of men. As a result, the sources for understanding the nature, problems and development of women's work are poor.

Of course, the vast majority of adult women at any given time

are not in employment, but instead are usually at home rearing children and undertaking the many tasks associated with running a household. Here, more than in almost any other sphere, women's history suffers from an acute shortage of documentary evidence. The evidence that does survive tends to emanate from a socially-exclusive group: the literary middle-class or upper-class housewife who has written autobiographical accounts of her experiences. Such accounts, though useful, are invariably unrepresentative of women as a whole.

Similarly, the pattern of women's recreational activities has traditionally been quite different from that of men. Whilst men during the last two centuries have developed a very sophisticated system of voluntary organisations to provide outlets in various pastimes (ranging from participant and spectator sport, to working-men's clubs and self-help friendly societies), women's leisure has been characterised by informality and the absence of organisation. Women tended to spend a considerable proportion of their non-work time in casual meetings with relatives and other women at their own or somebody else's home, in the street, the corner shop or the 'yard'. Many women's liberationists and social reformers helped to found voluntary organisations for women between the 1880s and the 1920s, giving rise to societies as varied as the Women's Guild, the Women's Rural Institute and the Co-operative Women's Guild. But these never superseded the informal character of women's leisure activities, and their records do not give a full view of the life of women in a community.

More importantly, the paucity of such sources leaves the popular culture, attitudes and activities of women an area of some mystery. The historian finds it difficult to use documentary sources (whether institutional records or newspapers) to construct a picture of women's life-shaping experiences. Into this void, the oral historian can project a vast array of first-hand information which, when carefully handled and collated, can allow the writing of women's history during this century to begin in earnest.

THE PROJECT

The Stirling Women's Oral History Project was set up in December 1986 with the object of recording the recollections of seventy local women about life during the first half of this century in Stirling District. The finished archive of cassette tapes, transcripts and floppy discs will be stored in the Smith Museum and Art Gallery for public use. In addition, items from the Archive will be available through the district libraries.

The project is sponsored by the Manpower Services Commission and Stirling District Council, and employs a total of nine staff: three interviewers, four transcribers, an office coordinator, and a supervisor.

Methodology

THE SAMPLE

A problem often attributed to oral history is that it is not representative. The problem is virtually insurmountable. Some oral-history projects in the past have attempted to use the 1931 census as a basis for seeking respondents from a socially-representative series of occupations. This technique can only provide a rough guide, and though the Stirling Project has performed the same exercise, problems arise almost immediately. For example, there is a tendency for certain 'types' of person to come forward to be interviewed: the extrovert, those interested in local history, those who have a 'cause' to promote, and those amongst the elderly who are desperate for company and a 'blether'. Those who survive to an age considered ripe for oral-history interviewing are a self-selecting group who, because they have survived, tend to be drawn from less-dangerous occupations and from families which enjoyed a higher standard of living than those who died prematurely. Moreover, the women interviewed by this Project have tended to be widows; those with husbands still living are more reticent about coming forward.

These are just some of the numerous problems which emerge in trying to get a social cross-section. However, these problems do not detract from the worth of the testimony obtained. The Stirling Project has endeavoured to maintain the breadth of its respondents' backgrounds by using a multitude of means of recruitment. We have utilised 'third party' contacts through ministers, priests, doctors and similar sources (whilst in no way compromising the codes of confidentiality in those professions); occasionally, respondents obtained in this way feel an obligation to be interviewed, leading to less than total success before the microphone. Personal visits to sheltered housing, tea dances and old age pensioners' clubs have been very successful. As these forms of contact tend to give us access to the fit and mobile elderly, letters are sent out to women subscribers to the Stirling District Library Service for the Housebound; this has proved to be very successful.

Though oral history can and has been used for obtaining a large sample from which statistical analysis can be conducted (notably a major project conducted by Paul Thompson and Thea Vigne at the University of Essex in the 1970s), the present project has sought

to obtain high quality testimony for use in describing all areas of women's lives. Even so, the sample of seventy being collected by the Stirling Project will provide academic historians in certain fields with the opportunity to apply quantitative techniques.

THE INTERVIEW

The interviews conducted for the Project are based on the model questionnaire devised by Paul Thompson (1978). There are different sections covering childhood and parents, leisure, work, marriage, children, community and social class. The interviewer consults the special questionnaire compiled by the Project team (which takes up several pages of computer print-out) during the course of the recording. Although the interview is highly structured, the skill of the Project's three interviewers enables them to be flexible enough to adapt to the items raised by the respondent, to ask the questions relevant to the woman's circumstances, and to 'follow-up' any valuable reminiscences which may not fit into the exact format of the prepared questions.

The Archive already contains memories from women with a wide variety of occupational experience. There are women who were pit-head workers in the coal industry, textile workers of various kinds, domestic and hotel servants, nurses, teachers, workers in glass bottling plants and rubber-bottle manufacture. Their memories of leisure pastimes also reflect social variety. The following passage gives a hint of the social structure of sport in Stirling in the early decades of this century:

'There used to be dances up in the Golden Lion, but we didnae go that much. Most of the things we went to were 'churchy' things. And we played tennis Wednesday afternoon on the public courts. Oh! they were packed. You had to wait for ages to get a court at that time in the King's Park; they weren't long open, you see. There were private courts up at Livilands and the Riverside, but when they opened the public courts, what a difference it made to the young folk.'

The current state of knowledge concerning women's leisure activities before the Second World War is extremely thin, and extracts such as this are important sources of information which can assist in historical research.

Interviews last from three-quarters of an hour to as long as three hours, and are conducted in the respondent's home. Interviewers try to keep the atmosphere as informal as possible, and to cause minimum upset to domestic routine (although dogs, chiming clocks and budgerigars are better removed during recording!). Each interviewer uses a Sony Walkman Professional stereo cassette

recorder and TDK tapes. Microphones are Sony ECM 155 electret tie-clip which are unobtrusive and minimise the formality of the occasion.

TRANSCRIBING

The master metal tapes are copied onto ordinary TDK tapes for use in the office, while the master is stored unused to minimise damage. The tapes are fully transcribed onto an Apricot word processor and 3½ inch floppy discs, and print-outs made on an Epson LX80 printer. Transcribers and interviewers work together on the transcripts, undertaking the long process of checking and re-checking. Care is taken to ensure that the meaning of the respondent is transferred to the written word, and difficult phrases and words precisely transcribed.

It was hoped originally to transcribe dialect completely, but this has proved impossible. The major inhibiting factor is that when respondents are sent a copy of the transcript so that they might have the final veto over its storage in the Archive, a large percentage object to the use of dialect words. As a result, only a proportion of dialect words – like 'Aye' and 'lassies' – are transcribed.

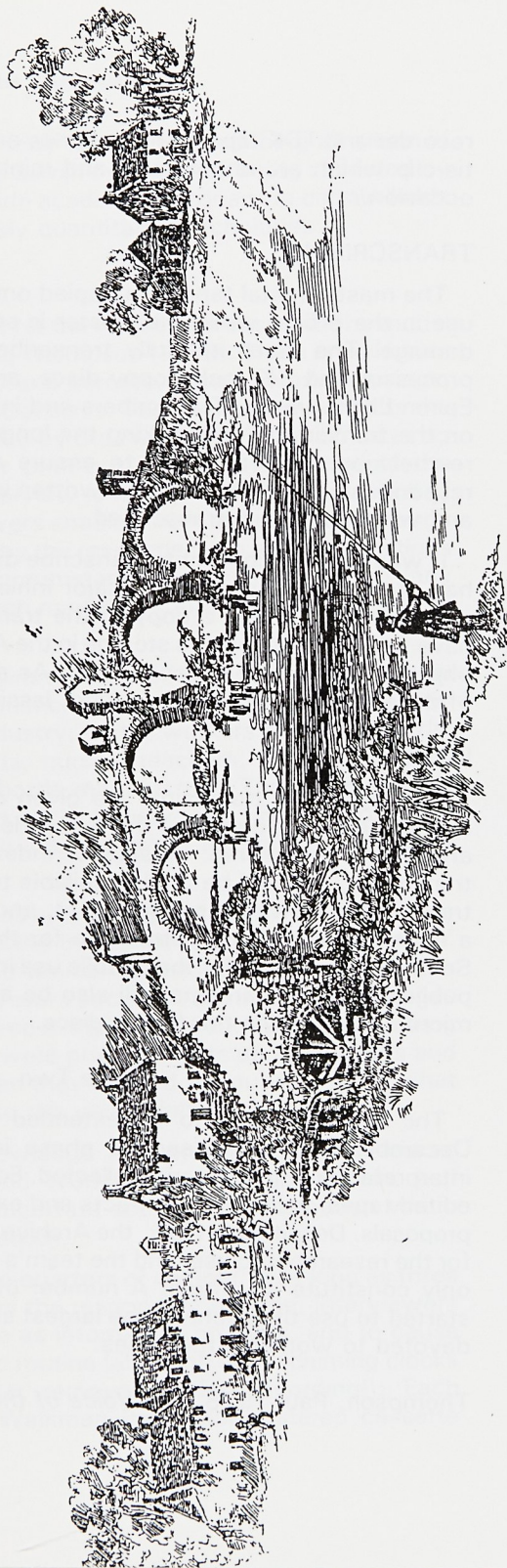
INDEXING

The tapes and transcripts are given catalogue numbers which substitute for the names of the respondents; in this way, complete anonymity is assured. A subject index is prepared for all the transcripts, and will be made available to inquirers. A copy of the transcript is sent to the respondent, and they are asked to return a consent form giving permission for the deposit of tapes in the Smith Museum, and for their public use in research, exhibitions and publications. Researchers will also be able to call up material on micro-computer via the floppy discs.

Phase Two

The Project hopes to be extended for a second year from December 1987. The second phase is planned to involve the interpretation of the material collected. Educational packs, booklets, edited tapes, volumes of extracts and exhibitions are amongst the proposals. Despite this work, the Archive offers a wealth of material for the researcher to use, and the team's own interpretive work will only constitute an entree. A number of academics have already started to use the Archive, the largest such collection in Scotland devoted to women's memories.

Thompson, Paul 1978. *The Voice of the Past*. OUP. 272pp.



Stirling Bridge in early 1700's — from J. S. Fleming *Old Castle Vennel* and based on an original painting of the time'

THE HEARTH TAX AND THE POPULATION OF STIRLING IN 1691

John G. Harrison

INTRODUCTION

Tax returns have been widely used in recent years as a means of examining the distribution of wealth in past societies and hearth taxes have been amongst the most useful. These taxes were based on the principle that wealthy people – those best able to pay taxes – tended to live in larger houses with more hearths than did poorer people. Like other hearth taxes the Scottish tax of 1691 charged a fixed rate per hearth and was thus a simple but progressive tax.

In rural areas the majority of houses had only one hearth, used for heating and cooking, but in the towns many, indeed most, households had more than one hearth. By comparing the numbers of hearths per household in different parts of a town the historian hopes to be able to locate areas of comparative wealth and of comparative poverty (Clark and Slack 1976; Meekings et al 1984). Many but not all of the returns for this tax survive (Scottish Records Office – hereafter SRO – E69 Series) and their general significance for the study of population history is discussed by Flinn (1977). The returns for Dumfries and for West Lothian have been published (Adamson 1970, 1971, 1972 and 1981), and Fox (1983) presents an analysis of the return for Stirling. It might at first seem superfluous to publish a second paper on Stirling whilst other towns remain unexamined, but unfortunately Fox's paper has, in my view, a number of serious defects. These include errors of fact and of interpretation, whilst at the same time the return is capable of yielding information on topics such as property ownership which Fox did not examine. Furthermore I hope to show that by comparing the return for the town with other (partial) listings of the inhabitants we can draw conclusions about the occupational patterns of the inhabitants of different parts of the town, information not otherwise available since the poll tax returns (the most direct source for this type of information is Whyte 1987 Table 10.1) have not survived for Stirling.

COLLECTION OF THE TAX

The Scottish Parliament discussed the levying of the tax in 1690 and the due date for collection was Candlemas (2nd February) 1691 (Acts of the Parliament of Scotland IX Appendix pp149-153 and 236). The tax was fixed at 14 shillings (£0.7) Scots per hearth – 'hearths' included malt drying kilns, bakers ovens, smiths forges and other industrial hearths – but charitable institutions and people certified by a minister to be poor were exempt, though in many of the

returns including that for Stirling the poor are listed.

The tax for the entire sherifffdom of Stirling was collected by John Burd, himself a merchant burghess of the town. Since the purpose of the tax was to pay for the war against Jacobitism following the accession of William and Mary to the English and Scottish thrones, Burd, as a staunch Presbyterian, would have been wholeheartedly behind it. His appointment to the lucrative post of collector – undoubtedly the result of patronage and political influence – would have been some compensation for his sufferings during the preceding years of episcopalian ascendancy. Later in the 1690's he was one of the collectors of excise for the area and around the turn of that decade he acquired a post as a minor official in the Commissary Court. In rural areas collection of the tax was probably mediated through the landed proprietors but within the town Burd took a good deal of personal responsibility, a task made easier by the organisation of much of the population into Guildry, Incorporations and Tolerated Communities, representative of the town's merchants and artisans. Amongst the Mechanics records is the entry –

Item, in Bailie (John) Burd's at the getting of the list of hearths belonging to our number, by order . . . £00.11sh.06d (Central Region Archives – hereafter CRA – Miscellaneous Accounts and receipts belonging to the Mechanics 1650-1697).

and amongst the records of the Incorporation of Weavers is a receipt by Burd for some of their hearth money (Stirling Smith Museum, Unsorted papers relating to the Weavers, Receipts by John Burd... 1691).

Some difficulty was found with the collection however. On 8th June 1691, the Council pleaded, rather disarmingly, with the citizens to pay, 'as ane gratuitous act and favour done be them to this Burgh' (Extracts from the Records of the Royal Burgh of Stirling – hereafter Extracts – II p64). Apart from any general resentment at having to pay taxes, particularly novel taxes, the inhabitants had fairly specific objections. Firstly, in 1681 they had agreed to a new tax on malt ground at the towns mills to be a replacement for all other taxes (with some minor exceptions) both local and national (CRA Council Record 14th March, 23rd April, 16th and 19th May, 1681). Naturally people were afraid that the new tax would be used as a precedent for further exactions and the Council had to assure them that this would not be the case. Secondly, many citizens must have objected to the purpose of the tax, for the town was notoriously Jacobitical. In 1689, for example, Lord Kenmure had written that he would prefer his troops to be stationed elsewhere as he was afraid that they might be attacked by the Highlanders in 'that disaffected town of Stirling'.

All this must have contributed to the fact that a little over 18% of all the hearths in the town remained unpaid for when the final return was made out, in addition to the large percentage excused as 'poor'. Nonetheless Burd thought that he had done very well, 'if all the shires in Scotland had done so there would have been no ground of complaint' he wrote to James Melville of Cassingray, who was in charge of the collection at a national level (SRO Leven and Melville Papers GD26/7/359/2/13 Burd to Melville 17th October 1692), and he considered that further surveying to increase the income from the tax would not justify the expense (ibid GD26/7/359/2/3 Burd to Melville 15th March 1694).

The return for Stirling is indeed remarkably detailed and there are few names missing which one would expect to find. It is well preserved and legible. For some towns, Linlithgow for instance, it has been shown that the entries follow the order of houses along each street, perhaps turning up side entries and so on. This cannot be shown for Stirling at the present stage, though there is certainly evidence of 'bunching' of entries relating to particular areas in the suburbs (see the discussion of Castlehill below for instance). Probably something similar occurs with the entries for the central urban area, though corroborative evidence – for example from the Register of Sasines which record changes of property ownership – is needed, and would be of extraordinary interest. Few houses can be identified with certainty at present and some of these are mentioned below.

HOUSEHOLDS, TOWN AND SUBURBS – PRELIMINARY CONSIDERATIONS

At the end of the seventeenth century Stirling was a moderate sized market town. During the course of that century it had undergone a decline relative to other Royal Burghs, falling from 7th to 13th place in terms of liability to taxation (Smout 1963).

The weaving of woollens was its principal industry and weaving, like the other skilled crafts such as shoemaking or metal working, was controlled by a craft incorporation or association of master craftsmen, though the workforce also included family members, paid servants and apprentices. Both industry and business were organised domestically, with the result that a 'household' often included people who were not all members of one nuclear family. An expansion of trade could mean an increase in household size as new apprentices and other workers who 'lived in' were taken on. Domestic servants too – and perhaps the distinction between domestic and industrial servants was not always very sharp – often lived in as part of an employers household. Whilst we can easily imagine that numerous servants were needed to run some of the larger houses it should not be forgotten that even fairly modest households would have

employed a resident woman servant.

At this time the town (Figure 1 fold out) was largely confined within its walls and to the ridge of the hill crowned by the Castle. The long axis of the town rose steeply from the Burgh's Gate at the south-east to the Castle Wynd and Castlehill at the north-west. Beyond and above these, dominating all, stood the castle. Scattered around the urban core were a number of suburban areas and some houses which were so far isolated from the town as to be fully rural whilst being counted along with the town for some administrative and taxation purposes. Figure 1 shows the roads, buildings and suburban areas referred to in the text. Like all early modern societies it was intensely hierarchical. There was a sprinkling of local rural gentry who had town houses, either rented or which they owned, though these people played only a minor role in the daily life of the town by this time, unless perhaps one of them acted on occasion as Provost. Often however, this post was held by one of the wealthier merchants implying that the social gap between gentry and the upper strata of merchants was not very great. The merchants formed the political, economic and social elite of the town, and though there was certainly a great range amongst them, from pedlars to international traders and bankers, their overall superiority was underlined by their control of the town council.

The other major group was the artisans or skilled craftsmen; as a group less wealthy and of lower status than the merchants, there were, nonetheless, influential and substantial men amongst them, and the better off artisan may well have cut a finer figure than the minor merchant. Even amongst the artisans there was a range of ranks; the Hammermen, Fleshers, Taylors and Bakers were of relatively high status, whilst the Skinners, Weavers and Shoemakers were of lower status. One measure of this ranking is the frequency with which members of the various trades held the important Burgh office of Deacon Convenor. Over the period from 1667-1717 a Hammerman held the post 21 times, a Baker 17, a Taylor 8 and a Flesher 4. The other trades never held the post at all, though the Weavers for instance outnumbered the Bakers probably by more than ten to one. Nobody could exercise any of these trades by way of being in business on his own account, without being a member of the relevant Incorporation, for which a substantial fee was payable, nor without being a burgess, for which a further fee was payable to the town. In return the town protected their monopoly and the burgesses had certain political privileges. Some building workers, collectively called Mechanics, and also Maltmakers, had also to be burgesses and members of the relevant Tolerated Community, though their degree of protection and of privilege was less. Other male urban workers could be burgesses, though they gained little in the way of protection from competition. Non-

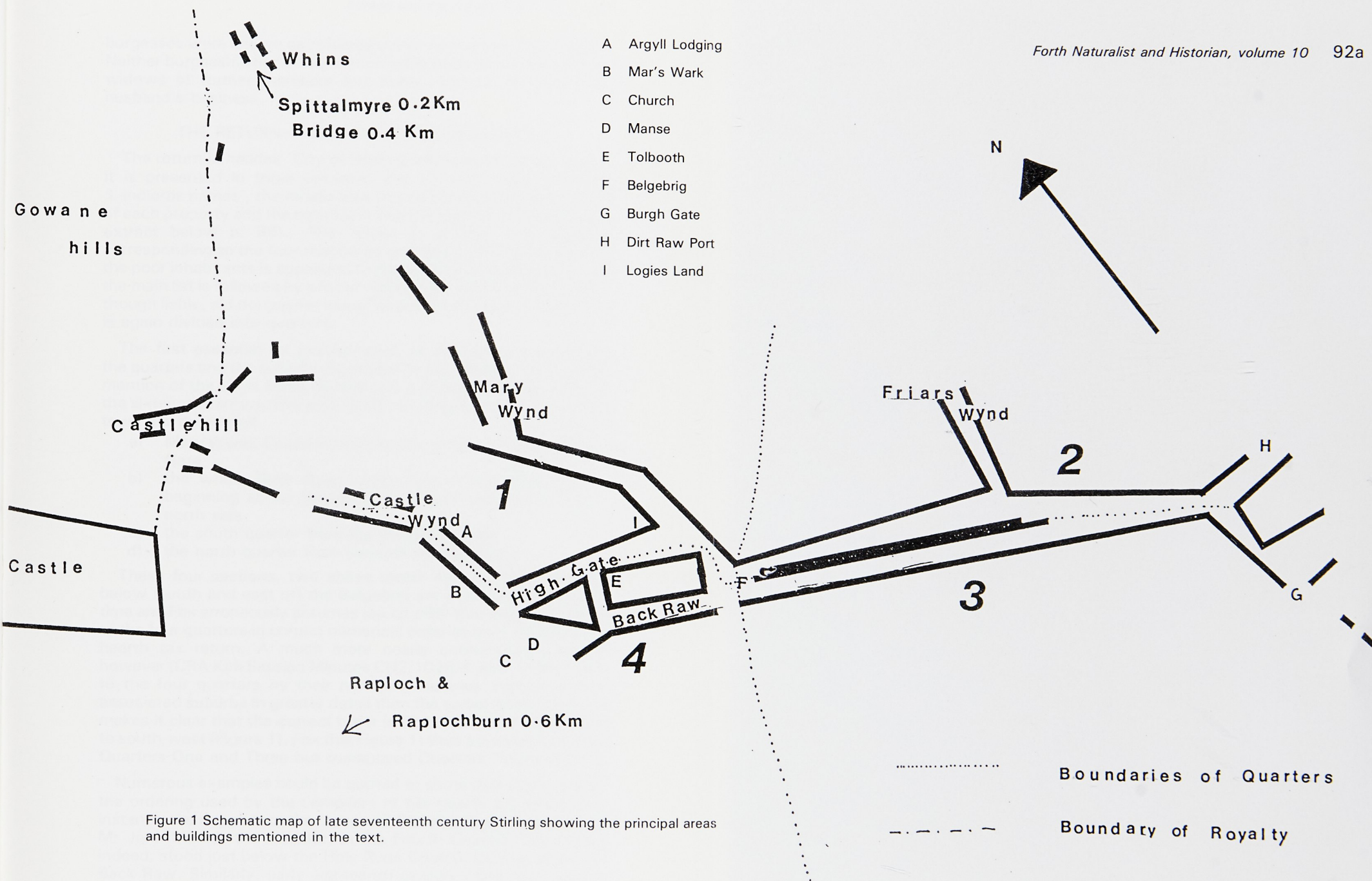


Figure 1 Schematic map of late seventeenth century Stirling showing the principal areas and buildings mentioned in the text.

burgesses were known as indwellers and most were of low status. Neither burgeship nor incorporation were open to women, though widows of former members had some right to carry on their husband's business.

THE RETURN – GENERAL CONSIDERATIONS

The return is headed 'City of Stirling and suburbs of the same.' It is presented in three columns, the left hand one is headed 'Landlords names', the middle lists the name(s) of the occupant(s) of each property and the right hand one the number of hearths (see extract below p. 96). The return is divided into sections corresponding to the four numbered quarters of the town; a list of the poor inhabitants is appended to the return for each quarter, and the main list is followed by a list of 'deficients', that is of those who, though liable, did not pay for some reason. This listing of deficients is again divided into quarters.

The first essential for interpretation of the return is to outline the quarters and the suburbs mentioned in the heading. The earliest mention of the town being divided into quarters is in the middle of the sixteenth century (Extracts I p59). At this time four parts of the town are delineated –

- a) Mary Wynd, Castle Wynd and the north part of the High Gate
- b) the whole Back Raw, south side of the High Gate beginning at the Belgebrig and a part beneath on the north side
- c) the south quarter from the Belgebrig down
- d) the north quarter from beneath the Belgebrig.

These four sections, two above (north and west of) and two below (south and east of) the Belgebrig are not numbered at this time and Fox erroneously assumes (op.cit.p66) that they correspond to the four quarters in correct numerical order as they appear in the hearth tax return. A much more nearly contemporary source however (CRA Kirk Session Minutes CH2/1026/4 June 1656) refers to the four quarters by their numbers, outlines them and their associated suburbs in greater detail than the earlier brief notes and makes it clear that the correct order is clockwise from north-west to south-west (Figure 1). Fox (his Figure 1) thus correctly identified Quarters One and Three but transposed Quarters Two and Four.

Numerous examples could be quoted to show that this is indeed the ordering used by the compilers of the hearth tax return. For instance the return lists the 'toun of Stirlings hous' occupied by Mr John Munro, the minister, in the Fourth Quarter. The manse indeed, stood just below the Holy Rude Church, looking down the Back Raw. Similarly, early eighteenth century stent (tax) returns confirm that Friars Wynd was in the Second Quarter, parts of Castle

Wynd (the west side) in the Fourth, and so on (CRA List of the House and Land Supply . . . 1716-1717 B66/25/779/2).

The Kirk Session material also helps to define the relationship of the quarters to the suburbs. The First Quarter there extends down what seems to be the north side of the High Gate (modern Broad Street) and then explicitly down the Mary Wynd and the lanes off it as we would expect from the earlier listing. But it proceeds too to the areas of Whins, the Gowane Hills and the area about the end of the Bridge. The hearth tax return follows the same policy. The return for the First Quarter includes the 'tenants of Spittal' i.e. the tenants of the lands of Spittalmyre; Robert Turnbull appears in the First Quarter and 'Robert Turnbull in Whins' is frequently referred to in other sources about this time. Amongst those listed as living in the Fourth Quarter are John Blair and William Row, who paid as tenants of Cowanes Hospital, and George Blair who was deficient and who was also a tenant of the Hospital. The Hospital records confirm that these three were all tenants and that all three lived in the Raploch/Raplochburn area, well away from the town itself but listed as part of the Fourth Quarter in 1656 and in later stent rolls. So with all the quarters, each can be taken to include suburban (and even rural) areas and we can usefully imagine the lines of division between the quarters radiating out into the surrounding countryside, though as indicated in Figure 1 the precise line of division remains in doubt around the upper part of Castle Wynd and near the Burgh Gate.

This still leaves the problem of the Constabulary of the Castle. The magistrates of Stirling exercised jurisdiction over an area known as the Royalty, which enjoyed certain privileges, particularly of trade, as did other Royal Burghs at this time. The Castle of Stirling however, with parts of the Gowane Hills and other areas of immediate military importance, fell outside the Royalty, though geographically enclosed within it. This area, the Constabulary, was under the jurisdiction of the governor of the Castle. Within this area a suburb had grown up whose inhabitants were not ordinarily subject to the magistrates (Morris 1927). The term 'Castlehill' includes these houses as well as others close by but within the Royalty. To the east Castlehill was close to the First Quarter which extended 'up the close that goes to Argylls stables'. The Fourth Quarter extended 'up the west side of the Castle Wynd (and) the south side of the Castlehill on both sides of the gate'. This leaves it unclear which of the two nearby quarters Castlehill was attached to, or even if the whole of Castlehill was counted into one quarter. It would be possible to assume that Castlehill within the Constabulary did not pertain to either quarter if we were only to rely on the 1656 delineation of the quarters. Neither that delineation nor the hearth tax return alone can tell us whether the inhabitants of the Constabulary paid the tax or not, or if they did, in which quarter they were placed.

Fortunately a list of 15 weavers, inhabitants of Castlehill within the Constabulary in 1681, survives (Smith Art Gallery . . . Unsorted Papers relating to the weavers . . . 1681), and nine of these people can be found either as tenants or resident landlords in the hearth tax return for the First Quarter made 10 years later. This makes it certain that those houses 'in Castlehill' but within the Royalty were also within the First Quarter, though they are less easy to identify.

The Castle itself is not mentioned in the return except for a note (f38R) that it was 'deficient'. An item in the Leven and Melville papers however (SRO Leven and Melville Papers. Ane Accompt of the Officers in Stirling Castle GD26/7/391), shows that some of the officers were assessed separately from the rest of the population. We will return to the position of the soldiers below. Finally, before moving on to analyse the return, we should remember that many of the properties in the town were occupied by several households, either as a result of sub-division, or in many cases due to people living in purpose built, multi-occupied tenements.

ANALYSIS OF THE RETURN

Table 1 summarises the totals for all sorts of hearths, whether domestic or industrial, paid, deficient or poor. The figures given here for the totals of paid hearths, taken directly from the original manuscript, differ somewhat from those offered by Fox (his Table 3 p 69) who counted 64 paid hearths in the Second Quarter as poor, probably due to an erroneous entry at the top of f34V. Fox's printed figures for the Second Quarter also seem to involve a misprint as his hearth/tenant ratios do not correspond to the numbers of hearths and tenants given.

Table 1 Summary of paid, poor and deficient

First Quarter	paid	393	Third Quarter	paid	167
	poor	46		poor	47
	subtotal	(439)		subtotal	(214)
Second Quarter	paid	222	Fourth Quarter	paid	283
	poor	42		poor	33
	subtotal	(264)		subtotal	(316)
Subtotal paid and poor		(1233)	Deficients		273
Total paid		1065	Total		(1506)

Numbers of paid and poor hearths in each quarter and total of deficient are from f39V and f39R of the return. Figures in brackets have been calculated. In later calculations some of these hearths have been excluded (see p 96).

Comparison of the paid and deficient lists shows that some of the landlords names appear in both lists, their order in the deficient list following that in the paid series. For instance in the First Quarter paid list (columns Landlords, Occupants and Hearths), entries 3 to 8 are as follows –

Stratans Lands	Serjant Downie & Jon Watson	3
Tho. Gilfillans lands	<i>Himself</i> , Geo Reid, <i>Alexr Blair & Ro. Henderson</i>	5
Wm. Wrights lands	<i>Himself</i> & Jon Drapper	2
Hendrie Finlaysone	<i>Himself</i>	1
Wm. Gilfillane	Wm. Gilfillanes tennant Wm. McKinlay	1
Rot. Mebbine	John Carmichael Smith	2

Entries 2 to 7 amongst the deficient for this First Quarter are –

Jon Gilfillan	<i>James Fergusson</i> & Jon Clerk	2
Elspeth Gillies	Don Gun , Wm. Millar & Agnes Gairner	3
Hen. Finlason	James Gilchrist & Janet Gillespie	2
Janet Henryson	John Kennedy	1
Wm. Gilfillane	Wm. Couston & <i>Walter Reid</i>	2
Rot. Mebbine	Tho. Robertson & <i>John Carrick</i>	2

These 12 entries relate to nine properties owned by 'Stratan', Tho. Gilfillan, Wm. Wright, Jon Gilfillan, Elspeth Gillies, Hendrie Finlaysone, Janet Henryson, Wm. Gilfillane and Rot. Mebbine. The nine names in *italics* are those of weavers resident in the Constabulary of Castlehill in 1681. The five in **bold** are the names of soldiers listed as members of the garrison in 1690 or 1692.

The tax was payable by the occupants of property rather than the owners and clearly Hendrie Finlaysone for instance, paid for his own occupancy of his property, but his tenants, James Gilchrist and Janet Gillespie, did not pay at all. Before collection of the tax began a complete list of hearths must have been drawn up, and the return as it now survives records whether or not people paid for the hearths for which they were originally assessed, a fact which is now of little interest to us. By going through the paid, deficient and poor lists in order, something approaching the original list can be re-constituted. Since this study is mainly concerned with domestic hearths the industrial hearths (which are undoubtedly under-recorded) have been left out of subsequent workings (Fox gives the correct figures for each quarter as they appear in the return). The integration of the paid and deficient lists is still not a simple process of addition however, as some hearths were unpaid for because they were waste or the occupants were dead, and these have been ignored, as have all the hearths occupied by the Countess of Argyll (she seems to have paid for 26 and been deficient for 21) all in the

First Quarter, as they would distort the final result. This re-constituted list gives, in effect, a list of property owners/properties, a list of heads of households and a list of the numbers of hearths in each property, and it allows us to consider the 18% of households which were deficient as well as those who paid or were poor.

Table 2 Domestic hearths by quarters

	First Quarter	Second Quarter	Third Quarter	Fourth Quarter	Totals
Total households including poor and deficients	222	162	109	146	639
Total Properties	88	70	57	60	275
Total domestic hearths	457	289	211	352	1309
Hearths per household	2.06	1.78	1.94	2.41	2.05
Hearths per property	5.2	4.1	3.7	5.8	5.1

Numbers of households and of occupied domestic hearths in each quarter calculated from the return. Some hearths have been excluded (see p 96).

This shows that there were more hearths per household and per property in Quarters One and Four than in Quarters Two and Three, a finding in agreement with Fox, though the numbers of hearths per unit are less due to the inclusion of the poor who had few hearths per household and also due to the other exclusions mentioned above. However, the re-identification of the quarters means that this area of larger houses is now to be identified as the upper part of the town rather than its northern side, a re-alignment whose significance we will return to. It is also clear that whilst the properties in the lower part of the town were very much smaller than those in the upper the number of hearths per household is only marginally less, which implies that the lower part of the town consisted of small properties, little divided, whilst the upper part consisted of larger properties more frequently divided into numerous small units. Whilst it must be acknowledged that 'small properties' could result from divided ownership of a large building, actual records of this type of division are rare (but see e.g. Fleming 1897 p 54 and SRO Sheriff Court, Register of Transumps pp 4-5). The picture implied by Table 2 is of large buildings in the upper part of the town and smaller ones in the lower. Indeed another pointer to the social and economic dominance of the upper part of the town is that 14 of the 22 houses with six or more hearths in single occupancy (all of which must have been large) are in the upper quarters. In Quarters One and Four are also found higher proportions of people distinguished in the return by titles implying the holding of high burgh office or who seem to

be rural land owners. Conversely in the lower part of the town, the proportion of poor households is sharply higher, the Third Quarter having a massive 22% of poor households.

Despite this tendency to polarisation, the separation of rich and poor is not so clear as it was to become with the development of Victorian and later suburbs which sharply divided middle and working classes. Indeed, finding Provost Dick occupying a house in the Third Quarter with 11 hearths whilst numerous obscure people rent single-hearth accommodation in the upper part of the town is just what we would expect from other studies of early modern towns (Meekings et. al. 1984).

At the same time it should be remembered that the form of the return for Stirling tends to blunt the distinctions between quarters due to the inclusion of suburban areas. We saw above for instance, that there were at least 9 properties in Castlehill within the Constabulary. Comparison of Layes Map of 1725 (NLS M.S. 1645. Z2/19a) with the First Edition of the Ordnance Survey, the earliest map to indicate the boundary between Royalty and Constabulary, shows that there were about as many properties in the one part of Castlehill as in the other in the early eighteenth century. Since the area seems to have been socially homogeneous and the nine properties in the Constabulary (p 92 above) held 23 households with only 26 hearths it seems probable that the whole suburb of Castlehill contained as many as 50 households all with as few hearths as those within the Constabulary. Obviously this would mean that the average number of hearths per household in the rest of the First Quarter would be considerably greater than appears from the aggregated return. (Removal of 50 hearths and 50 households from the figures for the First Quarter gives a new total of 172 households and 407 hearths, or 2.36 hearths per household). Since Castlehill was certainly by far the most important suburb and since Whins, Bridge-end, and several others of the important suburban areas with fairly small numbers of hearths per household were also aggregated with the return for the First Quarter, we can safely conclude that the return, as presented, masks the social and economic high status of the core of the First Quarter to a significant degree. Since suburban housing made only a small contribution to the other quarters, removal of all suburban properties if that were possible, would increase the dominance of the First Quarter at the expense of the others.

The return can also yield information about property ownership and poverty. If we ignore the possibility of lodgers who did not have a separate household and who would thus not appear in the return, three types of household can be identified –

- a) those in single owner-occupation
- b) those occupied by a landlord plus tenant(s)

c) those occupied by tenants alone.

A little over a year after the due date for collection of the tax the Council assured the Convention of Royal Burghs that 'the most pair of ther houses are inhabited by ther respective heritors (i.e. owners)' (Register Containeing the State and Condition of every Burgh p67), but Table 3 shows this to be far from the case. It is true that the owners were resident in 127 of the towns 275 properties but the frequency with which these people leased out part of their house together with frequent multiple occupation of properties where the landlord was absent, means that the owners occupied only a fairly small minority of the households in the town. In fact 469 of the 639 households in the town (73.4%) lived in rented accommodation. Furthermore, since around 40 proprietors owned around 100 of the town properties between them the whole urban and suburban property was owned by about 173 people – a fact with profound significance for every aspect of urban life.

Table 3 Types of occupancy by quarter

	First Quarter	Second Quarter	Third Quarter	Fourth Quarter	Totals
Total properties	88	70	57	60	275
Landlords in sole occupation	23	15	17	12	67
Landlords and tenants co-resident	20	15	10	15	60
Tenants only	45	40	30	33	148
Total households	222	162	109	146	639
Households in rented accommodation	141	131	77	120	469

Analysis of types of occupancy calculated from the return

Equally significant, whilst only 13% of heads of household who paid the tax were women, 55% of poor heads of household were women, many of them probably widows. It will be appreciated that the overall percentage of women amongst the poor would have been higher than this since many of the poor households headed by men would have included women. Not surprisingly very few of the poor households had more than one hearth, though there must be a question as to whether some of the poor did not really live with relatives and had a hearth notionally assigned to them to avoid paying the tax.

COMPARISON OF THE RETURN WITH OTHER LISTINGS

In 1685 119 burgesses of Stirling swore their allegiance to the Crown and they are listed with their occupations according to the

quarters in which they lived (Register of the Privy Council of Scotland XI p358-360) – 68 of them (57%) can be identified in the same quarters in 1691. The records of the Incorporated Trades of Stirling give various listings of their memberships and these can be similarly compared with the return as can the receipt by John Burd to various of the weavers (referred to above p 86). Burgess admissions give occupations for many entrants (Harrison, in press). Finally, the muster rolls for the garrison of the Castle list names and ranks of soldiers stationed there; one for 5th September 1690 lists 13 officers and NCOs and 76 sentinels, whilst one for February, March and April 1692 lists 20 officers and NCOs and 154 sentinels, indicating at once a large but sharply fluctuating local employment (SRO Muster Rolls . . . E100/39/7/19 and 20).

There is, of course, a problem with frequently duplicated names and these have been ignored except in cases where there is clear evidence of identity. The male heads of household were thus divided into four categories –

- a) those whose identity is certain; so Bailie Burd at this time can only be Bailie John Burd, the collector of the tax.
- b) those whose names occur only once in the return and whose name corresponds to a name in one of the other lists and in no other list in a contradictory capacity.
- c) those whose names occur more than once in the return or occur in different lists in differing capacities.
- d) those whose names appear in the return but not in any of the lists; most of these can be assumed to be low status non-burgesses though some, distinguished by a territorial title or the style 'Mr.' (Master, a university graduate) are obviously of high status and were included amongst the elite group in the analysis which follows.

Group c) and d) (with the exception noted) were ignored in the analysis and together they form a very substantial block of people. Groups a) and b), however, gave a large sample of a wide range of inhabitants though it is not claimed that in every case identity of name means identity of the person. There is some corroboration for the method from the results; for example, using the burgess list there is a strong tendency for people identified from the paid list to occur as burgess entrants in fairly recent years rather than in the distant past (N=253; mean time since burgess admission 18.1 years; range 1-49 years) whilst former entrants identified as poor had usually been admitted many years before (N=20; mean 28.9 years; range 7-43 years). This is consistent with the correlation we would expect between old age and poverty.

It will be realised that the method does not give anything like the absolute numbers in the various groups (there were certainly more than 44 members of the Incorporation of Weavers at this time);

since 'John Burn' could be any of several people but 'John Burn of Larbert' is unique, the method reveals the elite in greater proportion than those of low status.

High and low status people are identified in every quarter but the general trend is what we would expect from the hearth/household ratios. Using a chi-squared test and a 95% test of significance there is a statistically significant concentration of households headed by the elite group of merchants, lairds and university graduates in the combined upper quarters (combined total 56), and significantly fewer than we would expect by chance in the lower quarters (combined total 19). Conversely, low status weavers were concentrated in the lower part of the town where 34 were located, whilst in the upper part there were only ten. (These figures refer to Weavers who were members of the Incorporation of Weavers of Stirling and so exclude the majority of Castlehill weavers referred to above (page 96). Residents of the Constabulary, not being subject to the magistrates, tended to avoid the expense of incorporation, a source of great annoyance to the inhabitants of the Royalty. However, Tho. Gilfillan and Hendrie Finlaysone were incorporated). Some of the Incorporated Trades had too few members for it to be realistic to expect to find adequate numbers for statistical analysis but it is striking that using this method all six of the Fleshers identified were traced in the Fourth Quarter, where it is known that their houses were concentrated around the Flesh Market at the top of the Back Row.

Of the 503 male heads of household, 146 (29%) were definitely not burgesses whilst most of the rest probably were. Some of these 503 were the weavers living in the Constabulary already referred to whilst around 40 seem to be soldiers, again including several in Castlehill. This last contributed to a statistically significant concentration of soldiers in the upper part of the town and it may be that many of the other soldiers in this upper part were suburban rather than living in the core areas of the First and Fourth Quarters. These soldiers are, of course, those who had their own households; others certainly lived in lodgings (CRA Burgh Court Record, *passim*) and so are absent from the return; yet others may have lived in the Castle itself. Some of the remaining non-burgesses are people who would enter in succeeding years, in line with the ancient custom of allowing a period of urban residence before burgess entry became obligatory for qualified urban householders, whilst others seem to have been paid workers, particularly in the weaving industry. Fishers, quarriers and sandmen are also occupations found in the town and rarely amongst the burgesses.

One of the most striking conclusions to be drawn from this comparative exercise is that burgesship had lost its original connection with property ownership. The earliest burgess had necessarily owned property within the burgh and had been of

comparatively high status. Burgesship now extended into comparatively lowly parts of the population (21 'workmen' were identified as burgesses, for instance), and many burgesses lived in rented accommodation. At the same time almost all the male property owners within the town, except for the rural gentry, were indeed burgesses. The ways in which Stirling had modified its taxation system in order to accommodate to – perhaps even to encourage – this change will be looked at elsewhere.

Another important conclusion to be drawn from the comparison is that those people who owned several properties were overwhelmingly of the more important merchant families and were often politically active in the town. They include Provost Dick, Provost Stevenson and Provost Russall as well as several bailies. In some cases several people of a single name are multiple property owners, for example there were at least three Russalls who owned nine properties between them. They tended to live in the upper part of the town though much of the property they owned was in the lower part.

Having identified a substantial number of the inhabitants according to their occupations it is also possible to infer something of the numbers of hearths per household for the major social groups.

Table 4 Hearths per household by occupation

Number of hearths per household in properties occupied by households of some of the major social groups. Only burgess craftsmen have been considered amongst the artisans, poor households and households headed by women have been excluded as have Officers and NCOs.

Status/Occupation of Head of Household	Number of Households	Mean Hearths per Household	Range of Hearths per Household
Merchant, Gentry,			
Graduate	75	3.26	1-16
Hammerman	18	1.94	1-7
Flesher	6	3.00	7/3-7/2 *
Taylor	10	2.75	1-9/2 *
Weaver	44	1.42	1-6/2 *
Cordiner	13	1.74	1-2
Workman	21	1.32	1-10/5 *
Soldier	32	1.28	1-6/2 *

* Where a fraction appears in the Range column the upper figure is the number of hearths and the lower the number of households in the property with the least or the most generous ratio of hearths to households occupied by a member of the relevant group.

This cannot be done with the same certainty that would be possible if the return listed the numbers of hearths in each household rather than each property since clearly we cannot be sure, in an example where six households share 12 hearths, how the hearths were distributed between the occupants and in calculating the ratios in Table 4 it was assumed that in such a case the hearths were evenly distributed. Of course, there is no problem with properties in single occupation nor with those where the number of hearths is exactly equal to the number of households but strictly this method measures the average numbers of hearths per household in properties occupied by the various groups examined.

In fact the method gives surprisingly consistent results, a fact which itself gives a re-assuring sense of its validity. Names in the return identified as merchants are consistently found living in properties with generous hearth/household ratios and often in large houses in single owner occupation; weavers rarely inhabited properties where they could have had more than one hearth. The method works because the elite and the low status groups rarely inhabited the same properties, even when they lived in the same part of the town.

It is apparent from Table 4 that the numbers of hearths per household was closely related to social status. The elite group of merchants/gentry/graduates are well ahead of the artisans; the high status artisans (hammermen, fleshers, taylors) follow and are followed in turn by the low status artisans (weavers and shoemakers). Too few bakers and skimmers were identified to give meaningful figures; they were small trades and the bakers particularly often had common names such as Anderson and Russall. Soldiers almost invariably inhabited single hearth households and though there are difficulties about using the method for non-burgess indwellers it is clear that most of this group, too, lived in houses with few hearths.

A REVIEW AND SOME CONCLUSIONS

We are now in a position to step back, as it were, and to take a look at the town and its suburbs as a whole, dominated, as anyone familiar with the town today is aware, by the Castle, centre of royal and military power. The Castle was also by far the largest single employer, dwarfing the tiny businesses of the merchants and artisans in the town below. Despite this the sheer numbers of small family businesses in the town meant that trade and industry were the principal sources of the town's wealth, for whilst the numbers of 'weavers' referred to above may seem fairly trivial, each weaver must be seen as potentially at the centre of a small business employing several people. Furthermore, weaving was but one of a series of processes involved in converting a fleece into a wearable

garment; spinning, traditionally women's work, is the most obvious of these; dyeing was another skilled (male) occupation of major importance to the town.

Castelhill, both within and outside the Constabulary, was by far the most important suburb and its rather humble character is easily seen from the example quoted on p 92. Other suburbs, such as Whins and Spittalmyre, Raploch and Raplochburn, were predominantly agricultural, though Whins had a good sprinkling of carters who doubled as tenants of the towns and Hospital lands around the town; whilst the precise numbers of households in these cannot be ascertained, certainly all were small, probably not exceeding single figures. Bridge-end was almost entirely inhabited by people who either were associated with the nearby mill or with the collection of customs from those entering the town by the bridge; again there were very few households, perhaps six to eight. Further afield there were only very few isolated houses, mainly agricultural. There is some indication of houses around the Burgh Gate and along its eastern margin in a poorly defined area known as Craigs (certainly more extensive than the area still referred to by that name); in so far as there is any information about its inhabitants they seem to have been employees in the weaving industry.

Returning to the urban core we have seen that the upper part of the town was socially and economically dominant. Not only were the houses here larger than in the lower part, so too were the buildings. Here was the great Argyll Ludging, one of the most splendid town houses in Scotland; close to it was Mar's Wark, already a ruin at this time, though significantly placed in a commanding position looking down the High Gate. Here too were such important buildings as the church, the Tolbooth and several important markets; these included the Flesh Market and since this area also functioned as an abattoir the dirt and stench must have been a severe drawback to the amenity of the area. Some of the large properties may represent the remains, perhaps sub-divided, of the former houses of the nobility who had flocked around the Court in the town's more prosperous days; others, such as Norie's house were more modern, the creations of the merchant or professional elite of the seventeenth century and such properties were perhaps particularly numerous on Mary Wynd. Alexander Schort, a merchant, lived here in one of the largest non-noble houses in single occupation in the town; now known as Cowanes House it had a massive 12 hearths, some of which can still be seen. Even in the Second and Third Quarters there were certainly pleasant houses to be found. As well as Provost Dick's large house (see p 91), there was the Friars House, owned by Spittals Hospital and rented by Captain Johnstone, former leader of the town's militia, for a substantial £60 per year: it had a garden, an orchard and outbuildings attached and the house had seven hearths. This was

at the top end of the Third Quarter on the site now occupied by the Old High School. Probably below this things deteriorated towards what was obviously aptly named as the Dirt Raw Port.

But Captain Johnstone's case is a timely reminder that even in the lower parts of the town there were pleasant sites near the walls and with access to fresh air, whilst the upper part of the town was not lacking in back courts and spaces between buildings where the poorer members of the urban community could find cheap, if unhealthy, lodgings. This surely is the explanation of the very mixed nature of the populations of the various quarters, in spite of the general trend to polarisation. There is little or no evidence for the sort of stratification known to have occurred in the high 'lands' of Edinburgh, where the upper stories were occupied by people of high status; whilst there was a great deal of multiple occupation of property, the occupants seem usually to have been of similar status.

There is little evidence of true concentration by occupation as distinct from status, of the existence of a true 'weavers quarter' for example. Weavers are concentrated in the lower part of the town it is true, but they are well mixed so far as we can see with other people of low status such as shoemakers and workmen. One exception to this is the concentration of fleshers in the Fourth Quarter around the Flesh Market. This is certainly connected with the co-operative nature of the business, where not only was it necessary for men to help each other in such tasks as killing and dressing beasts, but also to co-operate financially in the purchase of herds of cattle. Tanning was the only noxious industry to have been removed from the town and it was carried out at the Skinners Mailing, to the south-east of the town; there is no evidence, either from the hearth tax return or from other sources at this time, that the Skinners (who were the tanners of Stirling) actually lived at the Skinners Mailing at this time. The only other clear concentration was at Bridge-end (see p 99) though this was strictly a suburban or even rural area.

The Stirling records of this period provide little support for Sjöberg's (1960) model of the pre-industrial city, which was in any case primarily concerned with great metropolitan concentrations whereas Stirling was a small market town. The nobility, with the exception of the Countess of Argyll and the Earl of Mar, now had little direct connection with it. The merchants who according to Sjöberg's model, were close to the 'outcast' groups, were in reality sometimes not merely substantial men but in some cases were close to the gentry and even inter-married with them. There is no evidence of a fixed 'outcast' group. Indeed Stirling, perhaps because it was small enough to do so without having a large bureaucracy, dealt with those who might have become urban outcasts in the most obvious way — it cast them out, as numerous entries in the records show.

Finally, the reader may be surprised that no estimate of the total population has been made. There are several reasons for this omission, principally that the population itself would have fluctuated sharply from time to time due to such factors as swings in the trade cycle which directly influenced household size (p 87 above) as well as influxes of troops either to the garrison or as regiments stationed in the town on a short term basis. Wider fluctuations must have occurred as a reflection of national demographic factors, particularly disease and famine. Various multipliers intended to give population by calculation from the number of households in a town have been suggested but none has yet been devised which can take account of such fluctuations, nor is there any figure which could be applied with any degree of confidence to a moderate sized declining Scottish market town.

ACKNOWLEDGMENTS

It is easy for the person who has never done work of this sort to think that acknowledgments are a mere convention. I can assure them that, in this case at least, my thanks are heartfelt. They are due to many people, but particularly to the staffs of the various Archives and Libraries which I have had occasion to consult.

PUBLISHED REFERENCES

- Acts of the Parliament of Scotland. IX Edinburgh 1822
- ADAMSON, D. 1970, 1971, 1972. The hearth tax for Dumfriesshire. *Transactions of the Dumfries and Galloway Natural History and Antiquarian Society* 47,48,49. pp147-177,133-145,56-83.
- ADAMSON, D. 1981 West Lothian Hearth Tax 1691 with county abstracts for Scotland. Scottish Record Society.
- CLARK, P. and SLACK, P. 1976. English Towns in Transition 1500-1700. London.
- Extracts from the Records of the Royal Burgh of Stirling 1889 II 1667-1752. R. RENWICK editor, Glasgow.
- FLEMING, J.S. 1897. The Old Ludgings of Stirling.
- FLINN, M. editor. 1977. Scottish Population History from the seventeenth century to the 1930's. Cambridge.
- FOX, R.C. 1983. Stirling 1550-1700; the morphology and functions of a pre-industrial Scottish burgh. pp 52-70 in G. GORDON and B. DICKS editors, *Scottish Urban History*. Aberdeen.
- HARRISON, J.G. (in press). Burgess List for the Burgh of Stirling 1640-1710 with Introduction and Notes.
- MEEKINGS, C.A.F., PORTER, S. and RAY, I. editors, 1984. The hearth tax collectors book for Worcester 1678-1680. *Worcestershire Historical Society*, New Series. Volume 11.
- MORRIS, D.B. 1927. The Incorporation of Weavers of Stirling. *Transactions of the Stirling Natural History and Archaeological Society* 49, 6-61.
- Register containing the State and Condition of Every Burgh within the Kingdom of Scotland in the Year 1692, in *Miscellany of the Scottish Burgh Record Society* 1881, pp 66-68.
- Register of the Privy Council of Scotland 1685-1686, volume XI. Edinburgh, 1929.

- SJOBERG, G. 1960. *The Pre-industrial City: Past and Present*. New York.
SMOUT, T.C. 1963. *Scottish Trade on the Eve of Union*. Edinburgh.
WHYTE, I.D. 1987. The occupational structure of the Scottish burghs, pp 219-244 in LYNCH, M. editor. *The Early Modern Town in Scotland*. London.

MANUSCRIPT SOURCES

CENTRAL REGION ARCHIVES – CRA

Miscellaneous Accounts and Receipts relating to the mechanics of Stirling 1650-1697. PD7/12/8.

Council Record of the Burgh of Stirling 1680-1703. B66/25/6. Quoted by date.

Burgh Court Record of the Burgh of Stirling B66/ 16 Series.

List of the House and Land Supply 1716-1717. B66/25/779/2.

Minutes of the Kirk Session of Stirling (Holy Rude) 1655-1677. CH2/1026/4.

SCOTTISH RECORDS OFFICE – SRO

Hearth Tax Returns E69 Series. The return for the Sheriffdom of Stirling is in E69/22/1 and that for the town is on ff32R-37V with some relevant notes on succeeding pages.

Leven and Melville Papers. Burd to Melville 17th October 1692. GD26/7/359/2/13.

Leven and Melville Papers. Burd to Melville 15th March 1694 GD26/7/359/2/3.

Leven and Melville Papers. Ane Accompt of the Officers in Stirling Castle GD26/7/391.

Muster Rolls for Stirling Castle E100/39/7/19 5th September 1690, and E100/39/7/20 February, March and April 1692.

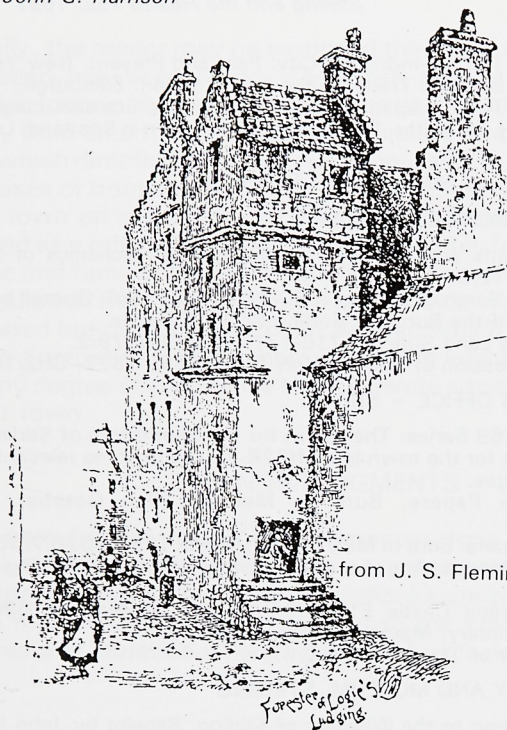
Sheriff Court Register of Transumps SC/67/1.

SMITH ART GALLERY AND MUSEUM, STIRLING

Unsorted Papers relating to the Weavers of Stirling. Receipt by John Burd to the weavers of Stirling of hearth money 1691, and Process, the weavers of Stirling against the Castelhill weavers 1681.

NATIONAL LIBRARY OF SCOTLAND (Map Room) – NLS

LAYE, J. Plan of the town & Castle of Sterling 1725. M.S. 1645. Z2/19a. This is conveniently reproduced as Plate 121 in *Royal Commission on the Ancient and Historical Monuments of Scotland. Stirlingshire* volume 2 HMSO(1963).



from J. S. Fleming *Old Ludgings of Stirling*

Forester of Logie's house stood at the corner of the High Gate and the Mary Wynd in the First Quarter. It is said to have consisted of two houses made into one. In 1691 it had 10 hearths and was occupied by the laird of Logie, Mr Thomas Forester (who was probably a relative of the laird's), Widow Allan and Widow Duff, Isobel Donaldson and Robert Luckison's widow.



Old House, Castlehill.

Sketch 1.

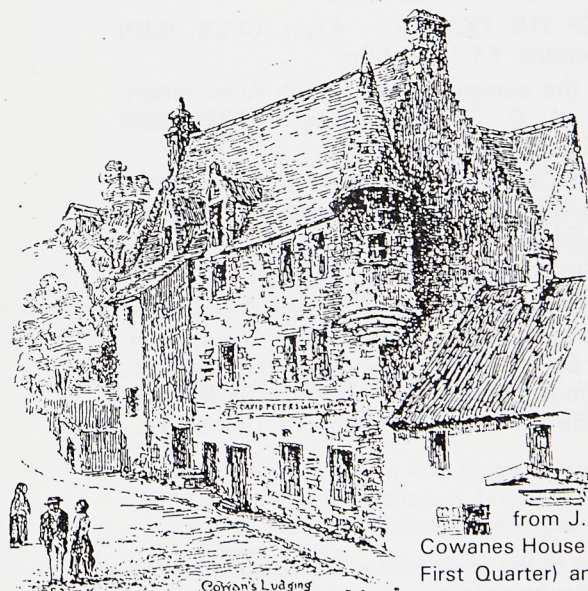
Old House, Castlehill from *Ancient Castles and Mansions of Stirling Nobility*, 1902



ALMS-HOUSE (OLD MANSR).

from J. S. Fleming *Old Castle Vennel*

The Manse is recorded in the return as the 'Toune of Stirlings hous', occupied by Mr John Munro, the minister. It was in the Fourth Quarter and had seven hearths, five of which were described as 'waste'.



Cowan's Lodging
Queen Mary's Palace.



from J. S. Fleming *Old Nooks of Stirling*

Cowan's House still stands on the old Mary Wynd (in the First Quarter) and is open to the public. In 1691 it was occupied by Alexander Schort a relative of John Cowane and himself a merchant. There were 12 hearths in 1691 and the building was extended later in that decade. Some of the old hearths can still be seen.

**FORTH NATURALIST AND HISTORIAN
AND ASSOCIATED PUBLICATIONS**

Orders/enquiries – address to Secretary/Editor L. Corbett, University of Stirling, FK9 4LA or 30 Dunmar Drive, Alloa FK10 2EH (tel: 215091). F N & H and associated publications are –

AIRTHREY & BRIDGE OF ALLAN – guided walk and brief history. 32pp. ISBN 0-9506962-6-9. 80p (p&p 50p)

ALLOA TOWER – new edition 1987, 32pp. CFSS. ISBN 0-903650-06-1. £1 (p&p 50p)

CLACKMANNANSHIRE: a guide to historical sources, by W. Brown. 390pp. F N & H ISBN 0-9506962-0-X £2.50 (p&p £1.20)

CLOCK MILL – extract from Woollen Mill Buildings of the Hillfoots. 12pp. 30p (p&p 30p)

DOUNE, by Mackay – historical notes including Kilmadock parish – 126pp. F N & H ISBN 0-9506962-5-0 £3.50 (p&p 70p)

THE FORTH NATURALIST & HISTORIAN – an annual journal of c130pp, 10/12 articles, vols. 1(1970) – 6 @ £1.50; vols 1 to 5 together with index £5; vols. 7 & 8 @ £2.50; vols. 9 & 10 (in press) @ £3 (p&p 50p) Reduced vols. 2, 3, 4 and 6, 50p each.

THE MAKING OF MODERN STIRLING, by T. Lannon. 130pp. F N & H ISBN 0-9506962-4-2 £2.60 (p&p 50p)

MINES AND MINERALS OF THE OCHILS – 43pp. CFSS. ISBN 0-903650-05-3 1986 reprint. £1 (p&p 50p)

THE STIRLING REGION – the survey for the British Association, by Stirling University, ed. D. Timms. 280pp. 1974. ISBN 0-901636-03-7. (p&p £1.60). Reduced £3.

STIRLING'S ROAD TO MASS CULTURE by T. Lannon, a local study of social change. 80pp. ~~80p~~ (p&p 40p). Reduced to 25p

WOOLLEN MILL BUILDINGS OF THE HILLFOOTS by Park. 180pp. 100 illus. ISBN 0-9506962-1-8. (p&p 80p). Reduced £3.

GODFREY of Gateshead reprints of large scale 1890's OS maps – flat or folded at £1 each (p&p 30p) – available – Alloa; Alva, Menstrie and Tullibody; Bo'ness; Clackmannan and Kincardine; Dollar; Falkirk; Grangemouth; Stirling (4 maps – St Ninians; Stirling North; Stirling 1896 and Stirling District); Tillicoultry.

Sale or return, and discounts to the book trade, and to societies for ten or more copies. Payment with orders welcomed. Cheques made payable to The Forth Naturalist and Historian.

COMING SHORTLY – from the Forth Naturalist and Historian

Volume 11 of this Journal, 1986/87 – to include –

Climatological Bulletins nos. 8 and 9, for 1986 and 1987, by John Harrison of the Climatological Hazards Unit, Environmental Sciences Department, Stirling University.

Forth Area Bird Report for 1987, by C. J. Henty.

The Sticky Catchfly (*Lychnis viscaria* L.), by N. F. Stewart of the Conservation Association of Botanical Sciences (CABS); on the rediscovery of the *Lychnis* on Abbey Craig, Stirling, after many years absence.

The Scenery of Scotland – the Structure Beneath by Bill Baird of the National Museum of Scotland, illustrated by Alan Chalmers of the Forestry Commission.

Dutch Elm Disease in Central Scotland – 1987, by Ruth Neiland of Stirling University and Wraight Shepherd, Landscape Architect, Central Regional Council.

Robert Burns at Harviestoun, by David Angus – and touching on the bard's love for Peggy Chalmers.

The Rise and Decline of the Coal and Railway Industries of Clackmannanshire, by John Elliott of Stirling University.

NEW BOOKS

DOUNE – POSTCARDS FROM THE PAST – selected from the collection of A. F. and S. McKenzie of Doune, to be priced about £1.50. ISBN 0 9506962 9 3.

and – from the Forth Naturalist and Historian with
Clackmannanshire Field Studies Society

THE OCHIL HILLS – a 40p illustrated A5 paperback to be c £2. This is a general introduction briefly describing the scenery, people, climate, waters, mammals, birds, insects, flora and trees – plus some selected walks.

SOME RECENT LOCAL PUBLICATIONS

THE LIBERTY OF THE BELL – an account of the Minutes, Members and the Auld Lairds of Bothkennar Parish in the year 1730, by William B. MacLaren. priv. print. 1987. £1.70.

The story of the church bell based on the inaugural lecture to the Falkirk Local History Society by its first Honorary President. Includes a list of the ministers of Bothkennar 1574-1943 and the Bothkennar and Carronshore United Church to its major renovation in 1986; also the membership list as of October 1986.

ROBERT BURNS IN CLACKMANNANSHIRE – by Robert Ritchie, illustrated by Janet McKay. Clackmannan District Council Interpretation Team. 1987. 32pp, 50p.

A well researched commentary on people and places in one of the poet's 'pilgrimage through Caledonia'. Here in 1787 aged 28, and basking in the success of his previous year's Kilmarnock poems, he is engaged in the unsuccessful pursuit of 'the immortal charms' of Peggy Chalmers.

QUEENSFERRY – A GUIDED WALK – by Queensferry Association. 1987. £1.25.

CALLANDER HERITAGE TRAIL – by Ken Dunn. Stirling Resource Centre. 1987. 90p.

PLACE NAMES OF STIRLING DISTRICT – selected from *Place Names of Stirlingshire* 1904 and *Place Names of Scotland* 1934 of James Johnston. Stirling District Libraries. 1987. 36pp. £1.

AN ANNOTATED BIBLIOGRAPHY OF CLACKMANNAN DISTRICT LIBRARIES PUBLICATIONS – by Adrian Ure. Clackmannanshire Field Studies Society. 1987. 28pp. 40p.

WHA'S LIKE US – poems by Nancy Barreto, illustrated by Barrie Barreto, Stirling District Libraries. 1987. 40pp. £1.50.

COMMUNITY HERITAGE BOOKLETS – A series of six deriving from a Community Programme with the Manpower Services Commission. Stirling District Libraries. 1987, each of some 40-50 pages, and 75p.

1. STIRLING RACES
2. COWIE – a mining village
3. WORTHIES – curious characters of old Stirling
4. STIRLING OCCURRENCES – anecdotes from the *Stirling Observer*.
6. SCOTT'S LEGACY – Sir Walter Scott and the Trossachs

Copies of these are available from the Secretary/Editor, and some bookshops and libraries – add p & p cost if by mail.

THE ALLOA AND HILLFOOTS TEXTILE INDUSTRY
– 1985 to 1987 events, and historical background –

Garry Scobie
University of Stirling

INTRODUCTION

It should go without saying that today's news is tomorrow's history and historians will know of the delight to be had in discovering an article which was written at the time of their particular field of study. While researching the history of the Alloa and Hillfoots textile industry, many hours were spent sifting through the back copies of the local press, wishing that someone had documented the progress of the industry as it evolved throughout the years to the present day.

During the 1985-7 time of the Oral History of the Hillfoots Textile Industry Project featured in volumes eight and nine of this journal many changes were indeed taking place in the industry. I outline these in this paper as a way of documenting such progress/information for future use. Some earlier historical background has been given in the Forth Naturalist and Historian's 1984 book *The Woollen Mill Buildings of the Hillfoots Area* by Brian Park.

The period I have considered was chosen simply because the article on Jaegers expansion plan in October 1985 was the first to make the headlines after the decision to keep a record of such events was made, with April 1987 a suitable stopping point to publish.

OCTOBER to DECEMBER 1985

Jaeger, Lornshill

On Friday, 18th October 1985, Jaeger announced that they were to create more than 62 new jobs as part of a £250,000 expansion plan at their Lornshill factory in Alloa. In the past work had been farmed out to smaller companies but the decision to increase the workforce in the garment manufacturing section by 25% and investing in new sewing and cutting machines means that such work will now be carried out in Jaegers own plant.

On Wednesday, 20th November, plans were announced to demolish part of the Kilncraigs factory in Alloa. The Architectural Heritage Society of Scotland and the Scottish Civic Trust opposed the move as the building in question was B-listed. Nevertheless, the proposals were part of a rationalisation process by the company which had been ongoing since 1980.

Designed by William Kerr and built in 1904, the interior of the building is a classic example of the style of the day, with an abundance of ornate wood panelling complete with marble staircase. It was here that the main offices were housed along with the boardroom. Leading off from this was the wareroom but both this and the elegant frontage are now surplus to requirements. At the time of writing this building still stands.

JANUARY to DECEMBER 1986

Clackmannan Mill

On Sunday 12th January 1986 one of the oldest features to dominate the Clackmannan skyline was sadly brought to an end. The 100 foot tall red brick chimney which had stood for over one hundred years was finally demolished in spectacular fashion. The complex operation, which took two hours to complete, began with demolition experts removing bricks from the bottom of the chimney and placing stacks of timber into the space left. The wood was then set on fire and eventually the chimney toppled to the ground. The mill, which was in the process of being demolished had ceased production three years earlier, when the owners, Patons and Baldwins (Matlock) Limited decided on economic grounds to transfer production to Lornshill in Alloa. Almost 80 people were employed when the mill finally closed its doors. At the time of writing it is expected that the ground will be used for private housing.

It was in 1875 that John Paton, Son & Co. of Kilncraigs, Alloa acquired the ground on the southern bank of the Black Devon, a site which had in fact been occupied as a distillery known as the Back Work. Owned by a Dr Cameron and at the time of purchase in the hands of his daughter, the site was ideal as the Patons were urgently requiring further space for the manufacture of yarn and there was no available ground near to a good water supply in Alloa. The stones for the mill buildings were dug out of the quarry on the north side of the Devon immediately opposite the five acre site. On the South side the ground rises sharply towards Clackmannan House, which remained unaffected by the building.

The mill was built by a local firm, Charles Buick & Sons, and according to the Third Statistical Account 'it is said that the cost was no more than £1,500, a figure that strikes us to-day as fantastically low'. I have to agree that the figure is indeed low and that A. Forrester-Paton's quote of '£33,000, not including plant equipment' in his booklet *The Romance of Patons Yarn* is probably nearer the mark.

The mill was built on the pattern of a typical Lancashire mill, what is commonly known as a 'Vertical Mill'. Indeed Clackmannan

Mill was as good an example of this particular style as any in its day. It was not until much later that the thinking on mill design began to change in favour of the 'Horizontal Mill' with all the plant on one floor. In 1947 Patons & Baldwins – as they were then known – built a mill at Bo'ness on this design, the difference in style being radically different from the one adopted over 70 years before. Although a 'Vertical Mill' may not take up nearly as much ground as the horizontal design, it was nevertheless restricted to the machinery of the day. The main building itself consisted of five stories with the engine house, a two storey building at the West end. From the ground floor iron pillars supported the beams of the first floor, these pillars continuing in the same position throughout the remaining flats above. Consequently, the mill was built with the dimensions of the machinery in mind, machinery which had to fit in between the pillars on each floor. It is interesting to note that most of the original machinery continued in use until the end of the mill's working life.

Apart from the main building there was a single storey teaser house to the West of the engine room and on the bank of the river there was a building which housed three boilers at one end, the chimney situated at the other. The rest of this building included a general store, the mechanics shop and later on a First Aid room. Part of it was eventually used as a wool store for although there was adequate space for the plant, the mill was built without any provision for the storage of the wool itself. The mill's activities consisted of spinning, carding and teasing, acting as a conversion plant for the Alloa mill. Batches of wool were sent out to Clackmannan where it was converted into single yarn and then sent back to Alloa to be finished into a final product.

It should be noted that in early artists impressions of Clackmannan Mill, buildings can be seen on the other side of the bridge across the River Devon. These drawings featured in advertisements for the Company and its products. Later advertisements do not feature these buildings for in fact they never existed. Although artistic licence in the line of business is nothing new, it should be appreciated that such drawings do tend to give a romanticised view of the industry and the artists were inclined to add the odd building here and there in order to give their client's property a larger than life appearance. However, they nevertheless show us that the image a company put forward mattered as much then as it does today. For the record the entire complex was built using red brick.

Within a week of the demolition of the chimney at Clackmannan Mill, Patons immediately put up a new chimney at their Kilncraigs factory in Alloa. Continuing with the next stage of their investment plan three large boilers were no longer required for the needs of the

factory, so consequently these were dismantled in order to make way for two new boilers which would be far more economical to run.

The end of January 1986 saw the announcement of a proposed merger between Dawson International and Coats Patons. Dawson, the Kinross-based textiles group is best known for the famous knitwear brands it owns such as Pringle of Scotland, Ballantyne, Barrie, Braemar and McGeorge. Coats Patons brands names include Jaegar, Country Casuals, Chilprufe and Dalkeith. Both companies share common interests in fashionwear and handknitting as well as in the processing of rare animal fibres and in yarn production. Dawson launched an agreed £623 million bid for the Coats Patons group, and the general feeling was that this merger would be a force to be reckoned with. The combined group was forecasted to achieve worldwide sales of approximately £1.3 billion and have a total workforce of over 52,000 employees. It was stressed in the local papers that the 900 jobs at Kilncraigs in Alloa along with the 300 strong workforce at Jaegers factory at Lornshill were safe. However, a surprising turn around on the part of the Coats Patons Group hit the headlines on the 12th of February, with the group deciding to link with Vantona Viyella, a merger which valued the company at £661 million. No redundancies were expected as a result of the agreement.

However, in the intervening weeks redundancies had been announced at Glen Alva's Hallpark Mill in Sauchie. Due to a shortage of orders a total of 27 redundancies were announced in the papers on the 5th February. Three workers had been paid off the week before while a further 24 on temporary contracts left by the end of the week, their contracts not being renewed. A union official warned that if new orders were not found soon then other employees could be affected. The firm did state that they were awaiting confirmation of a big order and if this was confirmed then there was a possibility that the workers would be taken back on again.

The Clock Mill

On the 21st of February it was reported that Clackmannan District were to use the ground floor of the Clock Mill as a tourist and craft centre while Central Region would continue to lease out the first floor for small businesses. The Clock Mill in Tillicoultry has probably the most chequered history of any mill in the area. Although space precludes a detailed account of the mill's history, a brief synopsis is nevertheless desirable. The mill was built in 1824 by James and George Walker, who wove blankets, plaids and tartan shawls. The mill remained in the hands of the Walker family up until 1915 when Scott and Archibald bought the business. Robert Walker, who was the son of George Walker remained as Director while Scott took

over as manager. It should be noted that the Archibald family owned Middleton, Middletoun, Devonpark and Devonvale mills at this time. The post war depression took the Archibalds to bankruptcy and the Clock Mill again changed hands around 1922 when the firm of John Hewitts moved in. This firm moved on in 1930 to the Devonpark Mill. From there the occupants ranged from the Tillicoultry Quarry Company, and a Mr Johnstone who used part of the mill for the cultivation of mushrooms. During the Second World War the mill was used as a barracks for the troops. In 1947 Campbells the Kiltmakers moved in, who also specialised in the making of shrouds until 1968. In 1950 Duncan Sinclair rented the bottom flat, eventually taking over the whole mill. His son Tom continued running the family business until 1980. Between 1983 and 1985 Sandy Hardie was involved with the Youth Training Scheme, teaching school leavers in weaving and the repairing of looms.

It comes as no surprise then to find several different going concerns in the Clock Mill today. Marjory Fernie's design business in weaving using a 16-shaft Dobby loom produces fashion wraps in a variety of colour combinations. Dumyat Kilts owned by Moira Hunter and Isabel Jamieson, offer a complete kilt-making service. Each kilt is hand-sewn and they can supply everything to make up a complete outfit. Dumyat Kilts can also supply hand-knitted traditional Scottish knitwear such as Aran and Fair Isle jumpers. McDiarmid Knitwear owned by Jeanette McDiarmid, specialises in both men's and ladies' knitwear using mainly Shetland wool.

On the 4th of April the knitwear firm of R. & J. Bryants, Stirling Street, Tillicoultry announced that it was going on to short-time working the following week. The 117 strong workforce would be working only two to three days each week until further notice, but at present there were no plans for any redundancies. The firm, which produces quality cashmere and lambswool garments, were hoping that the situation would improve in the near future and blames the fall in the value of the American Dollar coinciding with a drop in sales as being at the root of the problem. However, on the 16th it was reported that the receivers had been called in and if a buyer was not found then the mill would close. The following day redundancy notices were handed out to most of the staff though 34 were being kept on to complete existing orders.

Tuesday the 22nd of April saw the return to normal working by the workforce of Jaegers at Lornshill in Alloa, after a sit-in which had begun on Friday the 18th when over 200 workers occupied the canteen. The dispute was between management and shop stewards for the National Union of Tailoring and Garment Workers over arrangements for time off for shop stewards attending union meetings during working hours.

There was good news at last for Glen Alva when it was announced on the 30th of April that a large order had been secured from Marks and Spencer to supply 1,000 dozen children's garments over the next four months. As a result the firm were intending to recruit more workers. The month of April also saw this Sauchie mill opening a £150,000 extension, and a further £120,000 invested in two new Jumberca circular knitting machines, the first to come to Britain.

There was good news on the 15th May when a deal was finalised which saw R. & J. Bryants being bought by the leading fashion firm. This is Laura Ashley, the firm's first British knitwear production unit.

The ups and downs of the textile business continued in July when it was reported on the 4th that 20 redundancy notices had been handed out at Glen Gordon Knitwear in Tillicoultry. The firm, owned by Sir Hugh Fraser, employed a workforce of 75, and blamed a lack of orders and fluctuations in world currency markets for the lay-offs.

The last six months of 1986 were relatively quiet compared to the activity of the first half of the year. The papers reported on August the 29th that the Knitwear firm of Blaebury Manufacturing was to go onto the open market, yet another victim of the slump in the textile trade. This company was set up two and a half years previously in Alloa's South Industrial Estate by Mr Hewitt.

JANUARY to APRIL 1987

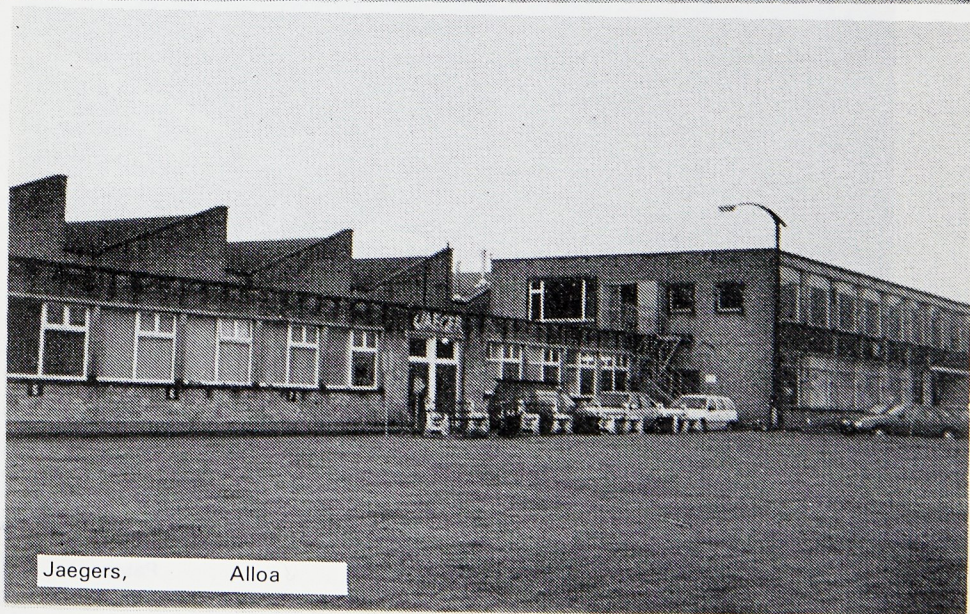
The end of January 1987 told the same old story once more, this time with Paton and Baldwins in Alloa putting around 300 workers in the finishing department onto a four-day week. The reason given was that the company was between seasons and orders were scarce. The situation was expected to continue for six to eight weeks.

On Friday the 27th of February the *Alloa Advertiser* ran a feature on R. & J. Bryants of Tillicoultry, which showed that since the takeover by Laura Ashley the firm had gone from strength to strength. The workforce had been taken back on again and the orders were coming in. A tremendous achievement for a business which had been close to shutting for good.

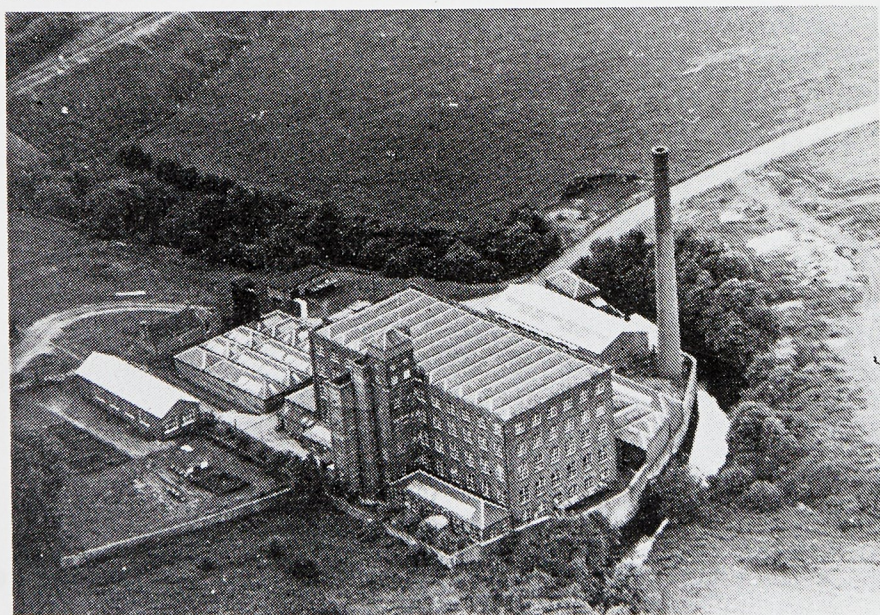
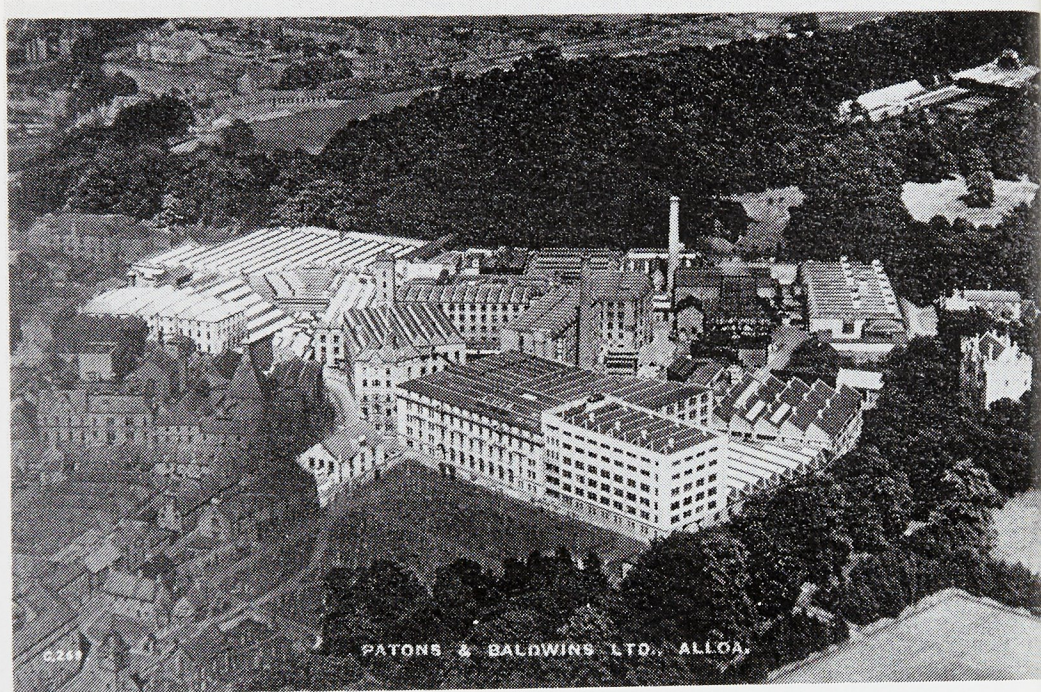
On Friday the 3rd of April, Paton & Baldwins announced that due to changing trends in the textile industry, the firm was laying off up to 70 of its workforce. A statement issued by the company spoke of the plain type of yarn being in fashion as opposed to the more intricate type so there was no longer enough work for the fancy yarn machines. Although a number of redundancies would take place on the nightshift, the three-shift system would carry on working.



Clock Mill, Tillicoultry



Jaegers, Alloa



Clackmannan Mill

Patons

BOOK REVIEW

WILLIAM WALLACE. Andrew Fisher.

John Donald. 1986. 147pp. £6.50. ISBN 0 859976 154 1.

It is the genuinely extraordinary nature of Wallace's achievement which clearly emerges from Andrew Fisher's biography. In 1296 after Edward I's crushing conquest Wallace was confronted with the opportunity to assume the leadership of Scotland. Far from shirking it he stepped out of his social class to assume that role and to exercise it with consummate skill. Wallace, from a knightly family attached to the Stewart magnates, would never have been expected to fulfill the leadership role which was normally reserved for the magnates but by doing so he set an example which, according to Fisher, was not merely novel but, in the magnates' eyes, dangerous because it threatened to upset the established feudal balance.

Fisher considers that Wallace's first recorded action against Edward's government, the murder of the Sheriff of Lanark, was not inspired by fully-fledged national sentiments but rather by a desire to attack the sheriff of a court which was hearing a case against him. Acting independently and without the prompting of any magnates such as Robert Wishart, bishop of Glasgow or James Stewart Wallace's action was timed to perfection, coinciding with a series of spontaneous outbursts throughout Scotland against Edward's government. As his band of thirty followers grew, Wallace had the courage and the nerve to seize the opportunity which came his way.

In a flowing narrative Fisher not only discusses the motivation of Wallace and his followers but considers in some detail the actions of Edward, Surrey and Cressingham. His account of the battle of Stirling highlights the uncertainty of the whole proceedings on that September day. Firstly, Wallace and Murray may never have intended to fight at Stirling Bridge at all. Positioned on the rising ground to the north of the Forth they watched the antics of the English and waited. Following the account of Walter of Guisborough, which on this occasion there is no reason to question, Fisher explains how the English vanguard in fact crossed the bridge twice and withdrew twice without any Scottish attack being made. Not till the third crossing did Wallace and Murray judge the time right to order the attack. Fisher also raises the somewhat equivocal role of James Stewart and the Earl of Lennox at Stirling where they appear to have 'hedged their bets' till after the battle when they finally decided to join the victorious Scottish side. Stewart and Lennox, thus, illustrate the second main theme of this biography, the inconsistency of the magnates and barons compared with the loyalty and steadfastness of Wallace to the Balliol cause.

The barons remained sceptical of Wallace's position even though Wallace had the political sense to await his appointment as Guardian

and not to assume it without their consent. Bruce, the grandson of the Competitor, can have had little time for Wallace who wished to restore Balliol and it seems likely that he was not present at Falkirk in 1298. The Falkirk campaign, Fisher argues, could have been an outstanding success. Wallace, he believes, never intended to fight Edward but to retreat and let Edward's invasion wear itself out as his son's was to do in 1322. If this was his intention Wallace nearly succeeded for Edward was on the point of retreating when he was informed of the proximity of Wallace's force. Even then Wallace was only defeated because the cavalry, the barons, fled from the field. Wallace was not, therefore, hidebound by the feudal conventions of the time. He was not attempting to prove, as some have argued, that he was a master of conventional warfare and therefore worthy of acceptance by the magnates. He was his own man adopting the guerilla tactics which he believed best until he was caught out by Edward and forced to fight.

After Falkirk Wallace remained loyal to Balliol. Fisher argues convincingly that Wallace voluntarily resigned the Guardianship but rejected an offer of clemency from Edward. Wallace unlike many would not change sides. He left Scotland, visited France and may even have accompanied Baldred Bisset to Rome.

By 1304 the picture emerges of a baronial class in Scotland indifferent to Wallace's fate. Wallace was outlawed by a Scots parliament in 1304 and so even in Scotland Wallace would not have been permitted any defence at his trial. Edward had won and as far as the barons were concerned Wallace's reputation had been finally destroyed. Ironically it was the same trial which was to make Wallace a martyr to be remembered by future generations. Wallace's main support had always come from the common folk and in their memory he did not fade. The magnates in many ways were happy to see him removed for they had never accepted that someone from his class should exercise leadership of the government.

This is the first well-researched and reliable biography of Wallace to be published. Its strength lies in the narrative it presents, its discussion of motives and the manner in which many points, previously lying hidden in academic works are for the first time raised in a more popular style. Andrew Fisher has looked at the sources with a fresh eye and the result is a lively and interesting study.

The two main themes of the book, the inconstant patriotism of the barons and their social rejection of Wallace merit further consideration. Fisher, in developing the career of Wallace is perhaps rather hard on the barons. There can be no denying that very few barons fought consistently on one side or the other but this does not mean that their loyalties were not constant. Self-interest and self-preservation have always influenced those with most to lose. But it was an English chronicler who wrote that 'most of the Scots who were with the English were with them insincerely'. It must be remembered, as Alexander Grant

has pointed out, that Scottish inconsistency worked both ways, while the barons were not consistently patriotic neither were they consistently unpatriotic (*Independence and Nationhood*, 25). The Scots feudal lords were in a novel position, searching for a loyalty to a kingdom rather than to a king. There were no precedents to follow and so each had to make individual decisions which were bound to be inconsistent. What consistency there was lay in the idea of the community of the realm. Unfortunately Fisher does not discuss this concept nor Wallace's relationship to it – unfortunately, because it was during the period 1295-1304 that the aristocratic community of the realm first began to act independently of the king for the good of the realm.

Wallace's impact on the community of the realm was very much to the effect that the common folk and the middling folk could lead it and were part of it. Fisher realises that social barriers persuaded Wallace to resign as a leader of the community of the realm after his defeat at Falkirk but he fails to question the wider social implications of Wallace's movement. While one would agree with Professor Barrow that it would be 'misleading to picture Wallace as the common man leading an army solely composed of common men fighting to establish a proletarian republic' (*Kingship and Unity*, 166), it seems highly likely that there was as Professor Duncan once argued 'an element of social discontent' in the 1297 uprising. It is after all Barbour who equates freedom from foreign oppression with freedom from serfdom. The breach of feudal ties is one of the features of the Wars of Independence and indeed Fisher, unknowingly, describes one possible example of it when the men of Stewart and Lennox refused to leave the Scots' side to join the English before the battle of Stirling.

It has also been argued that the absence of peasant/landlord tension in the later fourteenth century in Scotland, which can be seen in the Peasants Revolt in England and the Jacquerie in France, stems from the wars with England because peasant political awareness was concentrated on foreign rather than domestic oppressors (Grant, *Independence and Nationhood*, 88). In terms of Scottish Society as a whole the years from 1296-1298 may be of greater significance than any other during the Wars and it would have been interesting to have seen Fisher's comments on the wider social implications of Wallace's career.

None of this detracts in the least from this excellent biography which will certainly become prescribed reading for all interested in the Wars of Independence.

GRANT, Alexander. *Independence and Nationhood*, Scotland 1306-1469. E. Arnold. 1984. 256pp. £6.95.

BARRON, G.W.S., *Kingship and Unity*, Scotland 1000-1306. E. Arnold. 1981. 182pp. £6.95.

JOHN M. GILBERT

AUTHORS' ADDRESSES

Bell, M.V. Department of Biology, University of Stirling

Gilbert, John M., Bell Baxter High School, Cupar, Fife

Harrison, John G. 14 Abercromby Place, Stirling

Harrison, S.J. Department of Environmental Sciences, University of Stirling,

Henty, C.J. Department of Psychology, University of Stirling

Scobie, Garry. Department of Sociology, University of Stirling

Stephenson, Jayne D. Women's Unit, Municipal Buildings, Stirling

Stewart, N.F. Conservation Association of Botanical Societies,
323 Norwood Road, London



the Forth
Naturalist



Historian



The *Forth Naturalist and Historian* Editorial Board was set up in 1975 by several staff of the University of Stirling and Central Regional Council as an informal collaboration to provide a focus for interests, activities and publication of naturalist, environmental and historical local studies. This journal is a successor to the basic information source, the *Transactions of the Stirling Field and Archaeological Society* (1878-1939).

The Board aims to provide contacts between people and organisations with related interests in central Scotland.

£3.00

