The Department of Fisheries and Wildlife

Wildlife Research Centre, Woodvale.

THE ATLAS OF WESTERN AUSTRALIAN FLORA - PILOT PROJECT

FLORAPLOT - A COMPUTER BASED DATA MANAGEMENT AND GRAPHIC DISPLAY SYSTEM

by

PAUL GIOIA, B.E.
CONSULTANT COMPUTER PROGRAMMER

1984

ACKNOWLEDGEMENTS

Thanks and appreciation is extended to the various people who have been invaluable in developing the FLORAPLOT system over the past three years. Norman Hall, Wilf Lehre and Geoff Adams have each contributed generously in time and effort in all components of the FLORAPLOT system. Steve Hopper has provided consistent feedback in the development of the FLORAPLOT program as well as co-ordinating the entire pilot project.

Thanks are also extended to the Department of Fisheries and Wildlife and the Australian Biological Resources Study for providing the funds and resources to make the pilot project possible.

The efforts of Raelene Hick and Jill Pryde in typing this manuscript are greatly appreciated.

CONTENTS

1.0 INTRODUCTION

The Atlas of Western Australian Flora was a pilot project initiated by the Western Australian Department of Fisheries and Wildlife and funded jointly by this department and the Australian Biological Resources Study.

Its aim has been to involve interested amateur and professional botanists in the collection of information on the geographical distribution and habitat of selected groups of native plants, especially those in nature reserves and national parks.

The information collected is of considerable value to the department as well as to various members of the community such as horticulturists, botanists, land developers and mining companies whose activity may possibly cause the destruction of rare or endangered species.

The information can also be used to assess the conservation status of native plants and to stimulate appropriate action where species appear to be endangered.

At various stages the data collected are returned back to the original contributors in the form of maps. In this way contributors can see the result of their efforts as well as being able to see how well a species is represented and where gaps lie in the geographical data. Efforts can then be made to fill in the missing data and gain a more accurate representation of that species.

Because of the large amount of information the Atlas would generate it was decided to use a computer data base as a data management tool. This would facilitate information storage and rapid retrieval of data for producing tabulations and maps for particular species.

This report seeks to document the most significant part of the computer system used by the flora atlas, that being the FLORAPLOT program. Whilst a large amount of processing is done on systems other than that containing the FLORAPLOT program, this processing can be done on any suitable mainframe computer. This document seeks only to elaborate on the FLORAPLOT program and its interfaces to the outside world.

2.0 SYSTEMS OVERVIEW

Figure 2.1 shows the major components of the Flora Atlas data management system.

Flora occurrence and habitat data are initially collected by amateurs or professional botanists and are recorded on a pre-printed sheet suitable for inclusion onto a computer file. Figure 2.2 shows a copy of the sheet.

Collectors record the name of each plant species sighted in a particular location and other pertinent information.

The sheet also requires information about the location of the plant's occurrence such as latitude and longitude reference, nearest locality and measure of accuracy. Habitat information such as soil type, slope aspect and dominant vegetation is required.

Essentially the data are point distribution data.

In unprocessed form it is difficult to organise and manipulate data. Therefore, use has been made of a set of data management utilities developed by Wilf Lehre called the General Data Management System or GDMS. (This system was originaly developed to aid in the prawn and rock lobster data bases at the Western Australian Marine Research Laboratory and was later generalised to be used for any data base.)

The GDMS takes the raw data and reformats them into a special file used by GDMS utilities. Tabulation and listings of data are now possible.

Eventually a subset of these data are transferred to the TEKTRONIX 4054 minicomputer for generation of maps. The reason for entering the data on the CYBER initially is that the CYBER is far more capable of handling large volumes of data. As much pre-processing of data is done on the CYBER as possible so as to free the TEKTRONIX to do its primary function - plotting pre-processed graphic data.

Data that will be used by the TEKTRONIX plotting system are processed onto the CYBER, if possible, to gain optimum processing times. This means that, in some cases, information is directly entered onto the CYBER for processing and then transferred to the TEKTRONIX. Other times, data are captured by the TEKTRONIX, transferred to the CYBER for processing and then re-transferred back to the TEKTRONIX.

When a transfer of flora data occurs, only those data that are required for plotting are moved. This saves transfer time and space. The data subset is then transferred to the TEKTRONIX 4054 minicomputer.

Once a transfer has been completed the data are again

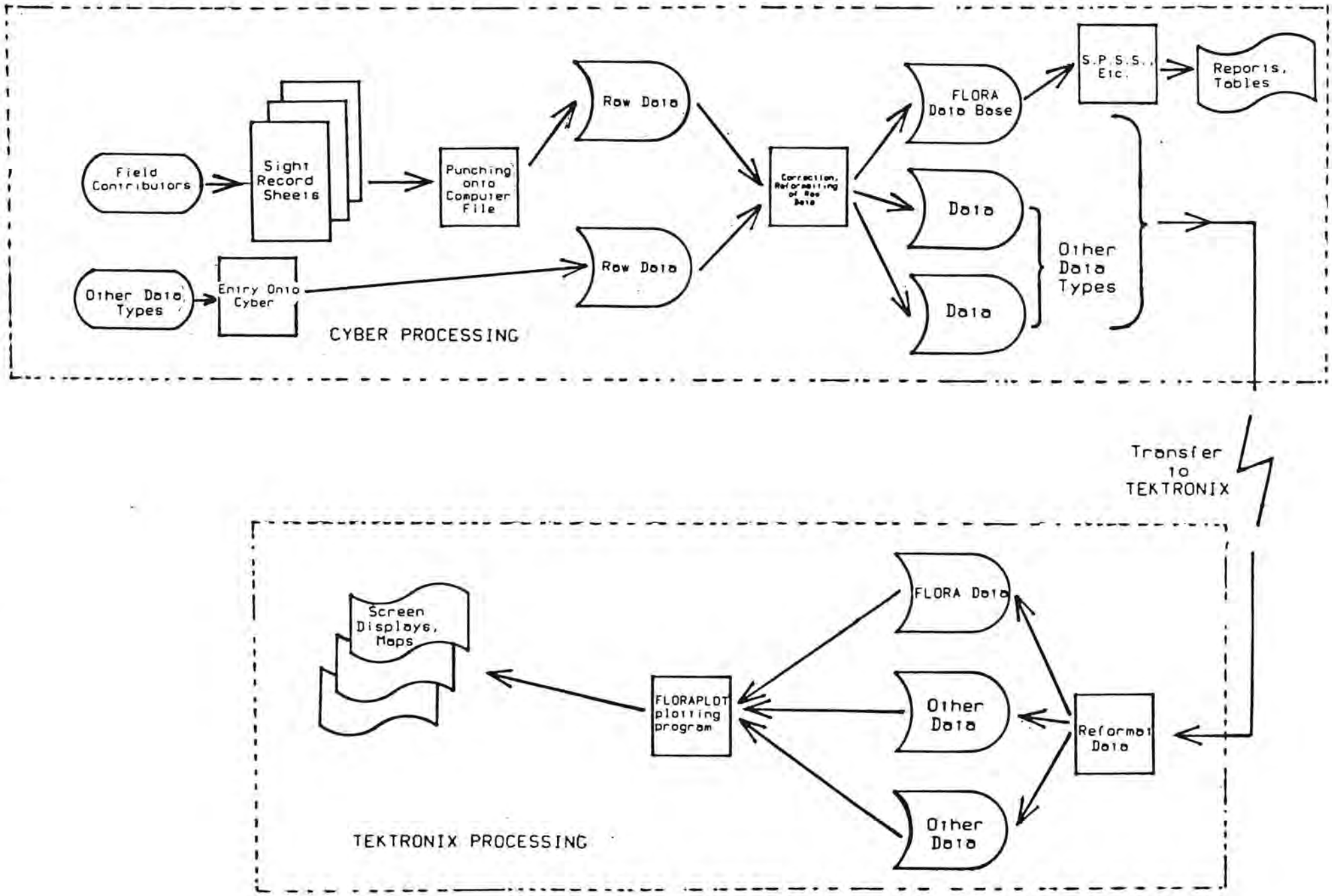


Fig. 2.1 FLORA ATLAS Data Flow

processed and reformatted into a form suitable to be used by the FLORAPLOT plotting program. This program uses not just flora data but also other information to make the resultant maps more meaningful.

A map can be generated on the 4054 screen from which a reasonable quality hard copy can be made. Or, alternatively, a pen plotter can be used to produce a high quality map.

Updating of the flora atlas occurs whenever a sufficient number of new records have been collected - usually two or three hundred sheets. The system is then updated and a book containing all flora data currently present on the atlas is published and circulated back to the original contributors as well as other members of the community.

3.0 THE FLORAPLOT PROGRAM

3.1 SOFTWARE DEVELOPMENT

The FLORAPLOT program was initially written in response to the initiation of the Atlas of Western Australian Flora pilot project in 1981. The first version of the program was written by Wilf Lehre. At that stage the 500 line program was comparatively small, having the basic ability to plot data at a species level, plot a lat./long. grid and had some discriminatory ability.

This software was then developed over a period of two years to produce a new enhanced program.

3.2 OVERVIEW

FLORAPLOT is a computer program that takes various types of data and represents them pictorially on a screen in the form of a map. When we read maps we expect a certain minimum amount of information to be on the map to give it some meaning e.g. border, scale bar, lat./long. grid. Once this information is there, other types of information can be "overlaid" on the existing base map to give it greater impact or meaning to the user.

Initially FLORAPLOT produces a map with a certain minimum amount of information. This is comprised of:

(a) The coastline of Western Australia

(b) At least one taxon distribution, whether it be at the generic, specific or subspecific level.

The user can then optionally add other information such as:

(a) a latitude/longitude graticule

(b) town names

(c) text

(d) national park boundaries; and

(e) nature reserve boundaries

The user can also zoom in and examine a smaller section of the map by specifying an area of interest on the screen and expanding that area to obtain greater detail.

A valuable feature of FLORAPLOT is its ability to discriminate between taxa when plotting their distribution. The user may plot up to ten different taxa, each taxon having its own plotting symbol. Generic, species and subspecies/variety plots are possible. You can also distinguish between occurrences on or not on nature

reserves. Discrimination can be made as to whether the surrounding vegetation is restricted to the road verge or not, the flowering occurrence status and also the date of observation. The last two can effectively be used together to produce informative maps showing geographical differences in flowering time.

Essentially the flora atlas is all about point distribution data. FLORAPLOT puts these data into a meaningful context by overlaying other point and polygon data and producing publication quality maps.

3.3 HARDWARE REQUIREMENTS

To run FLORAPLOT V1.0 the following equipment is used.

Required: TEKTRONIX 4054 Graphics System
TEKTRONIX 4907 File Manager/Disk Drive
Optional: TEKTRONIX 4631 Hard Copy Unit
TEKTRONIX 4663 Digital Plotter

3.4 DATA INTERFACES

As this documentation deals primarily with the FLORAPLOT program it is essential to note the requirements of FLORAPLOT as far as data format is concerned. The appendices contain the format that FLORAPLOT expects for all data types it processes. It is up to the user to provide the data in that required format. In some cases data is organised into complex formats to enable quick retrieval and processing. In these cases the data has usually arrived in a much simpler format and is converted via another program. Both the transfer programs and the external and internal data formats are documented in Section 5 and the appendices.

3.5 PROGRAM EFFICIENCY

A program's efficiency depends on a number of factors. These include:

Data input/output access rates

Data storage type - sequential or random access

Data volume

Software efficiency

Machine memory limits

Because FLORAPLOT uses a large amount of data and is a large program in itself, the above factors had to be considered in its development so that optimum performance could be achieved. That development was affected in the following ways:

3.5.1 Coastline Data

As with the flora data, a large amount of data is involved. The coastline was divided up into segments and indexed. This means that when only a small portion of the map is shown on the screen the whole data file need not be read. Rather, the index is used to find the relevant parts of the coastline to be plotted. This technique saves a considerable amount of time when covering only a small area of the state.

When the first version of FLORAPLOT was written, the entire coastline was read into memory. When the program was first run it took 30 seconds to read these data in. Thereafter to plot the entire coastline took a matter of a few seconds. However, the map data took up over 70% of available memory space. As the program was developed it was necessary to change this. Now only small sections of the coast are read in at a time. This takes only a small amount of memory but the big trade off is that it now takes considerably longer to plot the coastline.

In most cases a tradeoff is required between efficient data storage and efficient run time. In this case the amount of data involved combined with machine memory limitations has led to a less-than-maximum run time but very efficient data retrieval techniques.

3.5.2 The FLORAPLOT Program

There are two ways that a program can be structured:

(a) Have the entire program reside in memory. This takes up a lot of valuable space but means that run time will be quicker.

(b) Have only a core module residing in memory and read in appropriate code as required during run time. This means a much larger program can be used but with the trade-off of slower run time.

Because of FLORAPLOT's size the latter option was adopted. Thus FLORAPLOT consists of a main module and a number of subroutines that are loaded as required.

3.5.3 Indexing Flora Data

The flora data file contains a large amount of data so it was important to have the data organised in a rapidly accessible and compact format. To achieve this the data are indexed by taxonomic name. That is, the data are sorted by genus, then species, then subspecies. Thus, species with small numbers of occurrences that may reside at the end of the file are quickly and easily assessed, like reading the index in a book to find the page number of some information. Thus the flora data file actually consists of four files:

(a) Main data file, sorted by taxon code

(b) Genus index

(c) Species index

(d) Subspecies index

3.6 IMPROVEMENTS/PROBLEMS

3.6.1 Raster Screens - Storage Screens

As is the case where any technology improves its quality at astounding rates, equipment that is obtained at one point in time quickly becomes out-dated with every new advance that comes along. One of those advances has been the trend towards graphics computers using raster screens rather than storage screens. Some reasons for this are:

(a) Raster screens are available in colour

(b) Colour filling of polygons is possible

(c) Individual graphic items can be moved dynamically without having to repaint the screen

(d) Publication quality colour hard copies are available.

The above features are either unavailable or only rudimentarily available on a storage screen which is just the type of screen used by the TEKTRONIX 4054 and the FLORAPLOT program (them's the breaks). This limits the options for good quality paper copies of screen images to either the thermal hard copy (reasonable) or a pen plotter (good). This will be a problem that will have to be lived with whilst the 4054 is used as a graphics system.

3.6.2 Equipment Upgrade

There are various TEKTRONIX upgrades available that dramatically improve the performance of the 4054. These include:

(a) More memory - quicker access and display

(b) Quick I/O rates - quicker access and and display

(c) Enhanced basic language - more efficient code

(d) Refresh graphics - enables a partial solution to feature (c) above.

If the above upgrades were implemented they would improve the FLORAPLOT system by dramatically reducing the turnaround time to produce a map as well as enable FLORAPLOT to have more functions and capabilities in

displaying flora information. These two improvements are essential in enabling the FLORAPLOT program to be better used as a tool for assessing the conservation status of plants as well as performing other research oriented tasks that are characterised by ad hoc enquiries.

3.6.3 Future Requirements

It is desirable to eventually have more polygon and line information such as shire boundaries, rainfall isohyets, and major roads overlaying the basic map. It is also desirable to incorporate more discriminatory capability such as soil type distinction and rarity status.

4.0 FLORAPLOT USER MANUAL

In this and subsequent sections the following nomenclature is used:

<CR> means pressing the RETURN button. Unless otherwise specified it is assumed that the RETURN button is pressed at the end of every line typed in by the user. This enters the typed information into the computer.

ß means a blank or space. e.g ßß means press the space bar twice. In most cases blanks are only required in a command to help improve its readability. Thus they can be omitted except where information is to be entered within quotes. e.g. "FREDßBLOGGS" is not the same as "FRED BLOGGS".

In this manual <TEK> is a prefix that is printed whenever the TEKTRONIX issues a prompt or a response. This is done to distinguish TEKTRONIX responses from user input.

4.1 PROGRAM OVERVIEW

When generating a map, the user usually has in mind a general idea of the information wanted on it. However the result may not be exactly what was required. The user then "tailors" or fine-tunes the map to make it more aesthetically acceptable. This "feedback" approach may have to happen two or three times before a suitable picture is achieved.

Floraplot is structured along the feedback approach. Figure 4.1 shows the major blocks in the program operation.

The first major block is the MENU. When the program is first started up a default menu is generated. This is shown in Figure 4.2. Here the user can determine the basic characteristics of the map such as

a) Taxa to be plotted
b) Selection criteria
c) Additional overlays
d) Type of plot

If the default menu is used then the following type of map will be generated:

a) The species plotted will be the first (alphabetically) in the list of available species, in this case Anigozanthos bicolor. All records of A. bicolor will be plotted irrespective of flowering status, location or habitat.

b) The southern half of the Western Australian coast will be plotted

No other information will appear on the map apart from the

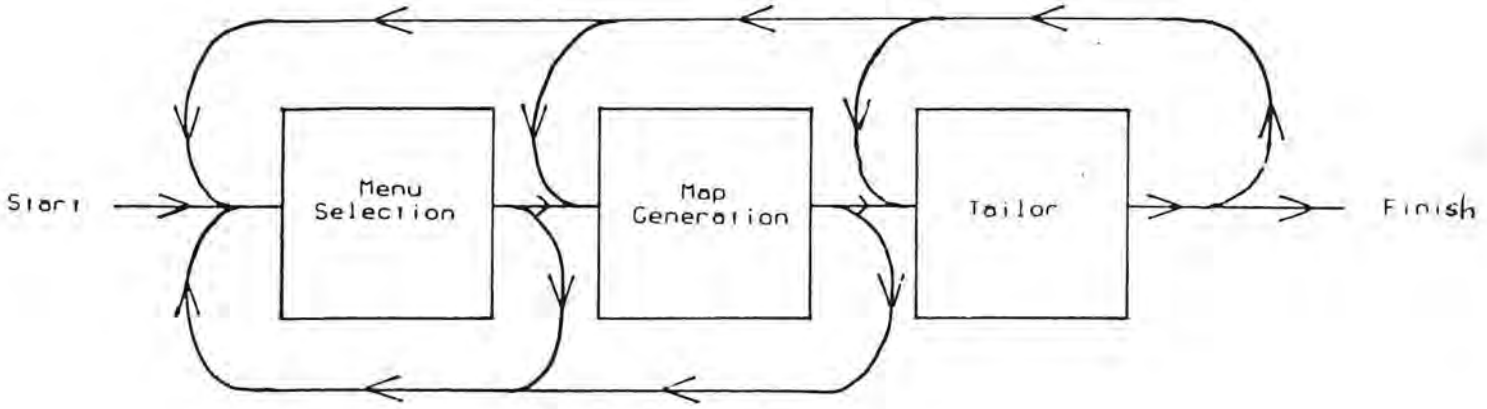


Fig. 4.1 FLORAPLOT Program Flow

FLORAPLOT MENU

1. Taxon Name :
(ANIGOZANTHOS BICOLOR)
2. Reserve Class :

3. Road Verges :

4. Regulative Period(s) :

5. Discrete Period(s) :

6. Flowering :
7. Grid :
8. Major Towns :
9. National Parks :
10. Nature Reserves :
11. Default Map :Lower State

12. Dig. Plotter
13. Plot On Screen
14. Continuous Plot
15. List Available Species
16. Terminate Program

Enter Option To Be Changed (1-11)

or

Function To Be Performed (12-16) :

Fig. 4.2 The Default FLORAPLOT Menu

species name and a scale bar.

This map is shown in Figure 4.3 This comprises the second major block: the generation of a map according to the menu specifications.

Once the map is completed the program enters the last major block - the "tailor". Here the user may choose to modify the map as necessary or may choose to make a hard copy of the map as is. Figure 4.5 shows the same map as Figure 4.3 with the addition of the tailor option printed in the lower left hand corner of the screen.

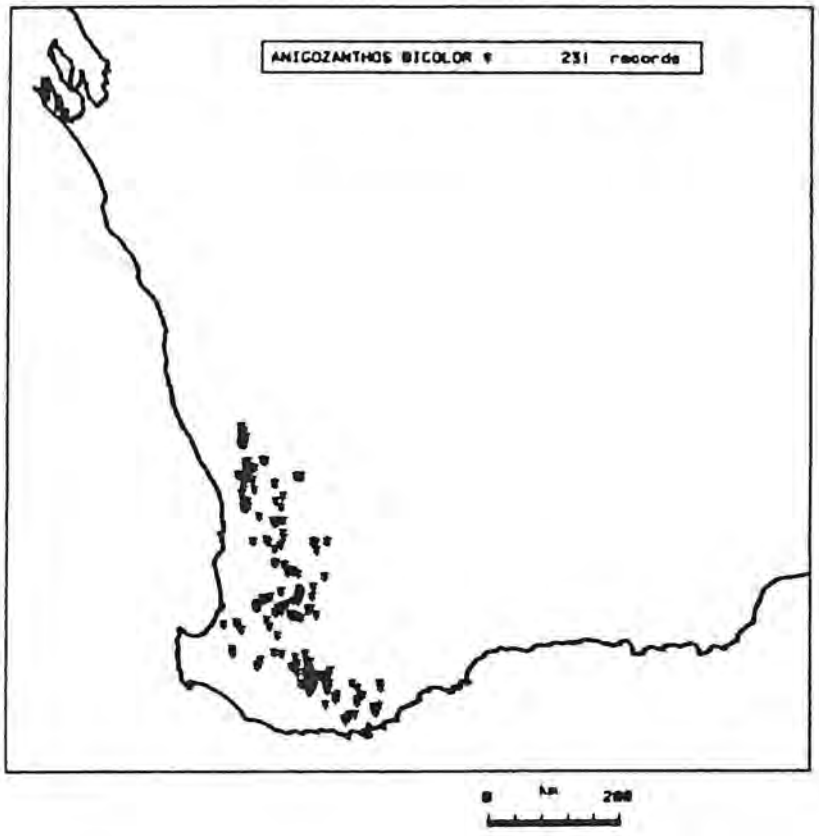
FLORAPLOT

A Department of Fisheries and Wildlife LAND INFORMATION SYSTEM PROJECT, forming part of the Atlas of Western Australian Flora Pilot Project.

Funded by the Australian Biological Resources Study and the Department of Fisheries and Wildlife

13-MAR-84

PLOT SPECIFICATIONS



National park & nature reserve boundaries as at 30/6/82. Digitised from 1:[illegible] & 1:[illegible] maps from Lands & Surveys' State Modified Polyconic series and reprojected.

Map data courtesy Lands & Surveys Dept. Albers Area Proj. Std Par 17 30', 31 30' C. Mer 121 E. Prod. by Maproj (Hutchinson, 1982) on Clarke's 1858 Spheroid

Fig. 4.3 The Default Map

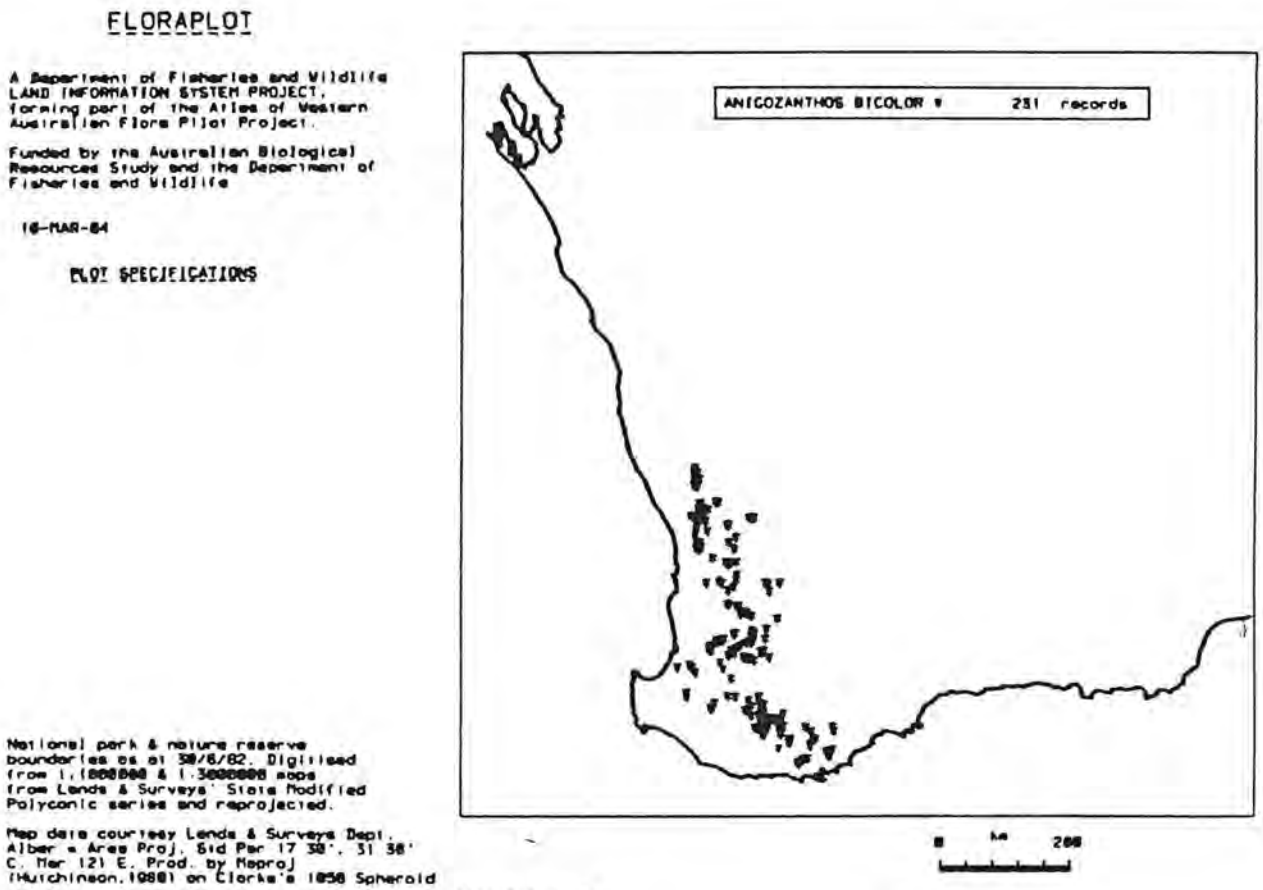


Fig. 4.5 Default Map With Tailor Options

4.2 GETTING STARTED

Step 1

Firstly turn on all equipment. Disk drives should be turned on first. If more than one disk drive is connected they should be turned on with highest drive numbers going on first. Turning off is the reversal of the above procedure.

Allow the screen about 30 seconds to warm up until it has "frosted" completely. Then press the yellow HOME/PAGE button, located at the upper left corner of the keyboard. This will cause the screen to be cleared or paged.

Step 2

Set the system clock.

The TEKTRONIX contains an internal 24 hour clock that must be initialized every time the system is powered up. On the front panel of disk drive number Ø are four lights. If the clock is not set the light marked "CLOCK" will be on. This is done by typing in the following command and pressing the "RETURN" button:

```
CALL "SETTIM", "15-DEC-84 13:ØØ"
```

This sets the clock to the 15th of December, 1984 at 1 p.m. The date and time entered should be your current date and time.

Note: Quotes, commas, dashes and colons must be entered in exactly as above. There must be exactly one space between the date and the time.

If the command was entered correctly the CLOCK light on disk drive number Ø should have turned off.

Step 3

Insert the FLORAPLOT disk into drive Ø (See the File Manager Manual, Section 2, pgs 4,5 if unsure about how to do this.

Step 4

Once the system clock has been set the disk must be "logically" mounted so that the 4054 knows what exists in the disk drive. This is done by typing in exactly as follows:

```
CALL "MOUNT",Ø,A$
```

Step 5

The program must now be loaded from the disk into memory.

Type:

OLD "FLORAPLOT"

This takes about 15 seconds.

Step 6

To run the program type:

RUN

Step 7

FLORAPLOT is a generalised program that can read from any flora data file on a specified disk. Once RUN has been typed the screen is erased (paged) and the following prompts issued:

> <TEK> Are the flora data contained on the same disk as the FLORAPLOT program (Yes or No):

If the data are on the same disk as the FLORAPLOT program enter Yes, if not then enter No.

Step 8

If Yes was entered skip to step 9.

If No was entered then the following prompt is issued.

> <TEK> Enter the number of the disk drive containing the flora data:

Step 9

On entering the drive number you are asked to insert the data disk into the appropriate drive and press <CR> on completion. Once this procedure has been completed FLORAPLOT then prompts for the name of the data file as follows:

> <TEK> Enter name of data file:

You should respond with the appropriate file name. This is the name assigned to the file when the file was initially created. Once this has been done the screen is paged and the default menu is printed. You can now start to generate maps.

If the name has been forgotten the following procedure can be used to find it:

Remove any disk that may be in drive Ø and insert the disk containing the flora data into that drive.

Type:

```
CALL "MOUNT",Ø,A$

DIR
```

The TEKTRONIX will print a directory of files currently stored on the disk. The flora data file consists of one data file and three indices. So, somewhere in the resultant directory, should be four files whose names are structured as follows:

```
FRED.DATA (data file)
FRED.GEN  (genus index)
FRED.SPEC (species index)
FRED.SBSP (subspecies index)
```

In the above example there are four files whose names begin with FRED and are followed with a period and then one of the above name extensions. Thus the name of the data file is FRED and the user would type those four characters in response to the prompt for the data file name.

Repeat from step 3.

4.2.1. Error Recovery

Whilst FLORAPLOT is largely "foolproof" there is the remote situation where an error may occur. If this happens the only safe way to restart the program is from the beginning. That is, type OLD "FLORAPLOT" followed by RUN.

If the user wishes to interrupt the program at any stage they should press the yellow BREAK button twice in succession. The BREAK button is located at the lower right hand corner of the keyboard. However, if FLORAPLOT is to be rerun then it should be retrieved from disk again (i.e. enter OLD "FLORAPLOT" again) before entering RUN.

4.3 THE MENU

Referring to Figure 4.2 there are eleven options and five functions. An option changes or modifies the content of a map. A function performs a specific task other than specifying the content of a map. This difference will become obvious with more use of the menu.

To choose a particular option or function type in the corresponding number. If an option has been selected the cursor will position itself along side that option and prompt for some more information. If a function has been selected then that function will be performed.

Options can be altered as much as required. The following sequence of events occurs when an option is selected:

1) The cursor position itself alongside the appropriate option.
2) A prompt is printed.
3) The program waits for one or more lines of information from the user.
4) When specification is complete the program will page the screen and reprint the menu. The menu will reflect the desired change (assuming the information was entered correctly in the first place).

Whenever invalid or non-existent data are entered by the user the screen is paged and the menu is reprinted with no changes.

There are two types of option:

a) Those with single entries.
b) Those with multiple entries.

Single entry options differ from multiple entry options in the way they are written on the menu. A single entry only ever takes up one line to display various parameters and symbols whereas multiple entries may take up one or more lines in the form of a list. Options one to five are multiple entry type and options six to eleven are single entry type.

Occurrence Selection

Options one to six are used to set conditions to determine whether a flora occurrence is plotted or not. An occurrence must fulfil all conditions specified before it will be plotted.

For example, option 1 is "Taxon Name". This option selects only those occurrences of a designated taxon. Up to ten different taxa can be specified here. Each one is assigned its own unique symbol.

Another example is option 2; "Reserve Class". This option

selects only those occurrences of the designated taxon which lie on an A, B or C Class reserve. A unique symbol is assigned for each particular condition. Any one or a combination of conditions is allowed. The user may choose to plot only those ocurrences specified in option 1 that are on an A Class reserve, or those on an A and C class reserve. Because there exists the possibility of a number of simultaneous multiple entry options, each with their own symbol assignments, the following two points need to be made:

1) Priority in Symbol Assignment

When FLORAPLOT plots flora occurrences it scans the menu from option 1 to option 6, in that order, to find whether a particular occurrence fulfils all conditions for plotting. If there exists the situation where an occurrence fulfils more than one condition and those conditions also have stipulated their own plotting symbols, then FLORAPLOT uses the last symbol read from the menu for those options whose conditions were met. Thus, if occurrences of Caladenia Filamentosa were to be plotted, but only those on A class reserves, then the symbol used will be that assigned by the "Reserve Class" option because it occurs further down in the menu. This leads us to the second point.

2) Simultaneously Multiple Entries

If there exists the situation where more than one multiple entry option all have more than one item in their lists then the results may be uninterpretable.

If, for example, three species were specified as well as A, B, and C class distinction, each with their own symbol, then the user will not be able to distinguish the three species anymore. Only if they lie with the specified reserve class.

This ambiguity may be extended to the other multiple entry option as well. Given the above information, the user may be able to predict how to interpret the resultant symbolization up to a point but as more conditions are applied "who knows?" It should be remembered that this problem of ambiguous symbolization exists already for cartographers and is only ever resolved by limiting the amount of information to be displayed on any one map.

4.3.1 Options

This section will document how to use options one to eleven. The most important option is option one; "Taxon Name". A careful study of how this option works will make the other options easier to understand and implement.

4.3.1.1 Taxon Name

This option specifies which taxa are to be plotted. The taxa may be specified at three different levels.

1) genus
2) species
3) subspecies/variety

Thus the user may obtain a plot of all plants of the genus Caladenia, or of all Conostylis aculeata, irrespective of subspecies status, or of all Caladenia filamentosa ssp. filifera.

Each taxon to be plotted is assigned a symbol by the user. Up to ten taxa may be plotted simultaneously, each having a unique symbol to be identified by.

When the program is first run it selects the first species (alphabetically) on the data file and uses this as the default species. In this case Anigozanthos bicolor is the first species in the data file.

There is always at least one species specified in the menu. It is not possible to have no species in this option.

To use this option type in the option number followed by <CR>. (It is assumed, unless otherwise stated, that <CR>, i.e. the RETURN button, is pressed at the end of each input.)

The cursor positions itself alongside the first taxon and prints

<TEK> Genus:

and waits for input from the user.

At this point three levels of specification can occur.

1) Generic Plot

Refer to Figure 4.6.

Once the program has printed "Genus:" the user should type in the genus. The whole name does not necessarily have to be typed in. Only as many characters as is required to make the generic name unique on the genus index. If, say, three characters are typed in but are not sufficient to uniquely identify the genus, the cursor will remain as a blinking "?" waiting for more letters. Type in extra letters as are required. The program then hunts for the generic name in the genus index. If the name is not found the screen is paged and the menu reprinted.

If, at any time, spurious characters are entered the program pages the screen and reprints the menu.

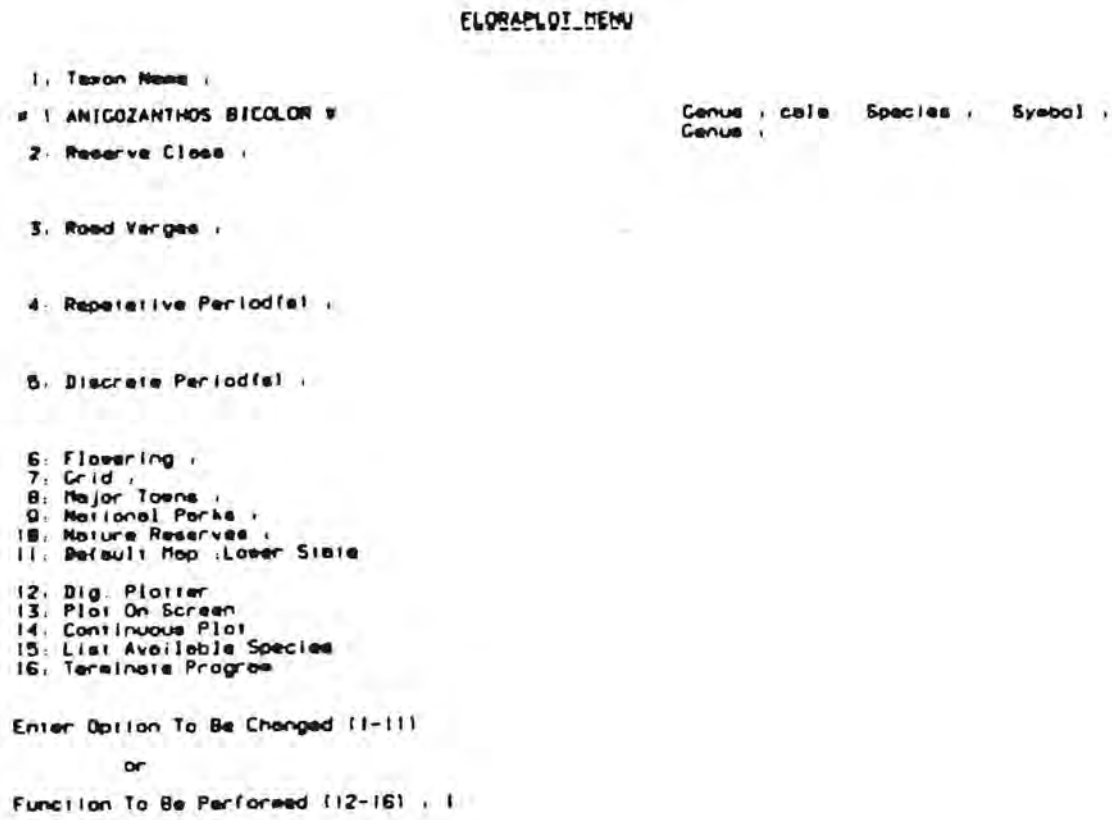


Fig. 4.6 Generic Plot Specifications

If the generic name was found the machine prompts with

<TEK> Species:

To obtain a generic plot just type in <CR> with no other input. The machine then prompts for a plotting symbol. Here the user may specify any single keyboard character or may press <CR> with no other input which makes the default plotting symbol an asterisk.

Once the symbol has been entered the program prompts for the next taxon to be specified. Pressing <CR> causes the screen to page and the menu is reprinted as shown on Figure 4.7. By entering the characters "CALA" as the genus the program has found that this uniquely identifies the genus "CALADENIA". Notice that this has overwritten the previous specification of ANIGOZANTHOS BICOLOR.

A plot may be obtained by typing in the "PLOT ON SCREEN" function number. The resultant plot is shown on Figure 4.8. This plot contains the minimum amount of information possible. That is, coastline, scale bar, Caladenia occurrence locations and no. of occurrences.

Note that some data records on the flora atlas have the genus name specified but no species name. This is because the species was not known at the time of data collection. This plot will include those records.

2) Species Plot

Suppose we now wish to do a species plot of Thelymitra variegata. Referring to Figure 4.9, type in the option number to select taxon specification. The cursor positions itself alongside the first taxon which in this case is Caladenia from the previous example. Entering the characters "TH" for the genus is sufficient to make them unique. The machine responds with the prompt

<TEK> Species:

Enter the species name in the same way the genus was entered. Entering the character "VAR" is sufficient to uniquely identify the species VARIEGATA.

The machine then responds with the prompt

<TEK> Subspecies:

Pressing <CR> tells the program that a species plot is required and not a subspecies plot. The machine then responds with the prompt

<TEK> Symbol:

Enter the symbol as for Generic Plot. The program then responds with "Genus:" again. Enter <CR> to page the

```
                    ELOBAPLOT_MENU

 1. Taxon Name :
* 1 CALADENIA *
 2. Reserve Class :

 3. Road Verges :

 4. Repetative Period(s) :

 5. Discrete Period(s) :

 6. Flowering :
 7. Grid :
 8. Major Towns :
 9. National Parks :
10. Nature Reserves :
11. Default Map :Lower State

12. Dig. Plotter
13. Plot On Screen
14. Continuous Plot
15. List Available Species
16. Terminate Program

Enter Option To Be Changed (1-11)

        or

Function To Be Performed (12-16) :
```

Fig. 4.7 Generic Plot Specifications

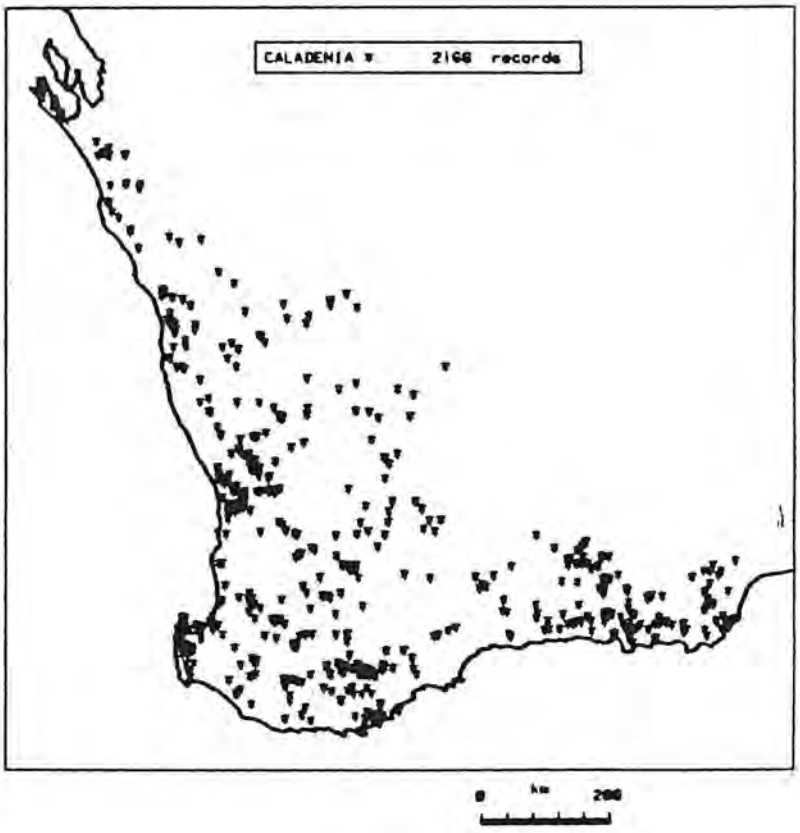
FLORAPLOT

A Department of Fisheries and Wildlife LAND INFORMATION SYSTEM PROJECT, forming part of the Atlas of Western Australian Flora Pilot Project.

Funded by the Australian Biological Resources Study and the Department of Fisheries and Wildlife

16-AUG-84

PLOT SPECIFICATIONS



National park & nature reserve boundaries as at 30/6/82. Digitised from 1:[illegible] & 1:[illegible] maps from Lands & Surveys' State Modified Polyconic series and reprojected.

Map data courtesy Lands & Surveys Dept. Albers Area Proj. Std Par 17 30', 31 30' C. Mer 121 E. Prod. by Maproj (Hutchinson, 1982) on Clarke's 1858 Spheroid

Fig. 4.8 Plot of Caladenia Genus

screen and update the menu. This is shown in Figure 4.10. The specification THELYMITRA VARIEGATA has overwritten the previous entry of CALADENIA.

3) Subspecies/Variety Plot

Suppose we now wish to obtain a plot of Caladenia cairnsiana ssp. cairnsiana. Refer to Figure 4.11. Type in option number and enter genus and species as described in the Generic Plot and Species Plot discussions. Once the species name has been found (in this case cairnsiana) the program responds with the prompt

<TEK> Subspecies:

Two types of input may be entered here. Either enter

a) The name of the subspecies/variety as previously discussed or

b) A minus sign. i.e. "-".

Entering the name causes the program to search for that name in the same way as genus and species. See Figures 4.11 and 4.12.

Entering a minus sign indicates to the program that only a plot of those species that do not have a subspecies name specified are to be plotted. See Figures 4.13 and 4.14.

If, for a particular species, there are no officially recognised subspecies, then specifying a minus sign has no effect. The same number of occurrences will be plotted.

Suppose, however, a species has 30 records, 20 of which are recorded as a variety. That leaves 10 records that have no 3rd level of taxonomic specification. These ten records would be plotted with the entry of a minus sign at the subspecies prompt.

Note that once a subspecies has been officially recognised this changes the taxonomic specification of all previously discovered plants. Thus, a number of records exist on the data file that are historically correct but not consistent with the current classification.

Specifying a minus sign at the subspecies prompt will pick up these records.

It should be noted that this type of selection will pick up those species that have no subspecies name specified. This may mean that

a) it is a historically accurate record but inconsistent with current classifications, or

b) the subspecies status was unknown at the time of data entry

```
                    FLORAPLOT_MENU

 1. Taxon Name :
* I CALADENIA *                          Genus : TH  Species : VAR  Subspecies :  Symbol : *
                                         Genus :
 2. Reserve Class :

 3. Road Verges :

 4. Repetitive Period(s) :

 5. Discrete Period(s) :

 6. Flowering :
 7. Grid :
 8. Major Towns :
 9. National Parks :
10. Nature Reserves :
11. Default Map :Lower State

12. Dig. Plotter
13. Plot On Screen
14. Continuous Plot
15. List Available Species
16. Terminate Program

Enter Option To Be Changed (1-11)

        or

Function To Be Performed (12-16) : 1
```

Fig._4.9_Species_Plot_Specifications

```
                    FLORAPLOT_MENU

 1. Taxon Name :
* I THELYMITRA VARIEGATA *
 2. Reserve Class :

 3. Road Verges :

 4. Repetitive Period(s) :

 5. Discrete Period(s) :

 6. Flowering :
 7. Grid :
 8. Major Towns :
 9. National Parks :
10. Nature Reserves :
11. Default Map :Lower State

12. Dig. Plotter
13. Plot On Screen
14. Continuous Plot
15. List Available Species
16. Terminate Program

Enter Option To Be Changed (1-11)

        or

Function To Be Performed (12-16) :
```

Fig._4.10_Species_Plot_Specification

```
                                    ELOBAECLOI_DEMO

  1. Taxon Name :
* 1 THELYMITRA VARIEGATA *                          Genus : CALA   Species : CAI  Subspecies : CAI  Symbol : o
                                                    Genus :
  2. Reserve Class :


  3. Road Verges :


  4. Repetitive Period(s) :


  5. Discrete Period(s) :


  6. Flowering
  7. Grid
  8. Major Towns
  9. National Parks
 10. Nature Reserves
 11. Default Map :Lower State

 12. Big  Plotter
 13. Plot On Screen
 14. Continuous Plot
 15. List Available Species
 16. Terminate Program

Enter Option To Be Changed (1-11)
          or
Function To Be Performed (12-16)   1
```

Fig. 4.11 Subspecies/Variety Plot

```
                                    ELOBAECLOI_DEMO

  1. Taxon Name :
* 1 CALADENIA CAIRNSIANA ssp. CAIRNSIANA o
  2. Reserve Class :


  3. Road Verges :


  4. Repetitive Period(s) :


  5. Discrete Period(s) :


  6. Flowering :
  7. Grid :
  8. Major Towns :
  9. National Parks :
 10. Nature Reserves :
 11. Default Map :Lower State

 12. Big  Plotter
 13. Plot On Screen
 14. Continuous Plot
 15. List Available Species
 16. Terminate Program

Enter Option To Be Changed (1-11)
          or
Function To Be Performed (12-16) :
```

Fig. 4.12 Subspecies/Variety Plot

```
                                    FLORAPLOT.PROG

 1. Taxon Name
* | CALADENIA CAIRNSIANA ssp. CAIRNSIANA o          Genus : CALA  Species : CAIR  Subspecies : -  Symbol : *
                                                    Genus :
 2. Reserve Class :

 3. Road Verges :

 4. Repetitive Periodial :

 5. Discrete Periodial :

 6. Flowering :
 7. Grid :
 8. Major Towns :
 9. National Parks :
10. Nature Reserves :
11. Default Map :Lower State

12. Big Plotter
13. Plot On Screen
14. Continuous Plot
15. List Available Species
16. Terminate Program

Enter Option To Be Changed (1-11)
        or
Function To Be Performed (12-16) : 1
```

Fig. 4.13 Unspecified Subspecies/Variety

```
                                    FLORAPLOT.PROG

 1. Taxon Name :
* | CALADENIA CAIRNSIANA- *
 2. Reserve Class :

 3. Road Verges :

 4. Repetitive Periodial :

 5. Discrete Periodial :

 6. Flowering :
 7. Grid :
 8. Major Towns :
 9. National Parks :
10. Nature Reserves :
11. Default Map :Lower State

12. Big Plotter
13. Plot On Screen
14. Continuous Plot
15. List Available Species
16. Terminate Program

Enter Option To Be Changed (1-11)
        or
Function To Be Performed (12-16) :
```

Fig. 4.14 Unspecified Subspecies/Variety

c) an error exists in the data.

The subsequent plots may have any of the above conditions occurring.

Multiple Entries and List Editing

The program has the ability to have a multiple number of species plotted simultaneously. This can be implemented as follows:

Refer to Figure 4.15. Type in the option number for taxon specification. The cursor positions itself alongside the first item in the taxon list. In this case, Thelymitra Variegata. Suppose we want to plot the species Caladenia Aphylla and the subspecies Caladenia Cairnsiana ssp. Cairnsiana and ssp. Pachychila.

Type the genus and species name and symbol for C. Aphylla. The machine then responds with the genus prompt again. Simply type in the next taxon name. Continue the process until all the required names have been entered. To end the process type a <CR> on the genus prompt. The screen will page and the updated menu will be printed as in Figure 4.16.

If a number of taxa have been specified they may be edited as follows:

Deleting

Refer to Figure 4.17

To delete a taxon from the menu, simply position the cursor alongside the taxon to be deleted. This is done by typing the option number to select taxon specification and pressing <CR> sufficient times. Once the cursor is in position type the slash character /. This character is used as the delete symbol throughout the program. Any option that needs to be deleted can be done so with the / character. Once this has been done the cursor position itself alonside the next taxon. In Figure 4.17 the first two species were deleted. <CR> was then pressed until it dropped below the end of the list. Pressing <CR> when the cursor is below the end of the list tells the program that taxon specification is complete and reprints the menu. The resultant menu is shown in Figure 4.18.

Overwriting

Now refer to Figure 4.19.

If we have a number of taxa specified in the menu, a particular taxon may be overwritten by positioning the cursor alongside the appropriate taxon and then entering another taxon as in the previously described procedure.

```
                    FLORAPLOT_MENU

 1  Taxon Name :

# 1 THELYMITRA VARIEGATA +                  Genus : CALA   Species : AP   Subspecies :        Symbol  +
                                            Genus : CALA   Species : CAI  Subspecies : CAI  Symbol : o
 2  Reserve Class :                         Genus : CALA   Species : CAI  Subspecies : PAC  Symbol : *
                                            Genus :

 3  Road Verges


 4  Repetitive Period(s)


 5  Discrete Period(s) :


 6. Flowering :
 7  Grid :
 8  Major Towns :
 9. National Parks :
10. Nature Reserves :
11. Default Map :Lower State

12. Dig. Plotter
13  Plot On Screen
14  Continuous Plot
15. List Available Species
16. Terminate Program

Enter Option To Be Changed (1-11)

        or

Function To Be Performed (12-16) :
1
```

Fig. 4.15 Multiple Taxon Entries

```
                    FLORAPLOT_MENU

 1. Taxon Name :

# 1 CALADENIA APHYLLA +
# 2 CALADENIA CAIRNSIANA ssp. CAIRNSIANA o
# 3 CALADENIA CAIRNSIANA ssp. PACHYCHILA *

 2. Reserve Class :


 3. Road Verges :


 4. Repetitive Period(s) :


 5. Discrete Period(s) :


 6. Flowering :
 7. Grid :
 8. Major Towns :
 9. National Parks :
10. Nature Reserves :
11. Default Map :Lower State

12. Dig. Plotter
13. Plot On Screen
14. Continuous Plot
15. List Available Species
16. Terminate Program

Enter Option To Be Changed (1-11)

        or

Function To Be Performed (12-16) :
```

Fig. 4.16 Multiple Taxon Entries

```
                              ELOBAEPLOI_MENU

  1. Taxon Name

# 1 CALADENIA APHYLLA v                                    Genus : /
# 2 CALADENIA CAIRNSIANA ssp. CAIRNSIANA o                 Genus : /
# 3 CALADENIA CAIRNSIANA ssp. PACHYCHILA s                 Genus :
                                                           Genus :
  2  Reserve Class .


  3  Road Verges


  4  Repetative Period(s) .


  5  Discrete Period(s) .


  6. Flowering
  7. Grid
  8. Major Towns
  9. National Parks
 10. Nature Reserves .
 11. Default Map :Lower State

 12. Dig. Plotter
 13. Plot On Screen
 14. Continuous Plot
 15. List Available Species
 16. Terminate Program

Enter Option To Be Changed (1-11)
          or
Function To Be Performed (12-16) . 1
```

Fig. 4.17 Deleting From List

```
                              ELOBAEPLOI_MENU

  1. Taxon Name .

# 1 CALADENIA CAIRNSIANA ssp. PACHYCHILA s

  2. Reserve Class .


  3. Road Verges .


  4. Repetative Period(s) .


  5. Discrete Period(s) .


  6. Flowering .
  7. Grid .
  8. Major Towns .
  9. National Parks .
 10. Nature Reserves .
 11. Default Map :Lower State

 12. Dig. Plotter
 13. Plot On Screen
 14. Continuous Plot
 15. List Available Species
 16. Terminate Program

Enter Option To Be Changed (1-11)
          or
Function To Be Performed (12-16) .
```

Fig. 4.18 Deleting From List

Figure 4.19 shows the cursor in line with C. cairnsiana spp. pachychila. This is being overwritten with C. filamentosa (no varieties because of minus sign entry).

Adding

Still referring to Figure 4.19 we can add taxa to the end of the list by positioning the cursor past the last taxon in the list and then entering the taxa as normal. In Figure 4.19 the first taxon was overwritten. The cursor positioned itself past the end of the list because only one taxon was in the list. At this point the user may add as many taxa as required. The resultant menu is shown in Figure 4.20. Figure 4.21 shows a plot of the three specified taxa. There were 86 records of C. filamentosa that had no subspecies specified, 15 records of subspecies filifera and 19 records of subspecies voigtii.

4.3.1.2. Reserve Class

Using this option the user can distinguish between occurrences found on reserves and occurrences not on reserves.

e.g. The user can plot only those records of Caladenia filamentosa found on A class nature reserves, or all records of Conostylis aculeata found on C class reserves. Or the user can produce a complete breakup by specifying a different symbol for each possibility. i.e. A class, B class, C class and "not specified". This option is implemented as follows:

Refer to Figure 4.22. Type in the option number. The cursor positions itself alongside the first item in the Reserve Class list and prints

<TEK> Class:

Type in the class required. This input may be A, B, C or - (minus sign). The first three inputs are the available classes of nature reserves in Western Australia. The last input operates in the same way as for the "Taxon Name" option. Only those occurrences that do not have a class specified will be plotted. Note that this may mean one of two things.

a) The occurrence was definitely not on a reserve.

b) It was unknown as to whether it was on a reserve or not or the reserve class was not known.

Once the class has been entered FLORAPLOT asks for the symbol to be used. This may be any single character. (See points 1 and 2 in section 4.3).

The machine then prompts for class again. Either enter another class or press <CR> to reprint the menu as in figure 4.23. See "MULTIPLE ENTRIES AND LIST EDITING" in

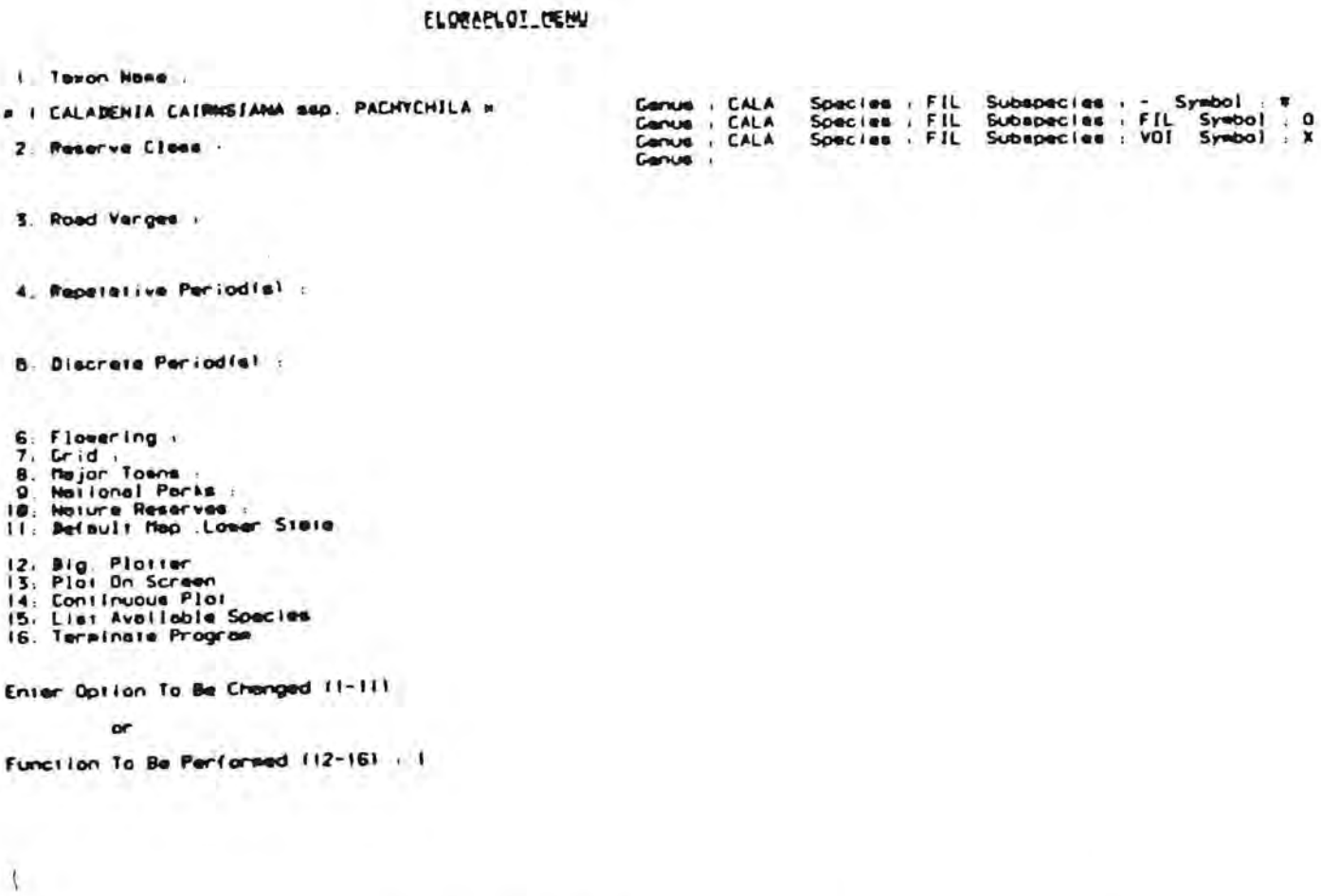


Fig. 4.19 Overwriting and Addind To List

```
                    FLORAPLOT_MENU

  1. Taxon Name :

# 1 CALADENIA FILAMENTOSA- 9
# 2 CALADENIA FILAMENTOSA ssp. FILIFERA O
# 3 CALADENIA FILAMENTOSA ssp. VOIGTII X

  2. Reserve Class :


  3. Road Verges :


  4. Repetetive Period(s) :


  5. Discrete Period(s) :


  6. Flowering :
  7. Grid :
  8. Major Towns :
  9. National Parks :
 10. Nature Reserves :
 11. Default Map :Lower State

 12. Dig. Plotter
 13. Plot On Screen
 14. Continuous Plot
 15. List Available Species
 16. Terminate Program

Enter Option To Be Changed (1-11)

          or

Function To Be Performed (12-16) :
```

Fig. 4.20 Overwriting and Adding To List

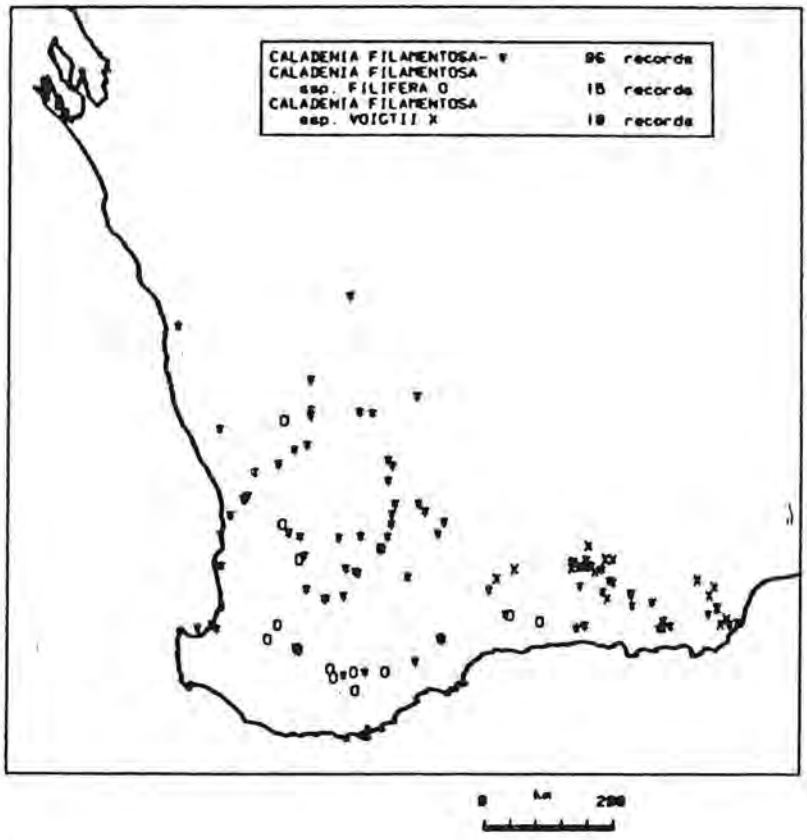
FLORAPLOT

A Department of Fisheries and Wildlife LAND INFORMATION SYSTEM PROJECT, forming part of the Atlas of Western Australian Flora Pilot Project.

Funded by the Australian Biological Resources Study and the Department of Fisheries and Wildlife

16-AUG-84

PLOT SPECIFICATIONS



National park & nature reserve boundaries as at 30/6/82. Digitised from 1:[illegible] & 1:[illegible] maps from Lands & Surveys' State Modified Polyconic series and reprojected.

Map data courtesy Lands & Surveys Dept. Albers Area Proj. Std Par 17 30', 31 30' C. Mer 121 E. Prod. by Maproj (Hutchinson,1982) on Clarke's 1858 Spheroid

Fig. 4.21 Plot of Previous Menu

```
                    FLORAPLOT_MENU

 1  Taxon Name ,

# 1 CONOSTYLIS ACULEATA #

 2  Reserve Class ,

                             Class ,   A        Symbol ,  †
                             Class ,   C        Symbol ,  C
 3  Road Verges              Class ,   -        Symbol ,  o
                             Class ,

 4  Repetitive Period(s) ,


 5  Discrete Period(s) ,


 6  Flowering
 7  Grid
 8  Major Towns
 9  National Parks ,
10  Nature Reserves ,
11  Default Map :Lower State

12  Dig. Plotter
13  Plot On Screen
14  Continuous Plot
15  List Available Species
16  Terminate Program

Enter Option To Be Changed (1-11)

        or

Function To Be Performed (12-16) , 2
```

Fig. 4.22 Reserve Class

```
                    FLORAPLOT_MENU

 1, Taxon Name ,

# 1 CONOSTYLIS ACULEATA #

 2, Reserve Class ,

# 1 A Class       †
# 2 C Class       C
# 3 Unspecified   o

 3, Road Verges ,


 4, Repetitive Period(s) ,


 5, Discrete Period(s) ,


 6, Flowering ,
 7, Grid ,
 8, Major Towns ,
 9, National Parks ,
10, Nature Reserves ,
11, Default Map :Lower State

12, Dig. Plotter
13, Plot On Screen
14, Continuous Plot
15, List Available Species
16, Terminate Program

Enter Option To Be Changed (1-11)

        or

Function To Be Performed (12-16) ,
```

Fig. 4.23 Reserve Class

section 4.3.1.1 to edit the list.

Figure 4.24 shows a map of the reserve status of Conostylis aculeata. Note that the symbols printed have overwritten this asterisk assigned to the species in option 1.

4.3.1.3 Road Verges

This option distinguishes between those occurrences that were recorded in a locality where the vegetation was restricted to a road verge and those where the vegetation was not restricted to a road verge. This option applies only to those records that were recorded on a road verge. It works in exactly the same way as the Reserve Class option except that the information entered is different. Editing of the list is as for options 1 and 2. To implement the option type in the option number.

Referring to Figure 4.25, the program prompts with

<TEK> Status:

Type in either a Y (vegetation restricted to road verge), N (vegetation not restricted to road verge) or - (unspecified). The machine then prompts for a symbol. Once specification is complete the menu is reprinted as in Figure 4.26.

4.3.1.4 Repetitive Periods

This option, if specified, will select flora occurrences that were recorded within a section of a year over a range of years.

For instance, one could plot all observations that occurred in the month of February over the range 1960 to 1980. Or, all the observations that occurred between July and August over the range 1970-1982.

It is also possible to plot multiple repetitive periods. i.e. All locations between Jan to March and all locations occurring in July, both over the range 1960-1970.

To implement this option use the following procedure:

Refer to figure 4.27.

Type in the option number. The machine positions itself alongside the last item in the list and then responds by printing:

<TEK> MONTH SPAN, YEAR RANGE (MM:MM, YY-YY)?

If the range is to be: Jan-July, 1970-1980, type:

01:06,70-80

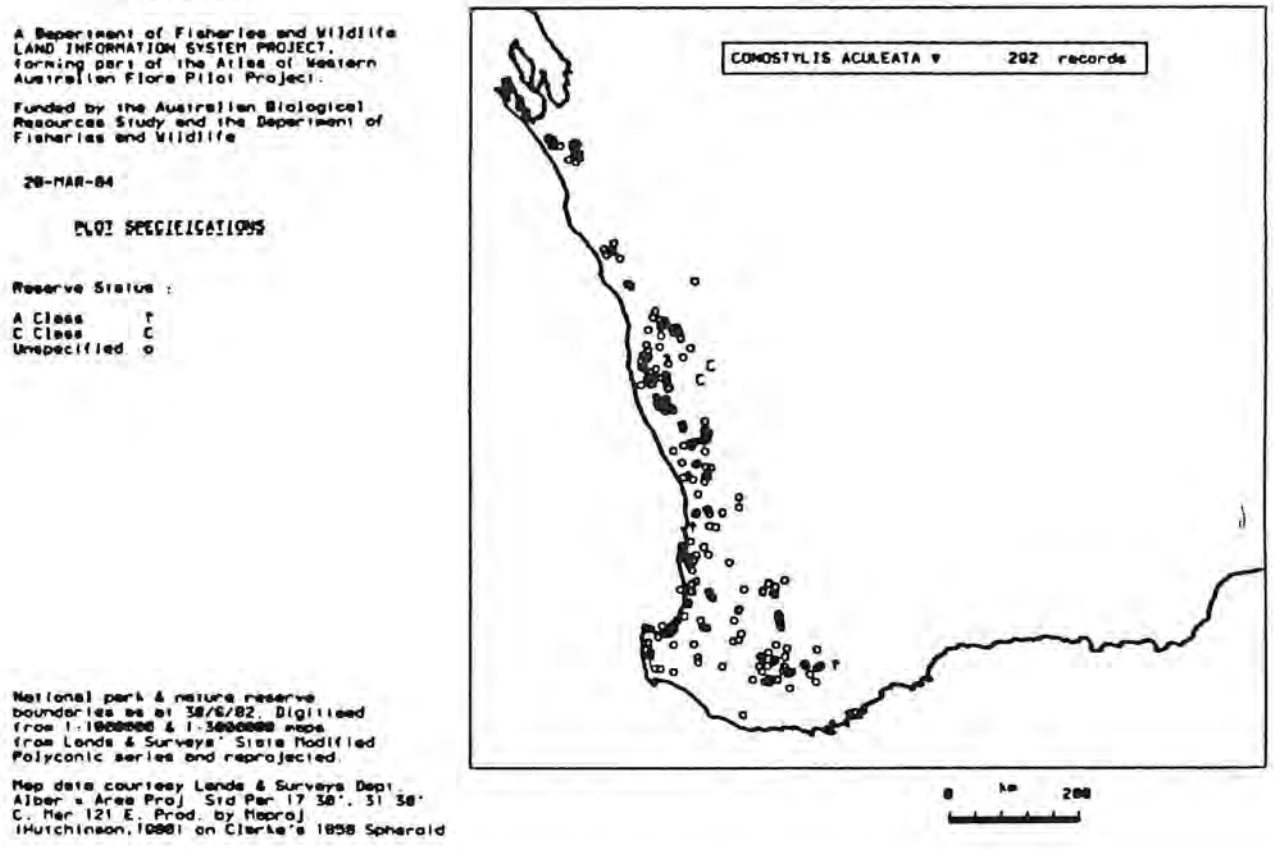


Fig. 4.24 Reserve Status of Flora Occurences

The machine will check to see that the dates are correct. e.g. typing in 30:02,70-80 will result in the screen being paged and the menu reprinted. It then prompts by asking for a symbol. Either type a single character then <CR> or <CR> with no input. If the latter is done the screen will be erased and the menu updated. Otherwise, the machine will continue asking for more periods.

It is important that the numbers be in their correct positions. If the month is Jan, type Ø1 and not 1

It does not matter what the non-numeric delimiters are.

To overwrite, add or delete a period use the same procedure as that described for option 1.

It is not permissible to have multiple periods while multiple species are also present in the menu and no discrete period has been specified.

A maximum of 10 repetitive periods is allowed.

See FIG. 4.27 for an example of inserting a repetitive period.

Note: To specify range of one month, say April, type

04:04,YY-YY

A range branching over more than one year is not permissible.

eg DEC-JAN or 12:01 is not permissible.

However it is possible to obtain this by typing two ranges.

eg. 12:12,60-80
01:01,60-80 is the same as 12:01,60-80

It is not permissible to specify a repetitive period if multiple species exist and a discrete period has been specified.

The user can produce a month by month breakdown of record observations as in Figures 4.28 and 4.29.

4.3.1.5 Discrete Periods

This option, if specified, will print out all flora occurrences with a discrete period.

For instance, one could plot all occurrences between 3/5/65 and 5/8/70.

Multiple periods can also be specified.

```
                                ELORAPLOT.MENU

 1. Taxon Name
* 1 CONOSTYLIS ACULEATA Y
 2. Reserve Class

 3. Road Verges

                                          Status : Y     Symbol : Y
                                          Status : N     Symbol : N
 4. Repetative Period(s) :               Status : -     Symbol : -
                                          Status :

 5. Discrete Period(s)


 6. Flowering
 7. Grid
 8. Major Towns
 9. National Parks
10. Nature Reserves
11. Default Map  Lower State

12. Dig. Plotter
13. Plot On Screen
14. Continuous Plot
15. List Available Species
16. Terminate Program

Enter Option To Be Changed (1-11)
        or
Function To Be Performed (12-16) : 3
```

Fig. 4.25 Road Verge

```
                                ELORAPLOT.MENU

 1. Taxon Name :
* 1 CONOSTYLIS ACULEATA Y
 2. Reserve Class :

 3. Road Verges :

* 1 Vegn. Restrict. To Road Verge      Y
* 2 Vegn. Not Restrict. To Road Verge  N
* 3 Unspecified                        -

 4. Repetative Period(s) :


 5. Discrete Period(s) :


 6. Flowering :
 7. Grid :
 8. Major Towns :
 9. National Parks :
10. Nature Reserves :
11. Default Map  Lower State

12. Dig. Plotter
13. Plot On Screen
14. Continuous Plot
15. List Available Species
16. Terminate Program

Enter Option To Be Changed (1-11)
        or
Function To Be Performed (12-16) :
```

Fig. 4.26 Road Verges

```
                    ELORAPLOT_DEMO

 1. Taxon Name
* 1 CONOSTYLIS ACULEATA *
 2. Reserve Class :

 3. Road Verges :

 4. Repetetive Period(s) :
                          Month Span, Year Range (MM:MM,YY-YY) ? (8,10,68-83        Symbol :
                          Month Span, Year Range (MM,MM,YY-YY) ?
 5. Discrete Period(s) :

 6. Flowering :
 7. Grid :
 8. Major Towns :
 9. National Parks
10. Nature Reserves
11. Default Map :Lower State

12. Dig. Plotter
13. Plot On Screen
14. Continuous Plot
15. List Available Species
16. Terminate Program

Enter Option To Be Changed (1-11)

         or

Function To Be Performed (12-16) : 4
```

Fig. 4.27 Repetetive Periods

```
                                ELGRAPLOT_MENU

 1. Taxon Name :
# 1 CALADENIA FILAMENTOSA #
 2. Reserve Class :

 3. Road Verges :

 4. Repetetive Period(s) :
                                Month Span, Year Range (MM,MM,YY-YY) ? 06,06,68-83      Symbol : T
                                Month Span, Year Range (MM,MM,YY-YY) ? 07,07,68-88      Symbol : V
 5. Discrete Period(s) :        Month Span, Year Range (MM,MM,YY-YY) ? 08,08,68-83      Symbol : +
                                Month Span, Year Range (MM,MM,YY-YY) ? 09,09,68-83      Symbol : B
                                Month Span, Year Range (MM,MM,YY-YY) ? 10,10,68-83      Symbol : o
                                Month Span, Year Range (MM,MM,YY-YY) ? 11,11,68-83      Symbol : x
 6. Flowering :                 Month Span, Year Range (MM,MM,YY-YY) ?
 7. Grid :
 8. Major Towns :
 9. National Parks :
10. Nature Reserves :
11. Default Map :Lower State

12. Dig. Plotter
13. Plot On Screen
14. Continuous Plot
15. List Available Species
16. Terminate Program

Enter Option To Be Changed (1-11)
          or
Function To Be Performed (12-16) : 4
```

Fig. 4.28 Multiple Repetetive Periods

FLORAPLOT

A Department of Fisheries and Wildlife LAND INFORMATION SYSTEM PROJECT, forming part of the Atlas of Western Australian Flora Pilot Project.

Funded by the Australian Biological Resources Study and the Department of Fisheries and Wildlife

20-MAR-84

PLOT SPECIFICATIONS

Repetetive Periods :

06.06,60-83 †
07.07,60-83 ‡
08.08,60-83 •
09.09,60-83 ß
10.10,60-83 o
11.11,60-83 ¤

National park & nature reserve boundaries as at 30/6/82. Digitised from 1:1000000 & 1:3000000 maps from Lands & Surveys' State Modified Polyconic series and reprojected.

Map data courtesy Lands & Surveys Dept.
Alber's Area Proj. Std Par 17 30', 31 30'
C. Mer 121 E. Prod. by Maproj
(Hutchinson,1982) on Clarke's 1858 Spheroid

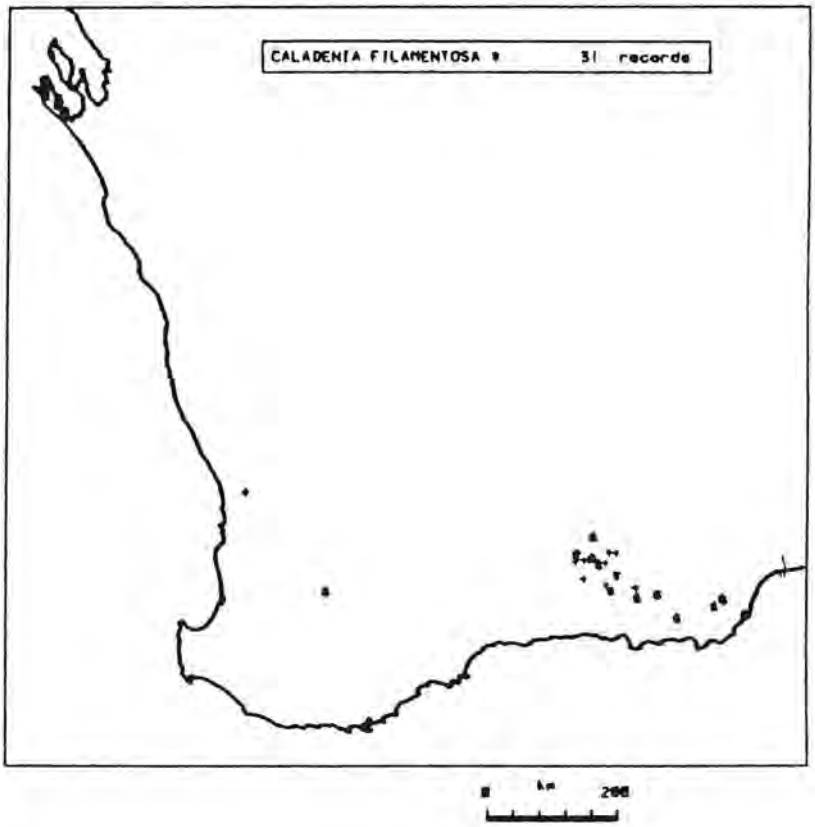


Fig. 4.29 Repetetive Period Plot

To insert a period use the following procedure:

Refer to Figure 4.30.

Type the option number. The cursor positions itself alongside the first item in the list and then responds with:

<TEK> DATE #1, DATE #2 (DD/MM/YY,DD/MM/YY)?

If the range is to be 1st Jan 1960 to 31st Dec, 1960 type

01/01/60,31/12/60 <CR>

Ensure that Jan. is typed as Ø1 and not 1. All numerics should be in their correct position. It doesn't matter what delimiters are used.

The machine will then ask for the symbol.

After entering the symbol the machine will then ask for another range. Either type another range or print <CR> to print updated menu.

To overwrite, add or delete a period use procedure outline in option 1.

If a repetitive period has been specified and there are multiple species in the menu it is not permissible to have a discrete period.

If multiple species exists and no repetitive period exists it is not permissible to have more than one discrete period specified.

Note: If multiple discrete periods have been specified and a location lies in one or more of those periods the symbol taken will be that of the last or lowest period in the list that the location is within. If both repetitive and discrete periods have common fields the symbol taken will be that of the discrete period.

4.3.1.6 Flowering

This is a single entry option. The user can specify if an occurrence is to be plotted according to whether it was flowering or not. This option is implemented as follows:

Referring to Figure 4.31, type in the option number. The cursor positions itself alongside the option and prompts with

<TEK> Flowering Status:

Enter either Y (only those flowering), N (only those not flowering) or / (delete symbol, means plot occurrence regardless of flowering status).

```
                                ELORAPLOT_MENU

 1. Taxon Name :
* 1 CALADENIA FILAMENTOSA *
 2. Reserve Class :


 3. Road Verges :


 4. Repetitive Period(s) :


 5. Discrete Period(s) :

                                Date #1, Date #2 (DD/MM/YY,DD/MM/YY) ? 01/01/60-01/01/70      Symbol : *
                                Date #1, Date #2 (DD/MM/YY,DD/MM/YY) ? 02/01/70-01/01/78      Symbol : +
 6. Flowering :                 Date #1, Date #2 (DD/MM/YY,DD/MM/YY) ? 02/01/78-30/06/78      Symbol : o
 7. Grid :                      Date #1, Date #2 (DD/MM/YY,DD/MM/YY) ? 01/07/78-31-12-78      Symbol : x
 8. Major Towns :               Date #1, Date #2 (DD/MM/YY,DD/MM/YY) ? 01/01/79-31/12/79      Symbol :
 9. National Parks :            Date #1, Date #2 (DD/MM/YY,DD/MM/YY) ? 01/01/80-31/12/84      Symbol : #
10. Nature Reserves :           Date #1, Date #2 (DD/MM/YY,DD/MM/YY) ?
11. Default Map :Lower State

12. Dig. Plotter
13. Plot On Screen
14. Continuous Plot
15. List Available Species
16. Terminate Program

Enter Option To Be Changed (1-11)

        or

Function To Be Performed (12-16) : 5
```

Fig. 4.30 Discrete Periods

Once the status has been entered the screen is paged and the menu reprinted.

Utilising this option in combination with the repetitive period option can provide the user with a means for establishing data on flowering times for various taxa.

For example, referring to Figure 4.32 we can break up the year into months and assign a unique symbol to each month. Combine with this specifying the "YES" option for flowering status. Figure 4.33 shows the resultant plot. From this map Conostylis aculeata flowers progressively later as you go further down the W.A. coast. You could then overlay other information such as rainfall isohyets and possibly show a relationship between rainfall distribution and flowering time.

4.3.1.7 Grid

This option allows the user to include a latitude/longitude grid on the map. We can specify whether lines or tics are to be printed on the a map and what increment the grid should have.

To change the grid specifications use the following procedure:

Refer to Figure 4.34.

Type in the option number. The cursor positions itself alongside the option and responds by printing

> <TEK> Enter A for auto-grid or grid interval (D:MM) or/for no grid:

If an A is entered a lat./long. grid will be generated automatically. That is, the spacing between lines (grid interval) will be automatically adjusted so that there are at least four lines per shortest side. In most cases this option is the most convenient to use rather than specifying an explicit grid interval. This is because once the map coverage changes then so does the grid interval. The A option makes the grid interval re-adjust automatically.

Alternatively the user may explicitly enter a grid interval in the format D:MM. That is, degrees and minutes. The degree value must be a single number. The colon must appear in 2nd position and the minutes must take up 2 character spaces. If the interval is less that a degree, e.g. 30 minute, it must be specified as Ø:3Ø and not ßß3Ø.

There are seven standard grid intervals that FLORAPLOT uses. These are:

5:ØØ, 1:ØØ, Ø:3Ø, Ø:15, Ø:1Ø, Ø:Ø5, Ø:Ø1

```
                              FLORAPLOT_MENU

 1: Taxon Name :
# : CALADENIA FILAMENTOSA #
 2: Reserve Class :


 3: Road Verges :


 4: Repetitive Period(s) :


 5: Discrete Period(s) :


 6: Flowering :          Flowering Status : Y
 7: Grid :
 8: Major Towns :
 9: National Parks :
10: Nature Reserves :
11: Default Map :Lower State

12: Dig. Plotter
13: Plot On Screen
14: Continuous Plot
15: List Available Species
16: Terminate Program

Enter Option To Be Changed (1-11)

          or

Function To Be Performed (12-16) : 6
```

Fig. 4.31 Flowering Status

If the user enters a value that is not one of the above then it will be replaced by the closest standard value.

If the user does not wish a grid to be plotted then a / should be entered.

Once the user has entered in either an A or a specific grid interval the program responds with:

<TEK> LINES OR TICS (L OR T)?

Type L or T. If just <CR> is typed the default is taken to be TICS.

See Figure 4.35 for the resultant map.

4.3.1.8 Major Towns

This option allows the user to display the major Western Australian towns on the generated map. The user may select between the most significant towns and lesser significant towns. To implement this option use the following procedure:

Type in the option number. The computer then prompts with

<TEK> Level(s) to be plotted:

The user may type in any combination of 1 (most significant), 2 (medium significant), 3 (least significant) or / (delete option). The entries may include commas but they are not necessary.

Examples of possible inputs are:

1) 1
2) 1,2 or 12
3) 123

Figure 4.36 shows a map containing towns of significance 1. i.e. greatest significance.

4.3.1.9 National Parks

This option allows the user to include national park boundaries on a generated map. This option allows the facility for choosing parks according to area of the park. National parks are drawn with a dashed line. Whenever this option is chosen a legend is automatically printed showing the smallest park area that will appear on the map. To implement this option use the following procedure:

Referring to Figure 4.37, type in the option number. The machine then responds as shown in Figure 4.37. There are five categories of area that the user may choose from. To select all reserves greater than 2 000 ha. type in 3.

```
                    FLORAPLOT_MENU

 1: Taxon Name :

# 1 CONOSTYLIS ACULEATA *

 2: Reserve Class :


 3: Road Verges :


 4: Repetetive Period(s) :

# 1 05.05.60-83 5
# 2 06.06.60-83 6
# 3 07.07.60-83 7
# 4 08.08.60-83 8
# 5 09.09.60-83 9
# 6 10.10.60-83 0
# 7 11.11.60-83 X
# 8 12.12.60-83 D

 5: Discrete Period(s) :


 6: Flowering :Y
 7: Grid :
 8: Major Towns :
 9: National Parks :
10: Nature Reserves :
11: Default Map :Lower State

12: Dig. Plotter
13: Plot On Screen
14: Continuous Plot
15: List Available Species
16: Terminate Program

Enter Option To Be Changed (1-11)

          or

Function To Be Performed (12-16) :
```

Fig. 4.32 Flowering Time Analysis

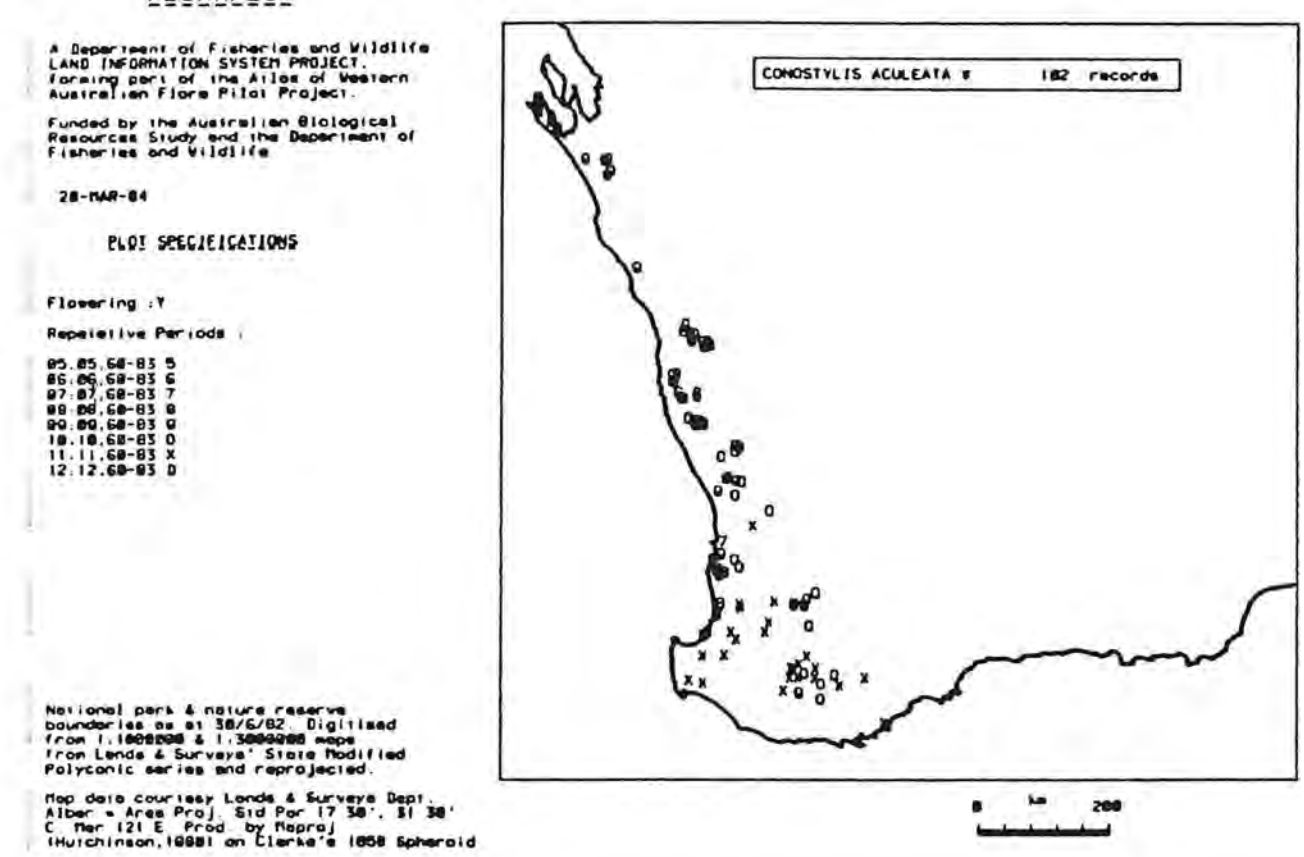


Fig. 4.33 Flowering Time Variation in Conostylis Aculeata

```
                    FLORAPLOT_MENU

 1. Taxon Name :
* | CALADENIA FILAMENTOSA *
 2. Reserve Class :

 3. Road Verges :

 4. Repetitive Period(s) :

 5. Discrete Period(s) :

 6. Flowering :
 7. Grid :                          Enter "A" for auto-grid
 8. Major Towns :                   or grid interval (D.MM)
 9. National Parks :                or "/" for no grid : A
10. Nature Reserves :               Lines or Tics (L or T) : L
11. Default Map :Lower State

12. Dig. Plotter
13. Plot On Screen
14. Continuous Plot
15. List Available Species
16. Terminate Program

Enter Option To Be Changed (1-11)

        or

Function To Be Performed (12-16) : 7
```

Fig. 4.34 Grid Specification

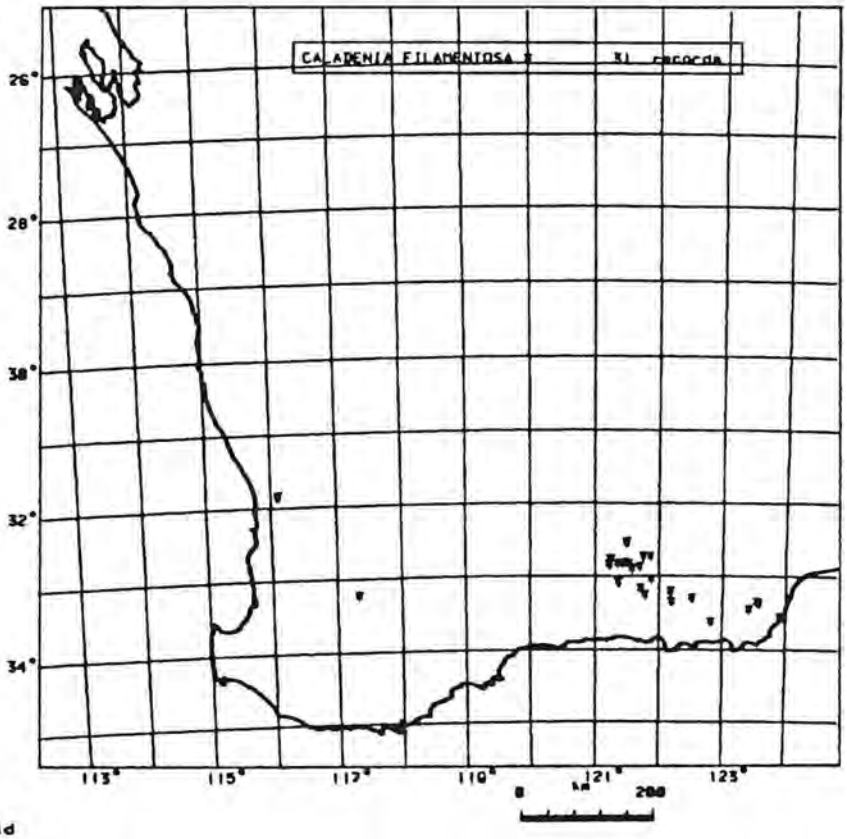
FLORAPLOT

A Department of Fisheries and Wildlife
LAND INFORMATION SYSTEM PROJECT,
forming part of the Atlas of Western
Australian Flora Pilot Project.

Funded by the Australian Biological
Resources Study and the Department of
Fisheries and Wildlife

20-MAR-84

PLOT SPECIFICATIONS



National park & nature reserve
boundaries as at 30/6/82. Digitised
from 1:1000000 & 1:3000000 maps
from Lands & Surveys' State Modified
Polyconic series and reprojected.

Map data courtesy Lands & Surveys Dept.
Albers = Area Proj. Std Par 17 30', 31 30'
C. Mer 121 E. Prod. by Maproj
(Hutchinson,1982) on Clarke's 1858 Spheroid

Fig. 4.35 Map with Latitude/Longitude Grid

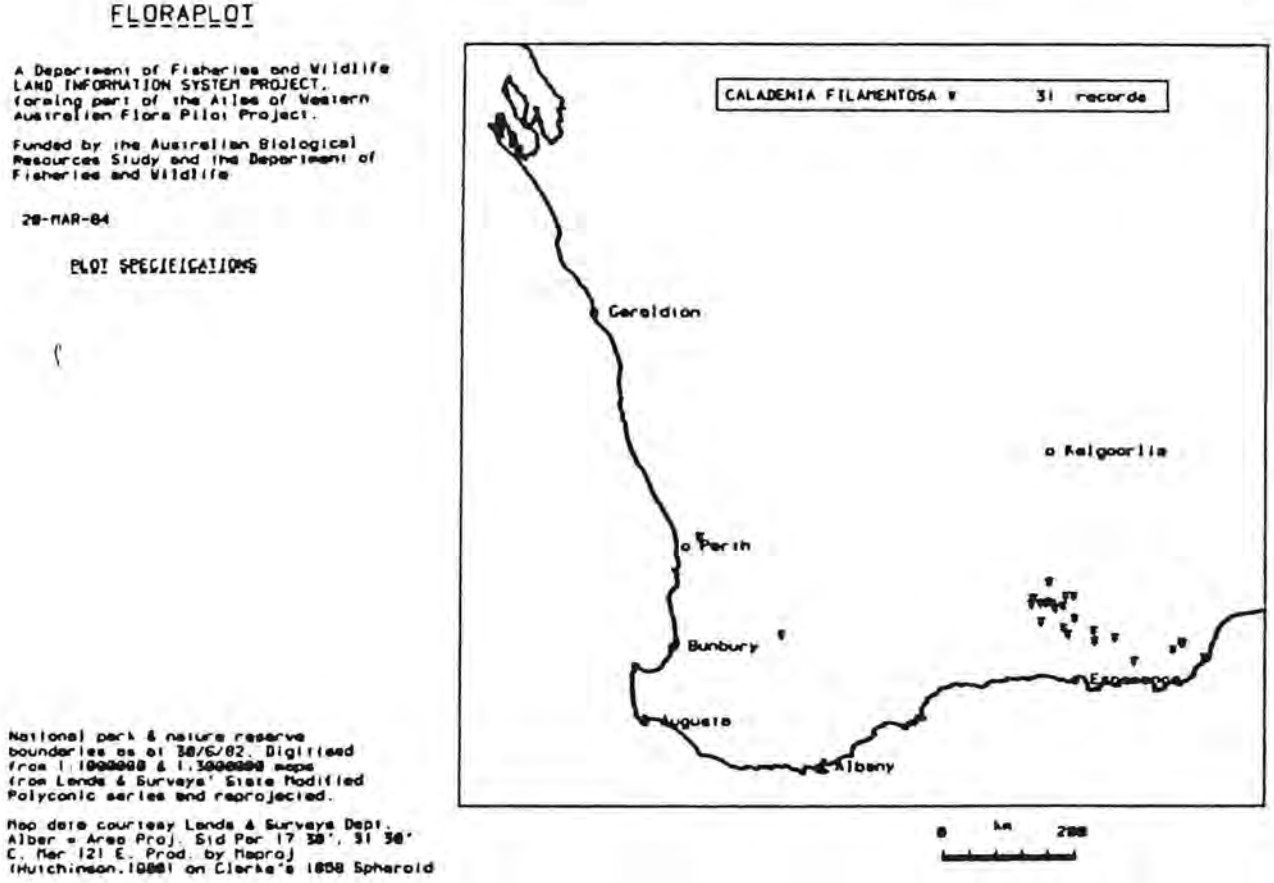


Fig. 4.36 Plot Containing Major Towns

```
                    FLORAPLOT_MENU

 1. Taxon Name :
* : CALADENIA FILAMENTOSA *
 2. Reserve Class :

 3. Road Verges :

 4. Repetative Period(s) :

 5. Discrete Period(s) :

 6. Flowering :
 7. Grid :
 8. Major Towns :Level(s)  :                1. >50000 ha.
 9. National Parks :                         2. >10000 ha.
10. Nature Reserves :                        3. > 2000 ha.
11. Default Map :Lower State                 4. >  500 ha.
                                             5. All National Park Boundaries
12. Dig. Plotter
13. Plot On Screen                           Enter which selection is required (1-5) : 1
14. Continuous Plot
15. List Available Species
16. Terminate Program

Enter Option To Be Changed (1-11)

          or

Function To Be Performed (12-16) : 0
```

Fig. 4.37 Selecting National Parks

Figure 4.38 shows the resultant map.

4.3.1.10 Nature Reserves

This option works in exactly the same way as the "National Parks" option. All nature reserves are drawn with a solid line.

4.3.1.11 Default Map

This option allows the user to designate which area of coverage shall be the default area. On implementation it also sets the current coverage or "window" to the selected coverage irrespective of what the previous window was. When FLORAPLOT is run for the first time the default map is the southern half of Western Australia. This default can be changed to include the whole state of W.A.

To implement this option type in the option number. The user is then prompted to either enter an S for a state map or L for a lower state map. If a state map is specified it will look as shown in Figure 4.39.

This option can also be used to reset the window to either of the two options. Suppose the user has designated the Lower State option. At a later stage the user may modify the map (using the TAILOR, discussed later) to zoom in to a small portion of the map. This option can be used to reset the map to the default with having to plot the map, thus saving time. Once the user has become familiar with the TAILOR this option's usefulness will become more apparent.

4.3.2 Functions

This section will discuss the various functions available and their correct usage.

4.3.2.1 Digital Plotter

This function tells FLORAPLOT to generate a map according to the menu specifications but direct all graphic printing to a TEKTRONIX 4663 digital plotter. The user should ensure that a digital plotter is connected otherwise an error will result. The program assumes that the continuous feed roll is connected on the plotter.

Using a digital plotter the user may introduce a certain amount of colour by pausing operation and changing the pen colours.

To implement this function type in the function number. The user should ensure that the digital plotter has been correctly initialised. This includes

1) Setting the page size.

2) Setting the form feed-out size.

no page 56

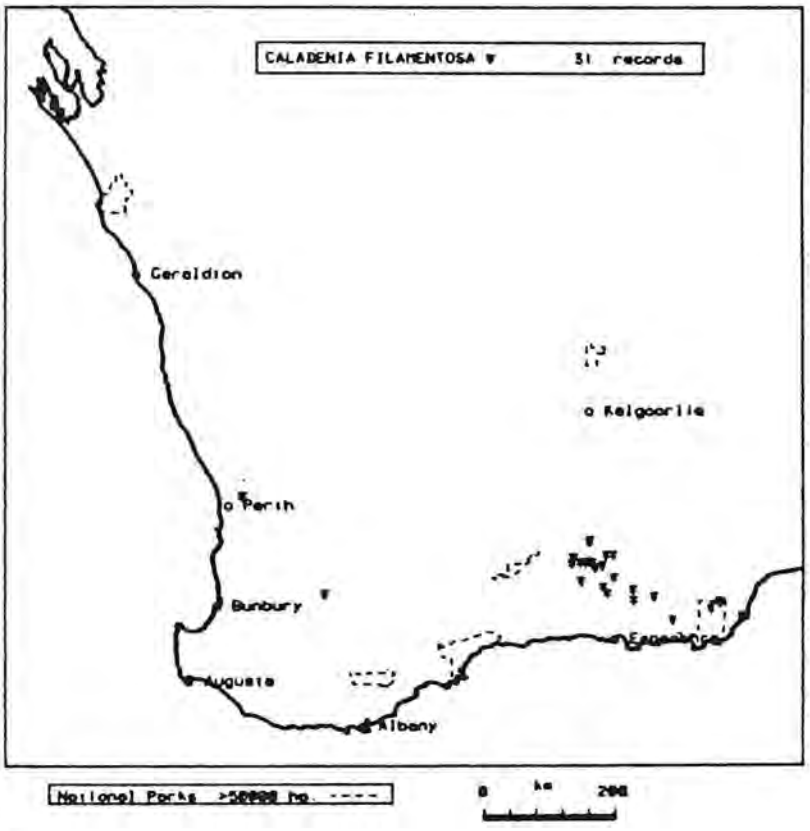
FLORAPLOT

A Department of Fisheries and Wildlife LAND INFORMATION SYSTEM PROJECT, forming part of the Atlas of Western Australian Flora Pilot Project.

Funded by the Australian Biological Resources Study and the Department of Fisheries and Wildlife

28-MAR-84

PLOT SPECIFICATIONS



National park & nature reserve boundaries as at 30/6/82. Digitised from 1:1000000 & 1:3000000 maps from Lands & Surveys' State Modified Polyconic series and reprojected.

Map data courtesy Lands & Surveys Dept. Albers Area Proj. Std Par (7 30', 31 30' C. Mer 121 E. Prod. by Maproj (Hutchinson, 1980) on Clarke's 1858 Spheroid

Fig. 4.38 National Park Boundaries

FLORAPLOT

A Department of Fisheries and Wildlife LAND INFORMATION SYSTEM PROJECT, forming part of the Atlas of Western Australian Flora Pilot Project.

Funded by the Australian Biological Resources Study and the Department of Fisheries and Wildlife

28-MAR-84

PLOT SPECIFICATIONS

National park & nature reserve boundaries as at 30/8/82. Digitised from 1:1000000 & 1:3000000 maps from Lands & Surveys' State Modified Polyconic series and reprojected.

Map data courtesy Lands & Surveys Dept. Albers Area Proj. Std Par 17 30', 31 30' C. Mer 121 E. Prod. by Maproj (Hutchinson, 1982) on Clarke's 1858 Spheroid

Fig. 4.39 State Map

3) Inserting correct pens

Refer to the 4663 manual for instructions on how to do this.

4.3.2.2 Plot on Screen

This function allows the user to generate a map according to the menu specifications onto the 4054 screen. The user should ensure that the hard copy unit is turned on if a hard copy is desired.

This function is implemented by typing in the function number.

4.3.2.3 Continuous Plot

This function allows the user to print a number of maps automatically. This is done according to the order in which taxa are stored on the disk. If the user wished to plot a section of the flora data disk then FLORAPLOT would start from a user-designated point in the data file and sequentially plot that taxon plus the next five taxa.

The user designates the starting point by specifying a single taxon on the menu. All plots will start from this taxon. To implement this function use the following procedure:

Type in the function. The machine responds as shown in Figure 4.40.

Enter a "Ø" if the plots are to be generated on a digital plotter (see DIGITAL PLOTTER function) or "1" if they are to be generated on the 4054 screen. Ensure that the hard copy unit is turned on and has had sufficient time to warm up if plots are to be done on the screen. The machine then responds with

<TEK> No. of Plots:

Enter the number of plots required. The program will then proceed to scan the flora data file, starting at the taxon specified in option 1, and plot each successive taxon.

Limitations

1) Only one taxon must be specified in option 1.

2) The taxon must be at a species level, e.g. Anigozanthos bicolor, Caladenia aphylla. Generic plots or subspecies/variety plots are not permitted. The species plot will include all subspecies/varieties and unspecified subspecies records. If the user wishes to obtain a set of maps with all taxa then the subspecies/variety plots must be done individually.

```
                    FLORAPLOT_MENU

 1. Taxon Name :
* 1 CALADENIA FILAMENTOSA *
 2. Reserve Class :

 3. Road Verges :

 4. Repetative Period(s) :

 5. Discrete Period(s) :

 6. Flowering :
 7. Grid :
 8. Major Towns :
 9. National Parks :
10. Nature Reserves :
11. Default Map :Lower State

12. Dig. Plotter
13. Plot On Screen
14. Continuous Plot
15. List Available Species
16. Terminate Program

Enter Option To Be Changed (1-11)

          or

Function To Be Performed (12-16) : 14

Digital Plotter or Screen (0 or 1) : 1
No. of Plots : 2
```

Fig. 4.40 Continuous Plot Specification

For a list of available species see "List Available Species" function.

4.3.2.4 List Available Species

This function generates a list of all taxon currently available on disk. The function is implemented by typing in the function number. Figure 4.41 shows the list of taxa that were available on the FLORA ATLAS as of 20/3/84. Ensure that the hard copy unit is turned on as this function automatically copies a page once it has filled the screen.

4.3.2.5 Terminate Program

The use of this function is obvious. Simply type in the function number to implement it.

Species Currently Available in File ... as of 27-JUN-89

	Genus	Species	Subspecies/Variety	Code	Number of Records
1	ANIGOZANTHOS	BICOLOR		ADBBHQ	233
2	ANIGOZANTHOS	FLAVIDUS		ADBFHQ	220
3	ANIGOZANTHOS	GABRIELAE		ADBGHQ	16
4	ANIGOZANTHOS	HUMILIS		ADBHHQ	505
5	ANIGOZANTHOS	KALBARRIENSIS		ADBKHQ	12
6	ANIGOZANTHOS	MANGLESII		ADBMHQ	408
7	ANIGOZANTHOS	ONYCIS		ADBOHQ	11
8	ANIGOZANTHOS	PREISSII		ADBPBB	25
9	ANIGOZANTHOS	PULCHERRIMUS		ADBPNN	121
10	ANIGOZANTHOS	RUFUS		ADBRHQ	93
11	ANIGOZANTHOS	VIRIDIS		ADBVHQ	100
12	ACIANTHUS			AIY	1
13	ACIANTHUS	RENIFORMIS		AIYRHQ	56
14	ACIANTHUS	RENIFORMIS	var. RENIFORMIS	AIYRHQA	29
15	ACIANTHUS	RENIFORMIS	var. HUEGELII	AIYRHQB	14
16	ACIANTHUS	TENUISSIMUS		AIYTHQ	12
17	BANKSIA	ATTENUATA		BIBAHQ	17
18	BANKSIA	GRANDIS		BIBGRH	9
19	BANKSIA	ILICIFOLIA		BIBIHQ	5
20	BANKSIA	LITTORALIS		BIBLRE	1
21	BANKSIA	LITTORALIS	var. LITTORALIS	BIBLREA	4
22	BANKSIA	MENZIESII		BIBMRH	11
23	BANKSIA			BIBOPH	1
24	BANKSIA	PRIONOTES		BIBPNL	8
25	BANKSIA	QUERCIFOLIA		BIBQHQ	1
26	BANKSIA	SPECIOSA		BIBSLD	2
27	BANKSIA	TRICUSPIS		BIBTHQ	1
28	BANKSIA	VERTICILLATA		BIBVBH	1
29	BLANCOA	CANESCENS		B4LCHQ	64
30	CONOSTYLIS	ANDROSTEMMA		CPUAHQ	63
31	CONOSTYLIS	ANGUSTIFOLIA		CPUALQ	19
32	CONOSTYLIS	ARGENTEA		CPUAPQ	56
33	CONOSTYLIS	AUREA		CPUARH	176
34	CONOSTYLIS	ACULEATA		CPUABH	158
35	CONOSTYLIS	ACULEATA	ssp. ACULEATA	CPUABHA	70
36	CONOSTYLIS	ACULEATA	ssp. BREVIFLORA	CPUABHB	7
37	CONOSTYLIS	ACULEATA	ssp. RHIPIDION	CPUABHC	30
38	CONOSTYLIS	ACULEATA	ssp. TENUIS	CPUABHD	22
39	CONOSTYLIS	BEALIANA		CPUBBB	19
40	CONOSTYLIS	BEALIANA	ssp. BEALIANA	CPUBBBA	2
41	CONOSTYLIS	BREVISCAPA		CPUBNM	7
42	CONOSTYLIS	CARICINA		CPUCHQ	18
43	CONOSTYLIS	CRASSINERVIA		CPUCRH	28
44	CONOSTYLIS	CRASSINERVIA	ssp. ABSENS	CPUCRHB	60
45	CONOSTYLIS	CANDICANS		CPUCGH	176
46	CONOSTYLIS	DIELSII		CPUDHQ	28
47	CONOSTYLIS	EXIGUA		CPUEHQ	65
48	CONOSTYLIS	FILIFOLIA		CPUFHQ	12
49	CONOSTYLIS	HIEMALIS		CPUHBB	13
50	CONOSTYLIS	HIEMALIS	ssp. HIEMALIS	CPUHBBA	24
51	CONOSTYLIS	HIEMALIS	ssp. TOMENTOSA	CPUHBBB	13
52	CONOSTYLIS	HNATIUKIANA		CPUHNW	6
53	CONOSTYLIS	INRETITA		CPUIHQ	6
54	CONOSTYLIS	JUNCEA		CPUJHQ	30
55	CONOSTYLIS	LEPTOSPERMOIDES		CPULHQ	2
56	CONOSTYLIS	MISERA		CPUMHQ	4
57	CONOSTYLIS	NEOCYMOSA		CPUNHQ	45
58	CONOSTYLIS	PETROPHILOIDES		CPUPBA	27
59	CONOSTYLIS	PHATHYRANTHA		CPUPCY	3

Fig. 4.41 Species List

60	CONOSTYLIS	PROLIFERA		CPUPNL	56
61	CONOSTYLIS	PSYLLIUM		CPUPUB	2
62	CONOSTYLIS	PAUCIFLORA		CPUPBN	5
63	CONOSTYLIS	ROBUSTA		CPURHQ	48
64	CONOSTYLIS	SETIGERA		CPUSEA	286
65	CONOSTYLIS	SETOSA		CPUSKE	28
66	CONOSTYLIS	STYLIDIOIDES		CPUSV4	61
67	CONOSTYLIS	SEORSIFLORA		CPUS4V	38
68	CONOSTYLIS	SERRULATA		CPUSQO	38
69	CONOSTYLIS	TERETIFOLIA		CPUTBB	124
70	CONOSTYLIS	TERETIFOLIA	ssp. MICRANTHA	CPUTBBB	1
71	CONOSTYLIS	TERETIUSCULA		CPUTNN	32
72	CONOSTYLIS	TERETIUSCULA		CPUTRB	2
73	CONOSTYLIS	VAGINATA		CPUVBB	34
74	CONOSTYLIS	VILLOSA		CPUVNN	6
75	CORYBAS	DESPECTANS		CRYDBB	4
76	CORYBAS	DILATATUS		CRYDNN	7
77	CORYBAS	UNGUICULATUS		CRYUHQ	8
78	CRYPTOSTYLIS	OVATA		CVAOHQ	18
79	CALADENIA			C12	43
80	CALADENIA	APHYLLA		C12AHQ	29
81	CALADENIA	AMPLEXANS		C12ANN	7
82	CALADENIA	BARBAROSSA		C12BBB	33
83	CALADENIA	BARBAROSSA	ssp. 'MURCHISON'	C12BBBB	2
84	CALADENIA	BICALLIATA		C12BHQ	6
85	CALADENIA	BROWNII		C12BKV	7
86	CALADENIA	BRYCEANA		C12BNN	6
87	CALADENIA	CAIRNSIANA		C12CBA	38
88	CALADENIA	CAIRNSIANA	ssp. CAIRNSIANA	C12CBAA	34
89	CALADENIA	CAIRNSIANA	ssp. PACHYCHILA	C12CBAB	13
90	CALADENIA	CHAPMANII		C12CDL	8
91	CALADENIA	CITRINA		C12CEN	5
92	CALADENIA	CORYNEPHORA		C12CGY	3
93	CALADENIA	CREBRA		C12CML	15
94	CALADENIA	CRISTATA		C12CUB	9
95	CALADENIA	CAERULEA		C12CSN	53
96	CALADENIA	CAESAREA		C12CQV	4
97	CALADENIA	DILATATA		C12DBA	24
98	CALADENIA	DILATATA	var. DILATATA	C12DBAA	4
99	CALADENIA	DILATATA	var. FALCATA	C12DBAB	55
100	CALADENIA	DISCOIDEA		C12DGY	67
101	CALADENIA	DORRIENII		C12DKV	2
102	CALADENIA	DOUTCHAE		C12DML	20
103	CALADENIA	DRUMMONDII		C12DUB	4
104	CALADENIA	DEFORMIS		C12DSN	127
105	CALADENIA	DENTICULATA		C12DBW	87
106	CALADENIA	DENTICULATA	ssp. DENTICULATA	C12DBVA	11
107	CALADENIA	DENTICULATA	ssp. NOBILIS	C12DBVB	2
108	CALADENIA	ENSATA		C12EEN	1
109	CALADENIA	ERICKSONAE		C12EHQ	16
110	CALADENIA	EXCELSA		C12EXL	5
111	CALADENIA	FERRUGINEA		C12FAN	8
112	CALADENIA	FILAMENTOSA		C12FBB	86
113	CALADENIA	FILAMENTOSA	ssp. FILIFERA	C12FBBE	15
114	CALADENIA	FILAMENTOSA	ssp. VOIGTII	C12FBBF	10
115	CALADENIA	FLAVA		C12FNN	290
116	CALADENIA	FOOTEANA		C12F13	9
117	CALADENIA	GEMMATA		C12GBB	29
118	CALADENIA	GEMMATA	var. GEMMATA	C12GBBA	85
119	CALADENIA	GEMMATA	var. LUTEA	C12GBBB	2
120	CALADENIA	GARDNERII		C12GBN	4
121	CALADENIA	GRAMINIFOLIA		C12GNN	13
122	CALADENIA	GRANDIS		C12GRH	6
123	CALADENIA	HARRINGTONAE	ssp. HARRINGTONAE	C12HADA	2

Fig. 4.41 Species List (cont.)

124	CALADENIA	HARRINGTONAE	ssp.	ALBENS	C12HAD8	5
125	CALADENIA	HEBERLEANA			C12HAN	9
126	CALADENIA	HIRTA			C12H68	50
127	CALADENIA	HOFFMANII			C12H48	2
128	CALADENIA	HUEGELII			C12HHH	85
129	CALADENIA	HUEGELII	ssp.	HUEGELII	C12HHHA	11
130	CALADENIA	HUEGELII	ssp.	APPLANATA	C12HHH8	2
131	CALADENIA	INTEGRA			C121H8	12
132	CALADENIA	INFUNDIBULARIS			C121RH	4
133	CALADENIA	INTERJACENS			C121TJ	1
134	CALADENIA	LAVANDULACEA			C12LDL	1
135	CALADENIA	LOBATA			C12LLD	7
136	CALADENIA	LONGICAUDA			C12LNJ	88
137	CALADENIA	LONGICAUDA	ssp.	LONGICAUDA	C12LNXA	38
138	CALADENIA	LONGICAUDA	ssp.	SEROTINA	C12LNXB	1
139	CALADENIA	LONGICLAVATA			C12L16	15
140	CALADENIA	LONGICLAVATA	var	LONGICLAVATA	C12L16A	12
141	CALADENIA	LONGICLAVATA	var.	MAGNICLAVATA	C12L168	8
142	CALADENIA	LATIFOLIA			C12LGT	66
143	CALADENIA	MARGINATA			C12MDL	38
144	CALADENIA	MENZIESII			C12MLD	77
145	CALADENIA	MULTICLAVIA			C12MTG	4
146	CALADENIA	MACROSTYLIS			C12MGT	21
147	CALADENIA	NANA			C12NH8	22
148	CALADENIA	PATERSONII			C12PB9	44
149	CALADENIA	PATERSONII	var	PATERSONII	C12PBBA	4
150	CALADENIA	PLICATA			C12PNN	4
151	CALADENIA	PECTINATA			C12PRH	1
152	CALADENIA	PECTINATA	ssp.	PECTINATA	C12PRHA	7
153	CALADENIA	PECTINATA	ssp	CRYPTOCLAVA	C12PRH8	2
154	CALADENIA	RADIATA			C12RDL	6
155	CALADENIA	REPTANS			C12RLD	24
156	CALADENIA	RHOMBOIDIFORMIS			C12RNN	4
157	CALADENIA	ROEI			C12R16	40
158	CALADENIA	RADIALIS			C12RGT	8
159	CALADENIA	SERICEA			C12SH8	47
160	CALADENIA	SIGMOIDEA			C12SRH	10
161	CALADENIA	SACCHARATA			C12S8H	71
162	CALADENIA	TRIANGULARIS			C12TH8	5
163	CALADENIA	ULIGINOSA			C12UH8	5
164	CALADENIA	VANOSA			C12VH8	1
165	CALADENIA				C123	23
166	CALADENIA				C12X81	1
167	CALADENIA				C12X82	5
168	CALADENIA				C12X83	1
169	CALADENIA				C12X84	2
170	CALADENIA				C12X85	1
171	CALADENIA				C12X86	1
172	CALADENIA				C12X87	1
173	CALADENIA				C12X88	1
174	CALADENIA				C12X89	1
175	CALOCHILUS	ROBERTSONII			C2NRH8	6
176	DIURIS				DA8	6
177	DIURIS	EMARGINATA			DA8EH8	4
178	DIURIS	EMARGINATA	var	EMARGINATA	DA8EH8A	4
179	DIURIS	EMARGINATA	var	PAUCIFLORA	DA8EH8B	18
180	DIURIS	LAXIFLORA			DA8LH8	60
181	DIURIS	LONGIFOLIA			DA8LRH	278
182	DIURIS	LAEVIS			DA8L8H	5
183	DIURIS	PURDIEI			DA8PNN	2
184	DIURIS	SETACEA			DA8SH8	9
185	DRAKAEA				DB4	2
186	DRAKAEA	CONFLUENS			DB4CH8	6
187	DRAKAEA	ELASTICA			DB4EH8	18

Fig. 4.41 Species List (cont.)

188	DRAKAEA	GLYPTODON			DB4GH8	82
189	DRAKAEA	GRACILIS			DB4GNN	11
190	DRAKAEA	JEANENSIS	ssp.	CONCOLOR	DB4JH8B	1
191	DRAKAEA	MICRANTHA			DB4MH8	2
192	DRAKAEA	THYNNIPHILA			DB4TH8	4
193	DRAKAEA				DB4X81	1
194	DRAKAEA				DB4X82	1
195	ELYTHRANTHERA	BRUNONIS			E38BH8	156
196	ELYTHRANTHERA	EMARGINATA			E38EH8	36
197	ELYTHRANTHERA				E38X81	1
198	EPIBLEMA	GRANDIFLORUM			E4YGH8	8
199	ERIOCHILUS				E72	5
200	ERIOCHILUS	DILATATUS			E72DH8	164
201	ERIOCHILUS	SCABER			E72SH8	42
202	EUCALYPTUS	ALBIDA			EQJAB8	1
203	EUCALYPTUS	ANCEPS			EQJADL	2
204	EUCALYPTUS	ANGULOSA			EQJAFV	3
205	EUCALYPTUS	AQUILINA			EQJAQX	1
206	EUCALYPTUS	ASTRINGENS			EQJAXQ	1
207	EUCALYPTUS	ACCEDENS			EQJA4J	6
208	EUCALYPTUS	BURDETTIANA			EQJBUY	1
209	EUCALYPTUS	CONFERRUMINATA			EQJCLA	1
210	EUCALYPTUS	CONGLOBATA			EQJCNV	2
211	EUCALYPTUS	COOPERANA			EQJCR1	3
212	EUCALYPTUS	CORNUTA			EQJCS4	4
213	EUCALYPTUS	CORONATA			EQJCT7	1
214	EUCALYPTUS	CRUCIS	ssp.	LANCIDLATA	EQJCVD8	3
215	EUCALYPTUS	CAESIA	ssp.	CAESIA	EQJCI3A	1
216	EUCALYPTUS	CAESIA	ssp.	MAGNA	EQJCI38	1
217	EUCALYPTUS	CALOPHYLLA			EQJC4C	78
218	EUCALYPTUS	CALYCOGONA			EQJC5F	1
219	EUCALYPTUS	CANALBULENSIS			EQJCGJ	2
220	EUCALYPTUS	DISCRETA			EQJDJ4	3
221	EUCALYPTUS	DIVERSICOLOR			EQJDLD	4
222	EUCALYPTUS	DORATOXYLON			EQJDT6	1
223	EUCALYPTUS	DECIPIENS			EQJD2Q	18
224	EUCALYPTUS	DECURVA			EQJD4J	1
225	EUCALYPTUS	EREMOPHILA			EQJECC	3
226	EUCALYPTUS	ERYTHROCORYS			EQJEJJ	11
227	EUCALYPTUS	EUDESMIDIBES			EQJEQQ	3
228	EUCALYPTUS	EVARTIANA			EQJETT	1
229	EUCALYPTUS	EOBANDENSIS			EQJE33	2
230	EUCALYPTUS	FOECUNDA			EQJFGY	3
231	EUCALYPTUS	FOECUNDA	ssp.	FOECUNDA	EQJFGYA	3
232	EUCALYPTUS	FALCATA			EQJF2U	1
233	EUCALYPTUS	FICIFOLIA			EQJFBG	1
234	EUCALYPTUS	GITTINSII			EQJGAC	5
235	EUCALYPTUS	GOMPHOCEPHALA			EQJGCY	3
236	EUCALYPTUS	GRACILIS			EQJGLQ	2
237	EUCALYPTUS	GARDNERI			EQJG56	3
238	EUCALYPTUS	INCRASSATA			EQJIBH	8
239	EUCALYPTUS	LEPTOCALYX			EQJLC2	2
240	EUCALYPTUS	LEPTOPODA			EQJLEG	1
241	EUCALYPTUS	LONGICORNIS			EQJLGJ	4
242	EUCALYPTUS	LOXOPHLEBA	ssp.	LOXOPHLEBA	EQJLUYA	18
243	EUCALYPTUS	LOXOPHLEBA	ssp	GRATIAE	EQJLUYB	1
244	EUCALYPTUS	LANE-POOLEI			EQJL4U	1
245	EUCALYPTUS	LEHMANNII			EQJL8H	1
246	EUCALYPTUS	MARGINATA			EQJMC2	180
247	EUCALYPTUS	MEGACARPA			EQJMEG	1
248	EUCALYPTUS	MICRANTHERA			EQJMQ4	1
249	EUCALYPTUS	MACROCARPA	ssp.	MEATHLAND	EQJM4U8	1
250	EUCALYPTUS	OLDFIELDII			EQJOA5	1
251	EUCALYPTUS	ORBIFOLIA			EQJOPP	2

Fig. 4.41 Species List (cont.)

252	EUCALYPTUS	OCCIDENTALIS			EQJO3D	10
253	EUCALYPTUS	PETRAEA			EQJPH0	1
254	EUCALYPTUS	PLATYPUS	var	PLATYPUS	EQJPH1A	1
255	EUCALYPTUS	PLATYPUS	var	HETEROPHYLLA	EQJPH1B	1
256	EUCALYPTUS	PYRIFORMIS			EQJPYC	3
257	EUCALYPTUS	PATENS			EQJP83	2
258	EUCALYPTUS	RUDIS			EQJRME	16
259	EUCALYPTUS	RUGOSA			EQJRVN	3
260	EUCALYPTUS	RECURVA			EQJR8C	7
261	EUCALYPTUS	SPATHULATA	ssp	SPATHULATA	EQJSL0A	2
262	EUCALYPTUS	SPATHULATA	ssp	GRANDIFLORA	EQJSL0B	1
263	EUCALYPTUS	STAERI			EQJSM0	2
264	EUCALYPTUS	SALMONOPHLOIA			EQJS20	16
265	EUCALYPTUS	SALUBRIS			EQJS40	1
266	EUCALYPTUS	TETRAGONA			EQJT45	5
267	EUCALYPTUS	TODTIANA			EQJTLA	4
268	EUCALYPTUS	UNCINATA			EQJUH0	4
269	EUCALYPTUS	VALENS			EQJVH0	1
270	EUCALYPTUS	WANDOO			EQJV8H	18
271	EUCALYPTUS	WANDOO	ssp	WANDOO	EQJV8HA	50
272	EUCALYPTUS	YALATENSIS			EQJY80	1
273	GASTRODIA	SESAMOIDES			GISSM0	1
274					HYBRID	7
275	LYPERANTHUS	FORRESTII			LDLFH0	2
276	LYPERANTHUS	NIGRICANS			LDLNH0	181
277	LYPERANTHUS	SERRATUS			LDLSH0	40
278	LEPORELLA	FIMBRIATA			L5MFH0	169
279	MONADENIA	MICRANTHA			MBURH0	33
280	MACROPIDIA	FULGIDOSA			M0JFH0	78
281	MICROTIS				M06	16
282	MICROTIS	ALBA			M06AB0	11
283	MICROTIS	ATRATA			M06AN0	10
284	MICROTIS	BROWNII			M060H0	7
285	MICROTIS	ORBICULARIS			M060H0	8
286	MICROTIS	PULCHELLA			M06PH0	1
287	MICROTIS	UNIFOLIA			M06UH0	97
288	PRASOPHYLLUM				PR2	35
289	PRASOPHYLLUM	BROWNII			PR2BH0	8
290	PRASOPHYLLUM	CYPHOCHILLUM			PR2CH0	20
291	PRASOPHYLLUM	DRUMMONDII			PR2DH0	2
292	PRASOPHYLLUM	ELATUM			PR2EH0	27
293	PRASOPHYLLUM	FIMBRIA			PR2FH0	50
294	PRASOPHYLLUM	GRIMVADEANUM			PR2GRH	5
295	PRASOPHYLLUM	GIBBOSUM			PR2G0H	16
296	PRASOPHYLLUM	HIANS			PR2HH0	24
297	PRASOPHYLLUM	LANCEOLATUM			PR2LH0	1
298	PRASOPHYLLUM	MACROSTACHYUM			PR2MH0	33
299	PRASOPHYLLUM	MACROSTACHYUM	var	MACROSTACHYUM	PR2MH0A	12
300	PRASOPHYLLUM	MACROSTACHYUM	var	RINGENS	PR2MH0B	65
301	PRASOPHYLLUM	NIGRICANS			PR2NH0	25
302	PRASOPHYLLUM	OVALE			PR2OH0	6
303	PRASOPHYLLUM	OVALE	var	OVALE	PR2OH0A	1
304	PRASOPHYLLUM	OVALE	var	TRICLOCHIN	PR2OH0B	23
305	PRASOPHYLLUM	PARVIFOLIUM			PR2PH0	43
306	PRASOPHYLLUM	RECTUM			PR2RH0	7
307	PRASOPHYLLUM	SARGENTII			PR2SH0	10
308	PRASOPHYLLUM	TRIANGULARE			PR2TH0	1
309	PTEROSTYLIS				PNS	13
310	PTEROSTYLIS	ALLANTOIDEA			PNSAB0	20
311	PTEROSTYLIS	ANGUSTA			PNSAN0	2
312	PTEROSTYLIS	BARBATA			PNSBH0	35
313	PTEROSTYLIS	DILATATA			PNSDH0	7
314	PTEROSTYLIS	MUTICA			PNSMN0	53
315	PTEROSTYLIS	NANA			PNSNH0	165

Fig. 4.41 Species List (cont.)

316	PTEROSTYLIS	NANA	var.	ROSETTED	PNSNH0A	1
317	PTEROSTYLIS	NANA	var.	NONROSETTED	PNSNH0B	4
318	PTEROSTYLIS	PLUMOSA			PNSPB0	30
319	PTEROSTYLIS	PUSILLA			PNSPH0	1
320	PTEROSTYLIS	ROGERSII			PNSRH0	0
321	PTEROSTYLIS	RUFA			PNSRRH	80
322	PTEROSTYLIS	RECURVA			PNSRBH	164
323	PTEROSTYLIS	SARGENTII			PNSSB0	46
324	PTEROSTYLIS	SCABRA			PNSSMN	7
325	PTEROSTYLIS	SCABRA	var.	SCABRA	PNSSNHA	18
326	PTEROSTYLIS	SCABRA	var.	ROBUSTA	PNSSNH0	28
327	PTEROSTYLIS	VITTATA			PNSVH0	144
328	PTEROSTYLIS	VITTATA	var.	VITTATA	PNSVH0A	70
329	PTEROSTYLIS	VITTATA	var.	SUBDIFFORMIS	PNSVH0B	2
330	PARACALEANA	NIGRITA			PILN0	36
331	RHIZANTHELLA	GARDNERI			R2NGH0	4
332	SPICULAEA	CILIATA			SCWCH0	22
333	THELYMITRA				T36	17
334	THELYMITRA	ANTENNIFERA			T36AN0	143
335	THELYMITRA	CARNEA			T36CER	1
336	THELYMITRA	CORNICINA			T36CKE	3
337	THELYMITRA	CRINITA			T36C00	64
338	THELYMITRA	CUCULLATA			T36CV4	3
339	THELYMITRA	CAMPANULATA			T36CXV	15
340	THELYMITRA	CANALICULATA			T36C00	0
341	THELYMITRA	FLEXUOSA			T36FB0	37
342	THELYMITRA	FUSCOLUTEA			T36FMN	81
343	THELYMITRA	FUSCOLUTEA	var.	FUSCOLUTEA	T36FMNA	6
344	THELYMITRA	FUSCOLUTEA	var.	STELLATA	T36FMNB	1
345	THELYMITRA	MATTHEWSII			T36MH0	1
346	THELYMITRA	NUCIDA			T36MRH	7
347	THELYMITRA	MACMILLANII			T36MBH	8
348	THELYMITRA	NUDA			T36NM0	286
349	THELYMITRA	PAUCIFLORA			T36PB0	20
350	THELYMITRA	PSAMMOPHILA			T36PMN	2
351	THELYMITRA	SARGENTII			T36SB0	2
352	THELYMITRA	SPIRALIS			T36SMN	7
353	THELYMITRA	SPIRALIS	var.	PUNCTATA	T36SMNC	1
354	THELYMITRA	TIGRINA			T361H0	1
355	THELYMITRA	VARIEGATA			T36V80	6
356	THELYMITRA	VARIEGATA	var.	NOV	T36V80B	1
357	THELYMITRA	VILLOSA			T36VNN	38

Press 'RETURN' to continue

Fig. 4.41 Species List (cont.)

4.4 PLOTTING

Once FLORAPLOT has been instructed to generate a plot it scans the menu to find out what options have been specified and hence find out what is to be plotted and what isn't. Information is then drawn in the following order (assuming that information has been specified in the menu).

1) Coastline
2) Grid (if specified)
3) Major Towns (if specified)
4) Flora Occurrences
5) Plot Specifications
6) Scale Bar
7) Text (if specified)
8) National Park Boundaries (if specified)
9) Nature Reserve Boundaries (if specified)

Once the plotting of information is complete four bells sound to signify to the user that the TAILOR now requires information if the map is wished to be modified or "fine-tuned".

Note that when National Parks or Nature Reserves are plotted a legend is also drawn. If these boundaries are not plotted then the legend will not appear either.

Experience has shown that it may take up to two or three goes before a satisfactory map is produced (though it usually only takes one go). To speed up the turnaround time for generating map it is advisable to not print the latitude/longitude graticule until the very last moment. This is because this option requires a relatively large amount of time to produce the grid.

4.5 THE TAILOR

The tailor is that part of FLORAPLOT which allows the user to modify a map that has just been plotted. Here the user may choose to window in or out on a particular portion of the map. Information may be added, deleted or modified to make the map more informative or more aesthetically pleasing. This section will use the base map shown in Figure 4.42. The base map includes the southern half of Western Australia and shows the distribution of Caladenia filamentosa.

On completion of a map FLORAPLOT rings a series of bells. The cursor then positions itself at the bottom of the screen and about a third of the way across. A blinking question mark will appear. Here FLORAPLOT waits for input from the user. This input is a tailor option number.

On completion of a map the tailor options are not printed. This is so that a hard copy of the map may be taken. If the user wishes to display the available option simply type in <CR>. This option will be printed in the bottom left hand corner of the screen as shown in Figure 4.43.

There are twelve options. To select an option type in the option number.

If at any time a non existent option number is typed, or there is some incorrect input for an option, the option is ignored and the list of options is reprinted. The program then awaits further input.

Whenever the program reaches this point a single bell sounds to alert the user than an option has been completed and further input is required.

4.5.1 Plot

This option plots the current window. The screen is erased and plotting is performed again. If any changes have been made to the map via the tailor options then these will be reflected in the new map.

Options 2, 4, 9 and 10 change the window. If these have been used they do not actually take effect until either this option is implemented or the Save Window Option is used.

4.5.2 Window

This option allows the user to select a portion of the current map and expand that portion to show greater detail.

Refer to Figure 4.44. Suppose we wish to examine the bulk of C. filamentosa records in greater detail.

Type in the option number. Crosshairs then appear on the

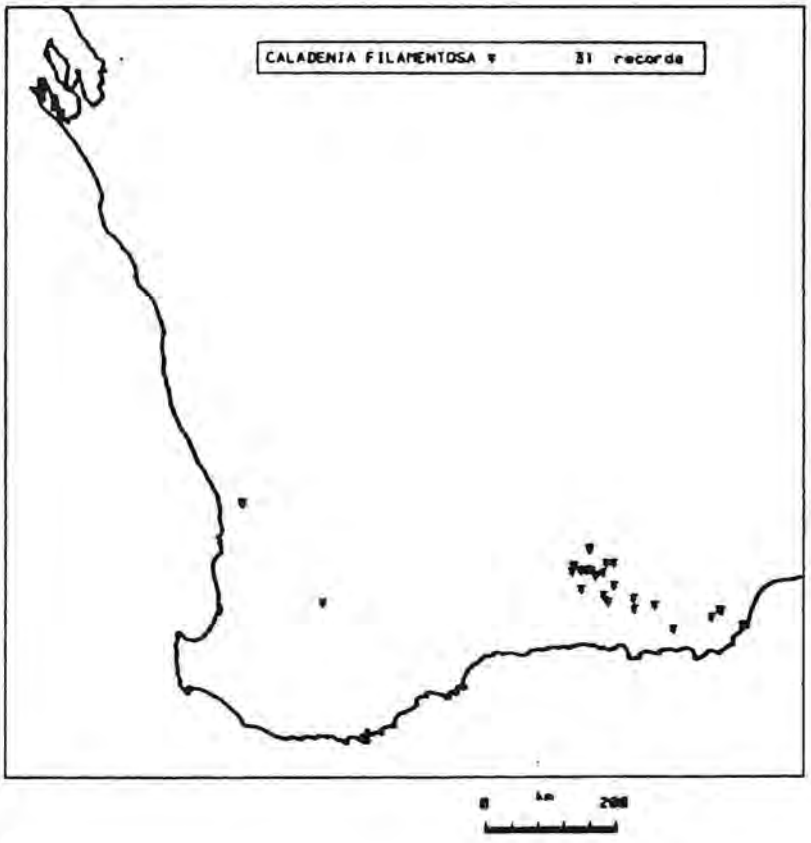
FLORAPLOT

A Department of Fisheries and Wildlife
LAND INFORMATION SYSTEM PROJECT,
forming part of the Atlas of Western
Australian Flora Pilot Project.

Funded by the Australian Biological
Resources Study and the Department of
Fisheries and Wildlife

25-MAR-84

PLOT SPECIFICATIONS



National park & nature reserve
boundaries as at 30/6/82 Digitised
from 1 1000000 & 1 3000000 maps
from Lands & Surveys' State Modified
Polyconic series and reprojected.

Map data courtesy Lands & Surveys Dept
Albers = Area Proj, Std Par 17 30', 31 30'
C Mer 121 E Prod by Maproj
(Hutchinson,1982) on Clarke's 1858 Spheroid

Fig. 4.42 Tailor Base Map

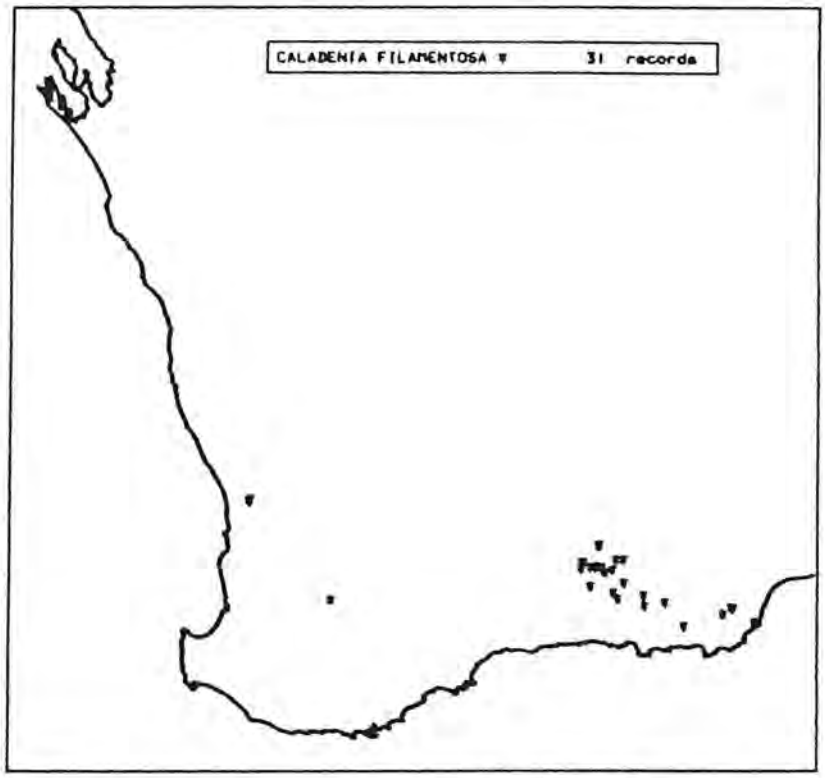
FLORAPLOT

A Department of Fisheries and Wildlife
LAND INFORMATION SYSTEM PROJECT,
forming part of the Atlas of Western
Australian Flora Pilot Project.

Funded by the Australian Biological
Resources Study and the Department of
Fisheries and Wildlife

25-MAR-84

PLOT SPECIFICATIONS



National park & nature reserve
boundaries as at 30/6/82. Digitised
from 1:1[illegible] & 1:3[illegible] maps
from Lands & Surveys' State Modified
Polyconic series and reprojected.

Map data courtesy Lands & Surveys Dept.
Alber's Area Proj. Std Par 17 30', 31 30'
C. Mer 121 E. Prod. by Maproj
(Hutchinson,1982) on Clarke's 1858 Spheroid

OPTIONS- 1. Plot 2. Window 3. Save Window 4. Set Default Map
5. Return To Main Menu 6. Relocate Town Names 7. Insert Text
8. Move Item 9. Zoom In 10. Zoom Out 11. Interrogate Point
12. Terminate - Type Option Required (1-12).

Fig. 4.43 Tailor Options

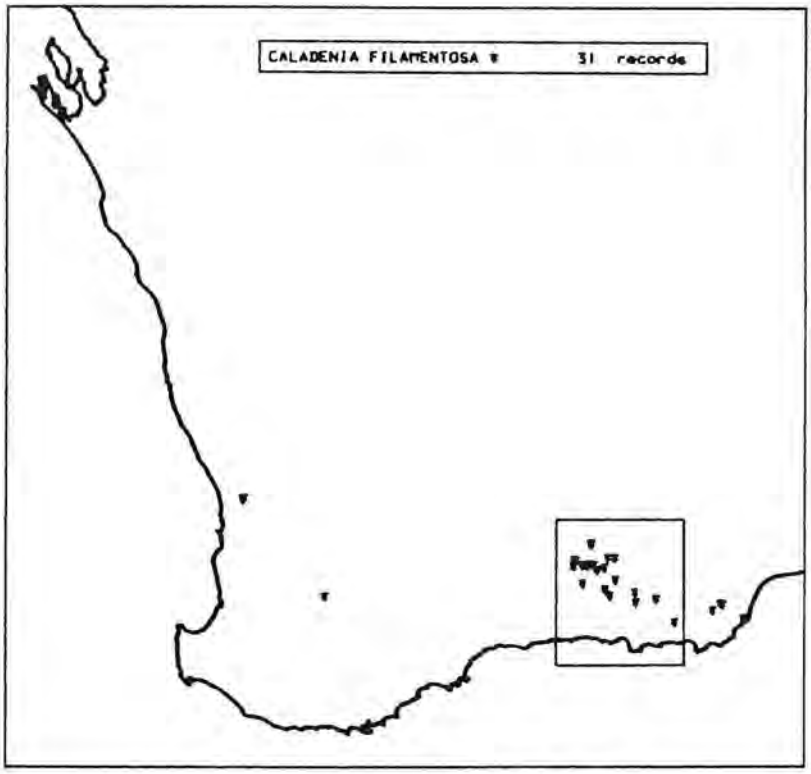
FLORAPLOT

A Department of Fisheries and Wildlife
LAND INFORMATION SYSTEM PROJECT.
(forming part of the Atlas of Western
Australian Flora Pilot Project

Funded by the Australian Biological
Resources Study and the Department of
Fisheries and Wildlife

25-MAR-84

PLOT SPECIFICATIONS



National park & nature reserve
boundaries as at 30/6/82 Digitised
from 1:1000000 & 1:3000000 maps
from Lands & Surveys' State Modified
Polyconic series and reprojected.

Map data courtesy Lands & Surveys Dept.
Albers's Area Proj. Std Par 17 30', 31 30'
C Mer 121 E Prod by Maproj
(Hutchinson,1982) on Clarke's 1858 Spheroid

OPTIONS- 1: Plot 2: Window 3: Save Window 4: Set Default Map
5: Return To Main Menu 6: Relocate Town Names 7: Insert Text
8: Move Item 9: Zoom In 10: Zoom Out 11: Interrogate Point
12: Terminate - Type Option Required (1-12):2

Fig. 4.44 Window

screen. At this point the user must specify the rectangle of interest. This rectangle is defined by specifying the diagonal corners. First, position the crosshairs at the location of the UPPER LEFT HAND corner of the rectangle. Then press any single character. A bell sounds and a dot is drawn to signify the specified point.

Then position the crosshairs on the location of the LOWER RIGHT HAND corner of the rectangle and press any single character. A rectangle is drawn according to the two specified points as shown in Figure 4.44. The program then waits for further input.

This window has not yet been implemented. It will not be "remembered" unless the user either plots the window, in which case it will be remembered thereafter, or implements the Save Window option which makes the program remember the window (see Save Window option).

If the resultant window is not acceptable repeat the above process.

If the two points are entered in the wrong order the option will be ignored.

To plot the window shown in Figure 4.44 implement the PLOT option. The result is shown in Figure 4.45.

Note: It is up to the user to determine if the window coverage exceeds the initial accuracy of the data. Flora occurrences are usually only accurate to the nearest minute. If the window exceeds an internally predefined scale a message will printed underneath the scale bar giving notice that the accuracy of the flora occurrences may have been superseded. Also, the coastline and other polygon data are only accurate up to a point. Beyond this, the coastline is made up of straight lines.

4.5.3 Save Window

Implementation of this option causes the machine to remember any new window that may have been specified.

Using the PLOT function automatically does this. However, the user may wish to return to the menu after specifying a new window so that the map may be further altered. If this is done without saving the window then it will be forgotten and the current window (prior to alteration) will be used.

4.5.4 Set Default Menu

This option causes the program to make its new window either a state map or a lower state map, depending on what default map was specified in the menu.

The new window is not effected until either the PLOT option is evoked or the SAVE WINDOW option is used (See

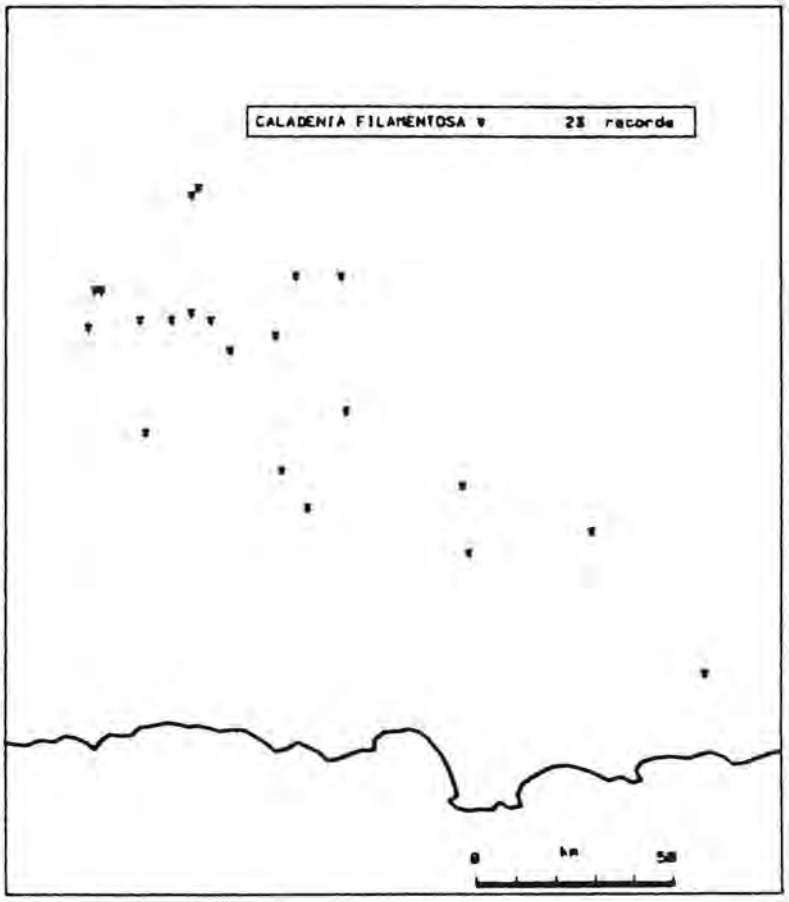
FLORAPLOT

A Department of Fisheries and Wildlife
LAND INFORMATION SYSTEM PROJECT,
forming part of the Atlas of Western
Australian Flora Pilot Project.

Funded by the Australian Biological
Resources Study and the Department of
Fisheries and Wildlife

25-MAR-84

PLOT SPECIFICATIONS



National park & nature reserve
boundaries as at 30/6/82 Digitised
from 1:1000000 & 1:3000000 maps
from Lands & Surveys' State Modified
Polyconic series and reprojected.

Map data courtesy Lands & Surveys Dept
Albers + Area Proj Std Par 17 30', 31 30'
C. Mer 121 E. Prod by Maproj
(Hutchinson,1982) on Clarke's 1858 Spheroid

Fig. 4.45 Expanded Window

Save Window option).

4.5.5 Return to Main Menu

Implementation of this option will cause the screen to erase and the menu to be reprinted. Any new windows will not be remembered unless the SAVE WINDOW option or the PLOT option were used.

4.5.6 Relocate Town Names

This option allows the user to move or delete town names from a map. A maximum of 20 towns maybe edited at any one time. Suppose we return to the menu via option 5 and specify that towns of levels 1 and 2 are to be plotted as shown in Figure 4.46 and 4.47. On first plot, at this particular scale, the town names are congested and not aesthetically pleasing. To edit the town names use the following procedure:

Enter the option number. The crosshairs will appear on the screen.

The user may either

1) Move a town name.

2) Delete a town name.

3) Reset all town names to their original position.

4) Exit from the option.

1) Move a Town Name

Position the crosshairs in the middle of the circular marker that represents the position of the town to be moved as shown in Figure 4.48. Press <CR>. A dot will be drawn at the position specified. Now move the crosshairs to the new position of the town name and press <CR>. A bell will sound and a dot drawn in the position specified. The crosshairs will now reappear. When the map is replotted the name will appear in the new position. (The circular marker will still be in the same position.) The new position is where the first character in the town name will be printed, as shown in Figure 4.49. Notice also that the height of the first character will be placed evenly around the horizontal crosshair.

2) Deleting a Town Name

Position the crosshairs on the circular marker representing the position of the town as shown in Figure 4.48. Press the slash character / (This is the delete symbol used throughout the program). A / will be printed directly above the circular marker

```
                    FLORAPLOT_MENU

 1: Taxon Name :
* 1 CALADENIA FILAMENTOSA *
 2. Reserve Class :

 3. Road Verges :

 4. Repetetive Period(s) :

 5. Discrete Period(s) :

 6. Flowering :
 7. Grid :
 8. Major Towns :Level(s)  1,2
 9. National Parks
10. Nature Reserves :
11. Default Map :Lower Strata

12. Dig  Plotter
13. Plot On Screen
14. Continuous Plot
15. List Available Species
16. Terminate Program

Enter Option To Be Changed (1-11)

        or

Function To Be Performed (12-16) :
```

Fig. 4.46 Specify Major Towns

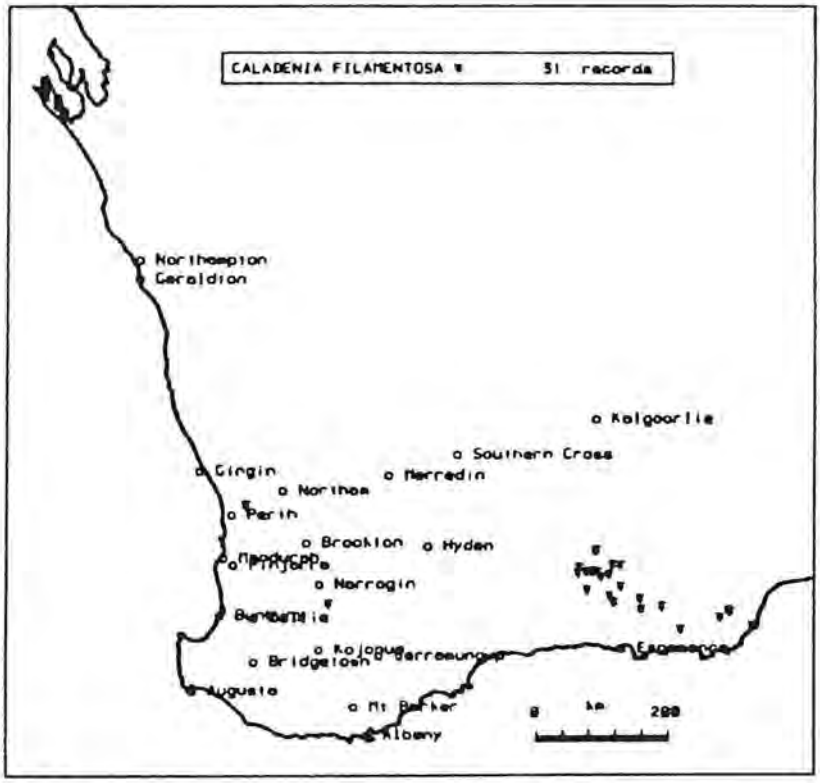
FLORAPLOT

A Department of Fisheries and Wildlife
LAND INFORMATION SYSTEM PROJECT.
forming part of the Atlas of Western
Australian Flora Pilot Project.

Funded by the Australian Biological
Resources Study and the Department of
Fisheries and Wildlife

25-MAR-84

PLOT SPECIFICATIONS



National park & nature reserve
boundaries as at 30/6/82. Digitised
from 1:1000000 & 1:3000000 maps
from Lands & Surveys' State Modified
Polyconic series and reprojected.

Map data courtesy Lands & Surveys Dept.
Alber's Area Proj. Std Par 17 30', 31 30'
C. Mer 121 E. Prod. by Maproj
(Hutchinson,1982) on Clarke's 1858 Spheroid

Fig. 4.47 Initial Distribution of Major Towns, Levels 1&2

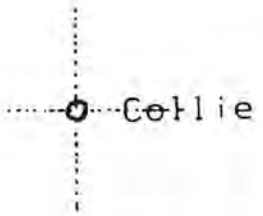


Fig. 4.48 Specifying a Town Name to be Edited

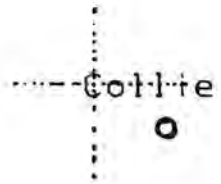


Fig. 4.49 Specifying New Position

and a bell will sound. The crosslines will then reappear. When the map is reprinted neither the town name nor the circular marker will appear.

3) Resetting Town Names

Enter the character R for reset. This causes all town names to be reset to their original positions and the option is then exited from. When the map is reprinted all town names will reappear.

4) Exit From option

Entering the character E causes the program to exit from this option. Once a user has completed moving and/or deleting town names this character should be typed to exist from the option.

Once the town names in Figure 4.47 have been edited they may be replotted as shown in Figure 4.50.

4.5.7 Enter Text

This option allows the user to incorporate text as part of a map. This text then appears on subsequent maps unless modified or reset. Up to 20 lines of text may be inserted. The option is implemented as follows:

Type in the option number. The crosshairs will appear. The user may now:

a) Insert new text

b) Modify old text

c) Reset the option

d) Exit from the option

a) Insert New Text

Position the crosshairs to where the beginning of the text is to appear. Type in the size that the characters are to be.

This is an integer from 1-4. Any other input will be taken as 1. The value 1 gives the smallest size character and the value 4 gives the largest. Values 2 and 3 give intermediate values.

Once the character size has been entered the crosshairs disappear and a blinking question mark appears in the position specified and with the apropriate character size.

Type in the required character. The crosshairs then re-appear. Repeat the process as desired.

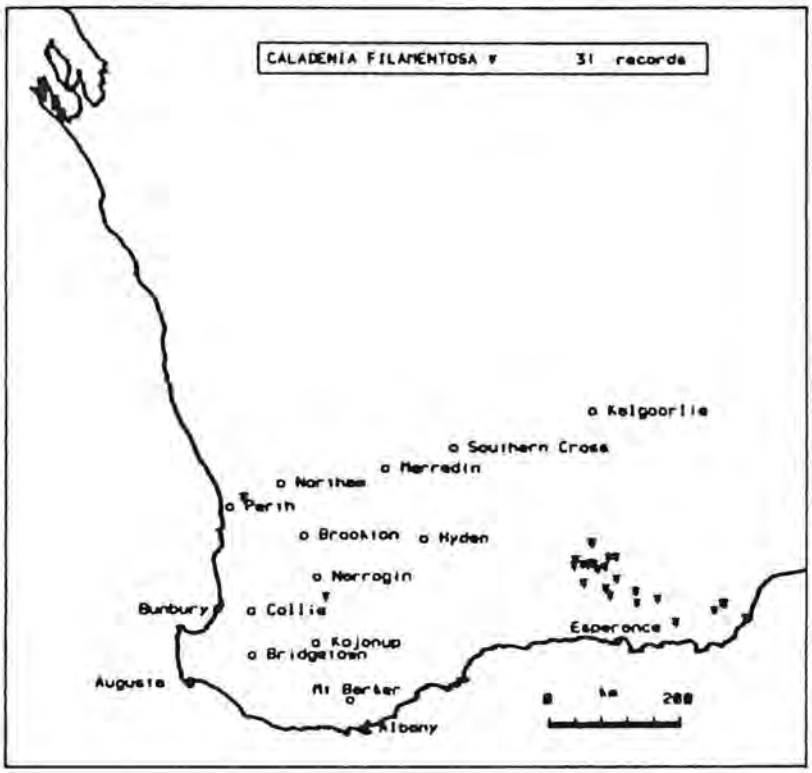
FLORAPLOT

A Department of Fisheries and Wildlife LAND INFORMATION SYSTEM PROJECT, forming part of the Atlas of Western Australian Flora Pilot Project.

Funded by the Australian Biological Resources Study and the Department of Fisheries and Wildlife

26-MAR-84

PLOT SPECIFICATIONS



National park & nature reserve boundaries as at 30/6/82. Digitised from 1:1000000 & 1:3000000 maps from Lands & Surveys' State Modified Polyconic series and reprojected.

Map data courtesy Lands & Surveys Dept. Albers = Area Proj. Std Par 17 30', 31 30' C. Mer 121 E. Prod. by Maproj (Hutchinson,1980) on Clarke's 1858 Spheroid

Fig. 4.50 Edited Town Names

b) Modify Old Text

Press the character O (Oh) (The position of the crosshairs is unimportant). Then type in the first few characters of the text to be modified, just enough to uniquely identify the text in question.

If this text is found it will light up three times.

Note: If there is more than one text sample having the same preceeding letter then the one chosen is that which was entered first.

The crosshairs then re-appear. Position where appropriate and then type in the character size. Enter text as normal. By entering a <CR> with no other input effectively deletes that piece of text.

c) Reset Option

Press the character R. This deletes all text previously entered and exit the user from the option.

d) Exit From Option

This exists the user from the option.

A plot can thus be made, as shown in Figure 4.5.1. This will appear on all subsequent maps unless otherwise altered.

Note: That the text is placed on the map according to a constant screen position. If the window changes, the text will still appear in exactly the same place, relative to the screen.

4.5.8 Move Item

This option allows the user to move around the screen any of three items, these being:

1) The scale bar

2) The species box

3) The national park/nature reserve legend.

These items always appear in the same position relative to the screen, irrespective of the window coverage. On power up they are positioned so as to fit comfortably on the default map, that being lower state. Once the window is changed it is up to the user to reposition them as desired.

To implement this option type in the option number. The crosshairs will appear.

Position the crosshairs close to the UPPER LEFT HAND

FLORAPLOT

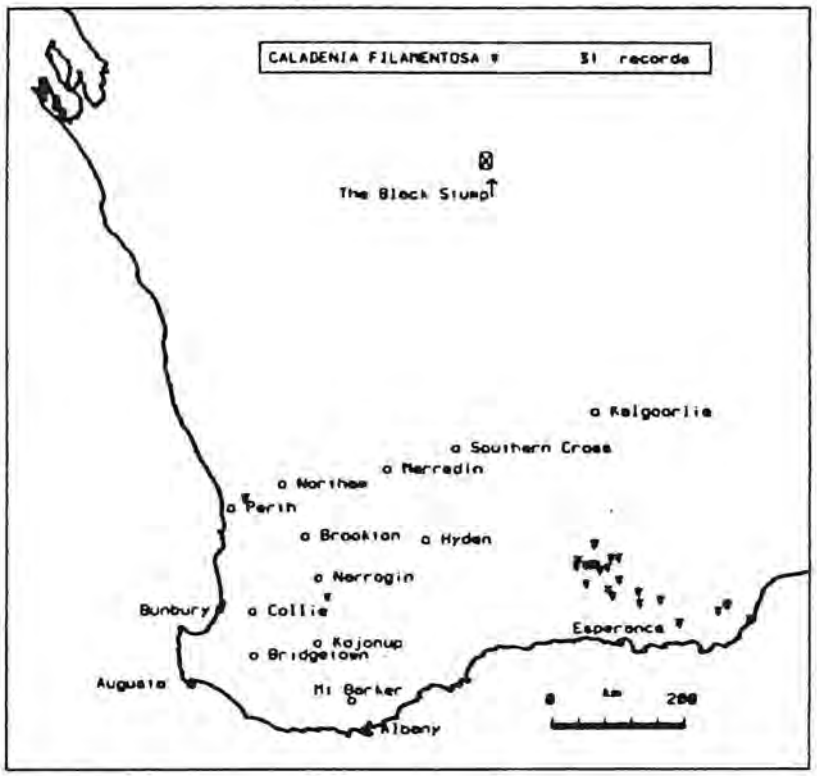
A Department of Fisheries and Wildlife LAND INFORMATION SYSTEM PROJECT, forming part of the Atlas of Western Australian Flora Pilot Project.

Funded by the Australian Biological Resources Study and the Department of Fisheries and Wildlife

25-MAR-84

PLOT SPECIFICATIONS

THIS MAP PRODUCED BY "FLORAPLOT"
GOOD, HUH?



National park & nature reserve boundaries as at 30/6/82. Digitised from 1:1000000 & 1:3000000 maps from Lands & Surveys' State Modified Polyconic series and reprojected.

Map data courtesy Lands & Surveys Dept. Albers Area Proj. Std Par 17 30', 31 30' C. Mer 121 E. Prod. by Maproj (Hutchinson, 1982) on Clarke's 1858 Spheroid

Fig. 4.51 Text Placement

corner of the item to be moved and press <CR>. If that item is found a dot will be printed in that corner and a bell will sound. Reposition the crosshairs to where that same corner is to be moved and press <CR>. Again a bell will sound and a dot be drawn in the specified position.

Either repeat the process or press E to exit from the option.

A plot can then be re-drawn that incorporates the shifted items.

4.5.9 Zoom In

The option performs roughly the same function as option 2 in that it sets the new window to a portion of the current map. It differs in that only one point is required to change the window. The user specifies a point about which the program should zoom in on. The resultant window will contain half the area of the original window and will be centred on the point specified by the user. This process can be repeated indefinitely.

To implement this procedure refer to Figure 4.52. Type in the option number. The crosshairs will appear.

Position the crosshairs on the point about which the program should zoom in and press <CR>. A box is drawn, centred about the point specified, having half the dimensions of the previous window. Note that any lines comprising this box that happen to fall outside of the current window will not be drawn. No line can be drawn outside the current window.

The cross-hairs will re-appear. Either repeat the process or press E to exit the option.

The resultant map is shown in Figure 4.53.

Note that this window will not be remembered unless either the Plot option or the Save Window option is implemented.

4.5.10 Zoom Out

This option works in exactly the same way as the Zoom In option except that instead of halving the area of the current window it doubles that area.

Note that the resultant box shown in Figure 4.52 will not be seen usually. This is because the perimeter of the box most often falls outside the current window. No lines can be drawn outside the current window.

By zooming out a few times on the map in Figure 4.53 the resultant map in Figure 4.54 occurred.

4.5.11 Interrogate Point

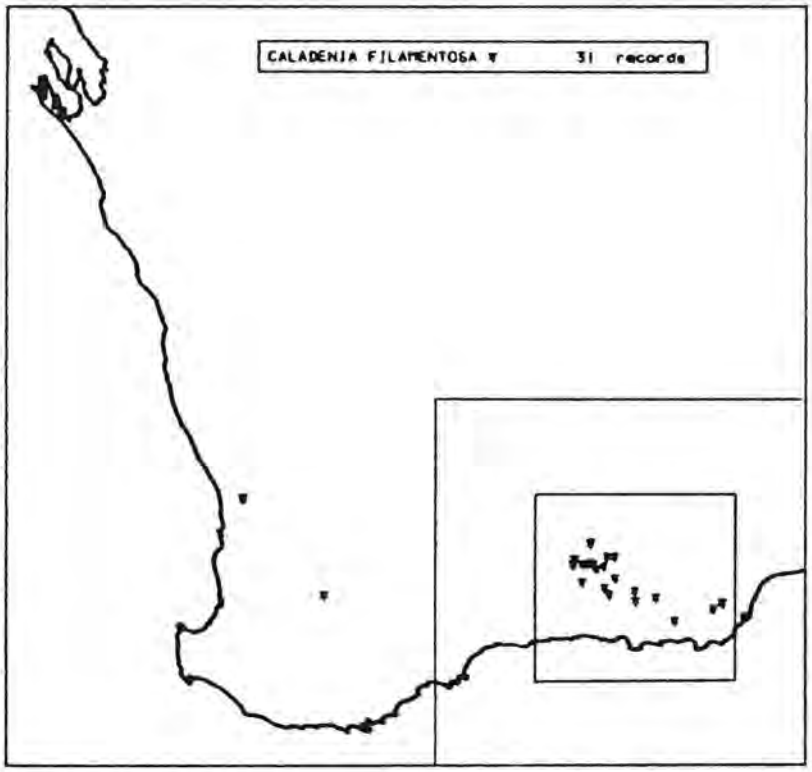
FLORAPLOT

A Department of Fisheries and Wildlife
LAND INFORMATION SYSTEM PROJECT,
forming part of the Atlas of Western
Australian Flora Pilot Project.

Funded by the Australian Biological
Resources Study and the Department of
Fisheries and Wildlife

25-MAR-84

PLOT SPECIFICATIONS



National park & nature reserve
boundaries as at 30/6/82. Digitised
from 1.1000000 & 1.3000000 maps
from Lands & Surveys' State Modified
Polyconic series and reprojected.

Map data courtesy Lands & Surveys Dept.
Alber's Area Proj Std Par 17 30', 31 30'
C. Mer 121 E. Prod. by Maproj
(Hutchinson,1982) on Clarke's 1858 Spheroid

OPTIONS- 1. Plot 2. Window 3. Save Window 4. Set Default Map
5. Return To Main Menu 6. Relocate Town Names 7. Insert Text
8. Move Item 9. Zoom In 10. Zoom Out 11. Interrogate Point
12. Terminate - Type Option Required (1-12).9

Fig. 4.52 Zooming In

FLORAPLOT

A Department of Fisheries and Wildlife LAND INFORMATION SYSTEM PROJECT, forming part of the Atlas of Western Australian Flora Pilot Project.

Funded by the Australian Biological Resources Study and the Department of Fisheries and Wildlife

25-MAR-84

PLOT SPECIFICATIONS

National park & nature reserve boundaries as at 30/6/82 Digitised from 1:1000000 & 1:3000000 maps from Lands & Surveys' State Modified Polyconic series and reprojected.

Map data courtesy Lands & Surveys Dept. Alber's Area Proj. Std Par 17 30', 31 30' C Mer 121 E. Prod by Maproj (Hutchinson,1980) on Clarke's 1858 Spheroid

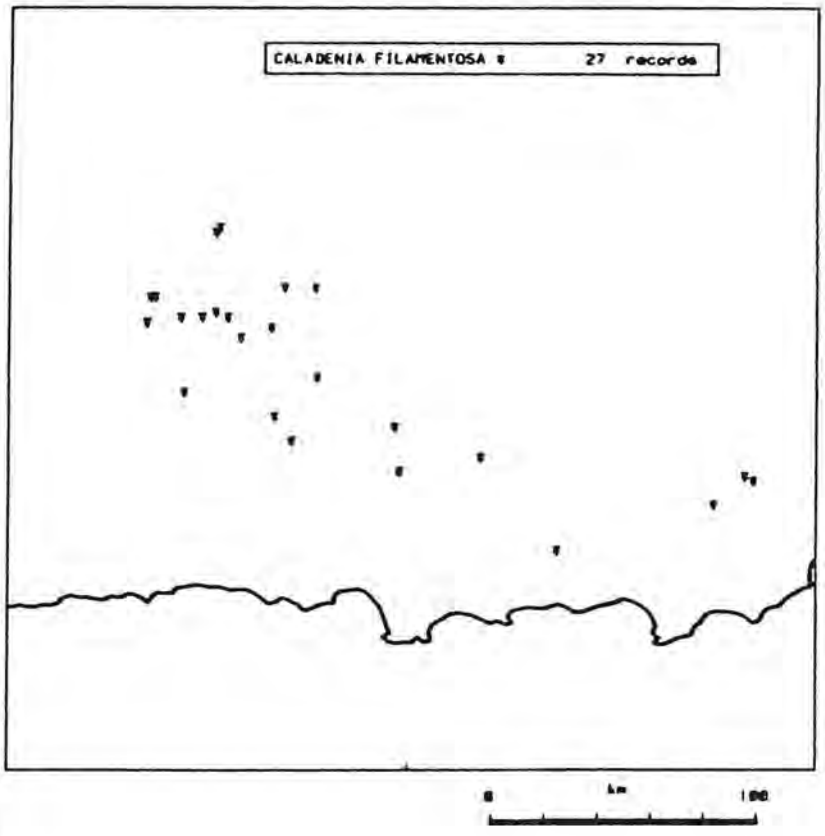


Fig. 4.53 Enlarged Portion of Map

This option allows the user to interrogate a flora occurrence that has been plotted. The information returned is:

a) The latitude/longitude coordinate of the occurrence

b) The observer code

c) The date of observation

The above items are used to validate data that may seem to be erroneous.

The procedure is implemented as follows:

Refer to Figure 4.54

Type in the option number. The crosshairs apear.
Using this option we will interrogate the flora occurrence that lies in the ocean near the border of W.A.

Position the cursor on the point in question and press <CR>. The program draws a circle around the point specified. Any occurrences outside this circle are disregarded.

The program now hunts through the data file looking for a flora occurrence of the same taxon and location as the one specified.

If no points are found within the given radius of interest the program prints the message:

<TEK> No points in aura.

If a point is found within the given radius the occurrence lights up and a bell sounds. The information is then printed to the right of the occurrence as shown in Figure 4.55. The crosshairs then reappear.

Either continue the process or press E to exit from the option.

Note: If more than one point lies in the specified radius of interest only the first one found in the date file is used. The user should zoom in sufficiently to spread out the occurrences so that they are more easily singled out.

The user should also leave sufficient room on the right hand side of the occurrence to allow for the messages to be printed.

4.5.12 Terminate

This option exits the user from the program.

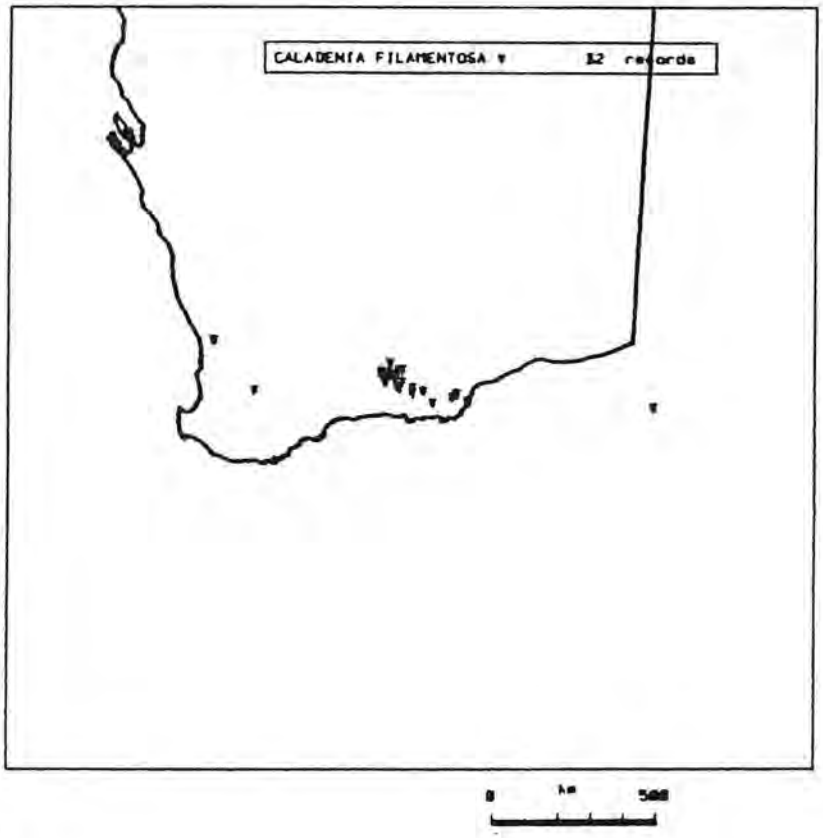
FLORAPLOT

A Department of Fisheries and Wildlife LAND INFORMATION SYSTEM PROJECT, forming part of the Atlas of Western Australian Flora Pilot Project.

Funded by the Australian Biological Resources Study and the Department of Fisheries and Wildlife

25-MAR-84

PLOT SPECIFICATIONS



National park & nature reserve boundaries as at 30/6/82. Digitised from 1:1000000 & 1:3000000 maps from Lands & Surveys' State Modified Polyconic series and reprojected.

Map data courtesy Lands & Surveys Dept. Alber's Area Proj. Std Par 17 30', 31 30' C. Mer 121 E. Prod. by Maproj (Hutchinson,1982) on Clarke's 1858 Spheroid

Fig. 4.54 Zooming Out

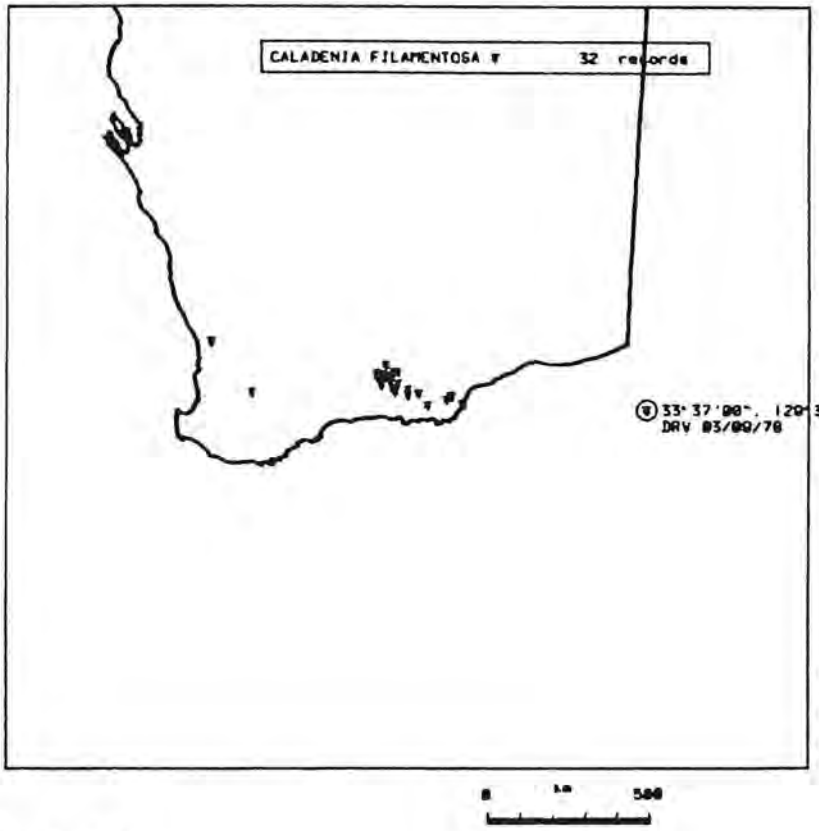
FLORAPLOT

)epartment of Fisheries and Wildlife
ID INFORMATION SYSTEM PROJECT,
'ming part of the Atlas of Western
)stralian Flora Pilot Project.

nded by the Australian Biological
)sources Study and the Department of
)heries and Wildlife

)-MAR-84

PLOT SPECIFICATIONS



)tional park & nature reserve
)undaries as at 30/6/82. Digitised
)n 1:1000000 & 1:3000000 maps
)m Lands & Surveys' State Modified
)lyconic series and reprojected

) data courtesy Lands & Surveys Dept.
)er = Area Proj. Std Par 17 30', 31 30'
Mer 121 E Prod. by Maproj
)richinson,1980) on Clarke's 1858 Spheroid

TIONS- 1. Plot 2. Window 3. Save Window 4. Set Default Map
Return To Main Menu 6. Relocate Town Names 7. Insert Text
Move Item 9. Zoom In 10. Zoom Out 11. Interrogate Point
. Terminate - Type Option Required (1-12):11

Fig. 4.55 Point Interrogation

5.0 DATA INTERFACES

This section documents those procedures that take data from an external environment such as magnetic tape and process/reformat them into an efficiently accessible form for use by FLORAPLOT. It also documents the transfer of data from the CYBER mainframe to the TEKTRONIX 4054 desk top computer.

For the actual data formats see the relevent appendices.

5.1 FLORA DATA

Refer to Figure 5.1. Data that have been transferred from an outside source to a TEKTRONIX magnetic tape must go through a final step of processing/reformatting into a form used by FLORAPLOT. The utility program to achieve this is DTRANSFER. This program takes the sequential tape file containing latitude/longitude values and flora information and reformats it into a random access data file and a series of indices. Latitude/longitude values undergo a transformation to the Albers Equal Area projection. The co-ordinates are stored in this format thus saving a considerable amount of time in generating plots.

Flora data is sorted by species code. This code contains three sections, those being genus, species and subspecies/variety. The indices are constructed according to these codes so that three indices are generated: a genus index, a species index and a subspecies/variety index. These indices facilitate rapid data retrieval.

When the program is run there are two phases that it goes through. After soliciting the required information about data filenames etc. it creates the main flora data file and stores the data. Once this has been completed the program proceeds to create the indices. During this second phase, name substitution occurs. That is, for every species code in the main data file the corresponding taxonomic name is searched for and written into the indices. This is the reason for having a new species list. This list contains a table of species codes and the corresponding names. When a code is to be substituted the new species list is searched to see if that code is present. If it is the name is substituted. If not then the can optionally look in the old indices (if they exist).

5.1.1. DTRANSFER V1.1 User Guide

DTRANSFER V1.1 will take flora data from a magnetic tape (or tapes) and transfer those data onto disk after some processing and reformatting.

Two files are required on tape. The first is a new species list. This file should contain the names and codes of any species that are not already on the atlas.

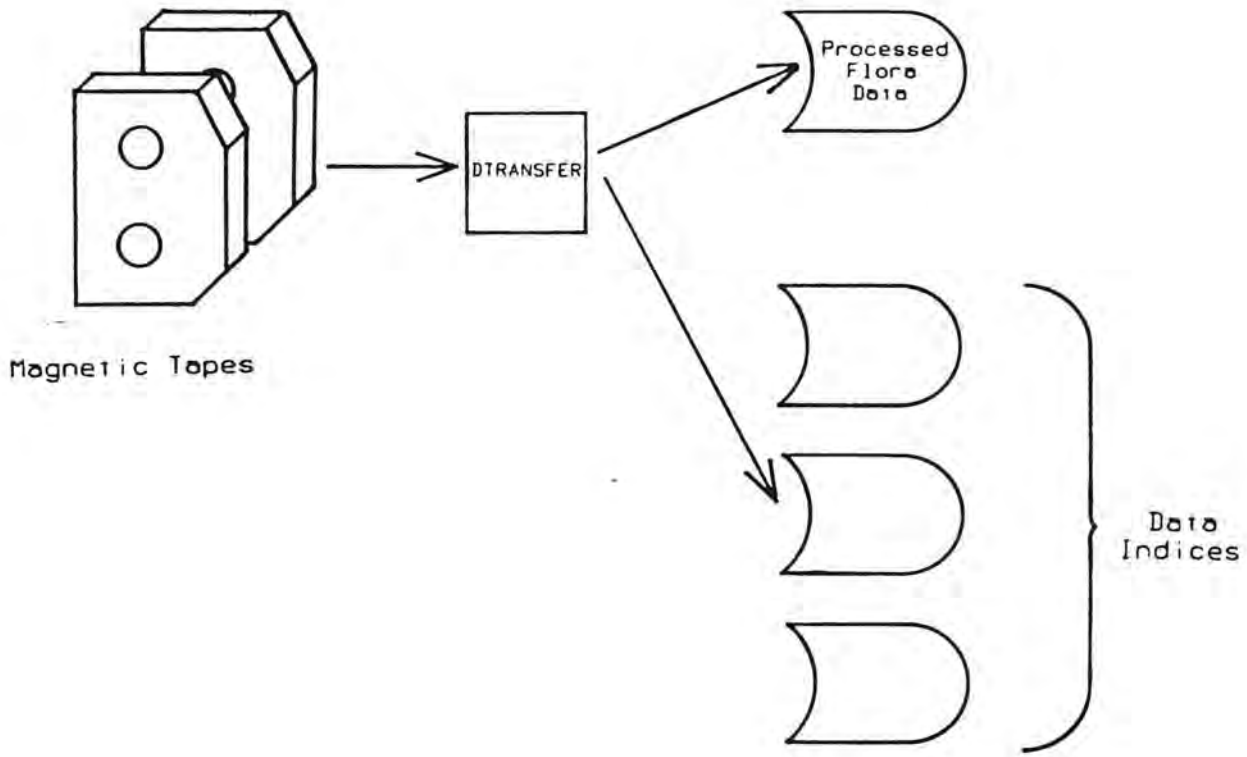


Fig. 5.1 Processing/Reformatting of Flora Data

The format of this file is shown in the appendices. The second file required is the flora data file. This may be contained in the remaining space on the tape. If, however, the space required exceeds the space available the flora data file can be split in two. The first part of the file should be on the same file as the new species list. The second part should be contained on a second tape.

The transfer process requires two disks. The first disk is the FLORAPLOT disk from which a copy of the DTRANSFER program is retrieved. The second is the disk that contains (or will contain) flora data. If the data disk is new it should have been formatted prior to receiving data. (Refer to the File Manager manual, pages 5-46 to 5-49).

To start the transfer process turn equipment on and mount the FLORAPLOT disk. (Refer to this document, section 4.2 on Getting Started, and do steps one to four). Then type in the following statements:

```
OLD "DTRANSFER"
RUN
```

The first prompt to be displayed is:

```
<TEK> Is this a creation or update run (Ø or 1):
```

If a zero is entered here then all species names will be assumed to be contained in the new species tape file. If a one is entered then both the new species list and the old indices will be searched.

Note: In the case of a creation run overwriting a previous run of the same name the old data file and indices are deleted. In the case of an update run the old data file is deleted but the indices are renamed ZZZZZ.ext.

The next prompt to be displayed is:

```
<TEK> Has the main data file already been created (Y
or N):
```

Enter an N. (This prompt is used to determine if the first phase of the program is to be bypassed and go straight onto index creation. In most cases this is not necessary)

The next prompt is:

```
<TEK> Is the data contained on a single tape (Yes or
No):
```

If it is, then enter Yes. If not then enter No.

If the answer was Yes the program prompts with

<TEK> Input file number of flora data on tape.
This tape should also contain the new species list:

Enter file number.

If the answer was No the program prompts with

<TEK> Input file number of flora data on tape 1.
This tape should also contain the new species list:

Enter the file number. The program then prompts with

<TEK> Input file number of flora data on tape 2:

Enter file number. Note that the first part of the file should be on tape 1 and the second on tape 2.

Once the program has determined whether it is going to be a one or two tape run it asks for the tape(s) to be inserted so that it can check the data types. Once this has been done successfully the program prompts with:

<TEK> Enter name of flora distribution data file name
(Disk)
(Name must be ten characters or less):

Enter the file name. If that file name already exists the program asks whether it should be deleted. If not then it asks for the file name again.

With this information the program allocates sufficient space for the data file and informs the user how long it will take to complete the first phase - reformatting/ processing the main data file.
If a single tape run was specified this first phase will go to completion automatically. If a two tape run was specified at some point the first tape will have been completely read. At this stage it will sound some bells and the program will prompt for the second tape to be inserted.

Once this has been done the first phase will go on to completion. The second phase then commences, that being index creation. As the indices are being created the species names and codes are printed on the screen. Whenever a code or a portion of a code is not found in the new species list a blank field will appear. A hard copy will automatically be made on every full page. At the end of the second phase the program terminates.

5.2 CYBER MAINFRAME - TEKTRONIX DATA TRANSFER

Refer to Figure 5.2 This shows the current interface system between the TEKTRONIX and the CYBER. A mode 4C line from the NOS operating system connects to the TEKTRONIX communications interface via modems. Under the control of a program called NOSCOM data can be transferred between the TEKTRONIX and the CYBER.

The TEKTRONIX program NOSCOM sets up a protocol that allows the following facilities:

(a) Use the TEKTRONIX as a dumb terminal for the CYBER

(b) Transfer data from the CYBER to a TEKTRONIX tape or disk

(c) Transfer data from a TEKTRONIX tape or disk to the CYBER.

5.2.1. NOSCOM V1.1 User Guide

NOSCOM is a utility used to transfer data between the TEKTRONIX and the CYBER.

To start the transfer process turn the equipment on and mount the FLORAPLOT disk. (refer to this document, Section 4.2 or Getting Started, and do steps one to four). Then type in the following statement:

```
OLD "NOSCOM"
```

Remove the FLORAPLOT disk from the drive. Then type in

```
RUN
```

The program will then print the menu of available options as shown in Figure 5.3

1. Talk to the CYBER

Enter 1 to select this option. The TEKTRONIX is now acting as a dumb terminal. The BASIC interpreter is non-operable. Normally this option is used to log in to the CYBER and optionally to retrieve or save files used in the transfer process. To exit from this mode back to NOSCOM control type in either:

(a) User Definable Key 5 or
(b) Hit the Esc Button twice in succession.

2. Transfer a CYBER local file of the TEKTRONIX

Enter 2 to select this option. Before selecting this option, however, it is assumed that option 1 has already been used to

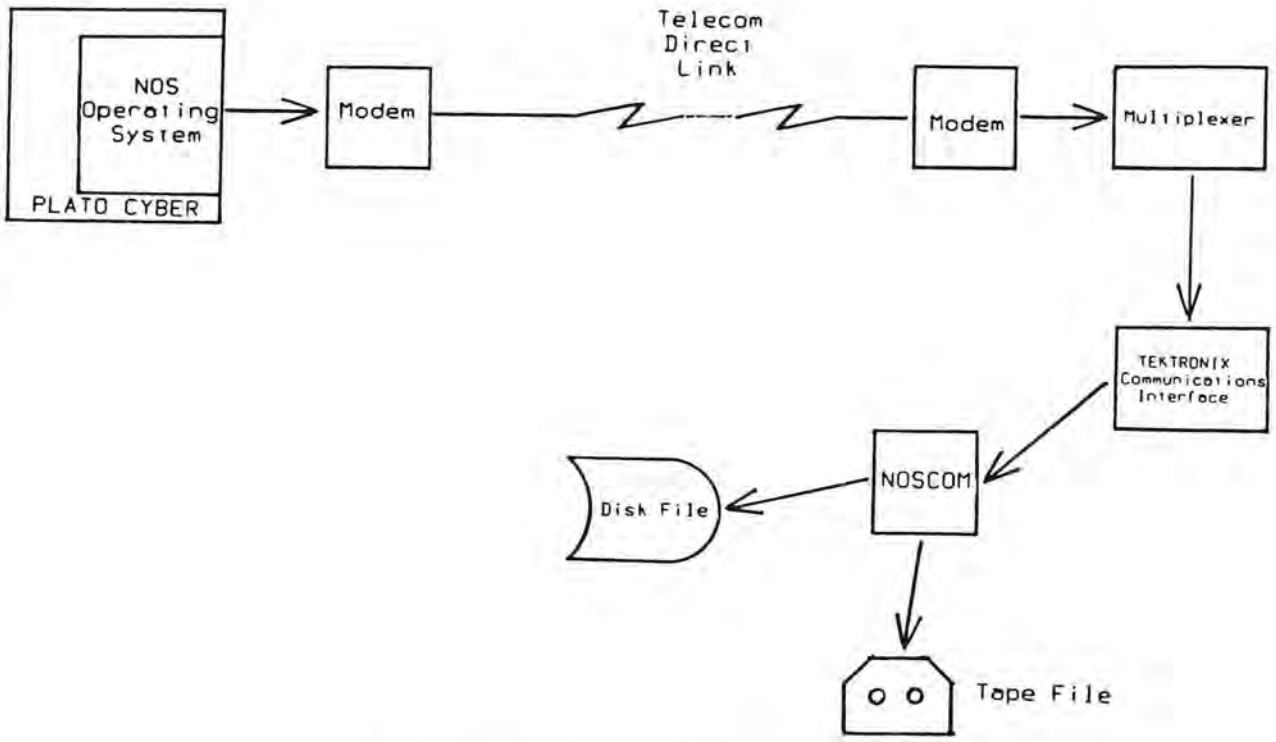


Fig. 5.2 CYBER - TEKTRONIX Communication Network

```
NOSCOM      Version 1.0

      Menu
      ****

Do you wish to

   1   Talk to the CYBER ?

   2.  Transfer a CYBER local file to the Tektronix ?

   3.  Transfer a file from the Tektronix to CYBER local file ?

   4   Exit from this program ?

   5   LOGOUT from the CYBER and exit from this program ?

Please type either   (a) the number of the option followed by a "?"
                         if you require help for a particular option

                                                  or;

                     (b) the number of the option you wish to choose

Option:
```

Fig. 5.3 NOSCOM Menu

(a) log in to the CYBER, and
(b) retrieve into a local file the data to be transferred.

A prompt is displayed reminding that the hard copy unit be turned on. It then prompts with the following message:

> <TEK> Is the local file being transferred to a tape or a disk? Enter T for tape or D for disk:

Enter the appropriate destination.

Note: If information is to be transferred to a disk then the disk must be mounted prior to execution of NOSCOM. If information is being transferred to a tape then it must be inserted prior to executing NOSCOM.

If a T was entered the program prompts for the file number of the file to receive the data.

If a D was entered the program prompts for the file name and file size.

The program then prompts for the record length of this file to be transmitted. This should be as small as possible but large enough to include the largest record to be transmitted. The smaller the record length the quicker the transmission time.

Lastly the program prompts for the name of the CYBER local file. On reception of this the transfer starts. The data is also printed on the screen.

Occasionally spurious line feeds occur. If this happens the program automatically takes a hard copy of the screen and prints a message. Transfer then continues. The program halts if data is corrupted or unsolicited messages are received.

At the end of reception the menu is reprinted.

3. Transfer a file from the TEKTRONIX to CYBER local file

Enter 3 to select this option. Before selecting this option, however, it is assumed that option 1 has been used to log in the CYBER.

The program displays the prompt

> <TEK> Is the file to be transferred from tape or disk? Enter T for a tape or D for a disk:

Note: It is assumed that the tape has been inserted on the disk mounted prior to the execution of NOSCOM.

If a T was entered the program prompts for the number of the file to be transferred to the CYBER.

If a D was entered the program prompts for the name of the

disk file to be transferred.

The program then prompts for the record length of the file to be transferred. This should be as small as possible yet large enough to contain the largest record to be transmitted. The smaller the record length the quicker the transfer time.

The program then finally prompts for the name of the CYBER local file that the data shall be transmitted to. On reception of this the transfer process starts. The transfer time in going from the TEKTRONIX to the CYBER takes much longer than the opposite direction. This is because the CYBER is much slower at receiving data than it is in sending data.

If any unsolicited messages are received the program halts.

On completion of the transfer the menu is reprinted.

4. Exit from this program:

Enter 4 to select this option. This option halts execution of NOSCOM and leaves the operator in TEKTRONIX BASIC mode. However, the line to the CYBER is still logged in.

5. LOGOUT from the CYBER and exit from this program

Enter 5 to select this option. This option both halts program execution and sends a LOGOUT command to the CYBER.

5.3 COASTLINE DATA

The coordinates for the W.A. Coastline were digitised by the Department of Lands and Surveys and transferred to the CYBER via magnetic tape.

Referring to Figure 5.4, the coordinates went through a filtering process as the accuracy of the coordinates was in excess of the TEKTRONIX storage capabilities and would have resulted in overly large I/O times.

These filtered data were then transferred to a TEKTRONIX tape. From here they were converted to an Alber's Equal Area projection using the program MTRANSFER and stored as a sequential disk file with the format N, X(N), Y(N) where N was the number of coordinate pairs.

At the beginning of the development of the FLORAPLOT program the coast was read in the above format. However, as buffer size and I/O times became more stringent it was necessary to introduce some indexation to the coordinates. This was via the program MADAT.

MADAT divides the W.A. coast into a group of rectangles. Thus, when plotting a portion of the coast, instead of reading the entire set of coordinates a hunt is made through the map index to see if any of the rectangles overlaps the current window being displayed. If so, only those sections of coast that are within the rectangles are read and plotted.

5.3.1 MTRANSFER User Guide

Initialize the equipment as in section 4.2 of this document, steps one to four with the exception that the FLORAPLOT UTILITIES disk should be inserted in drive Ø instead of the FLORAPLOT disk. Then type in the following command

```
OLD "MTRANSFER"
```

Remove the UTILITIES disk and insert and mount a temporary storage disk into drive Ø. Also insert the tape containing the coastline coordinates. Then type

```
RUN
```

The program prompts firstly for the number of the tape file containing the coastline data and secondly for the name of the disk data file.

The program then starts the transfer process. At the end of the transfer the number of data pairs read is printed and execution ends.

5.3.2 MADAT User Guide

Initialize the equipment as in section 4.2 of this

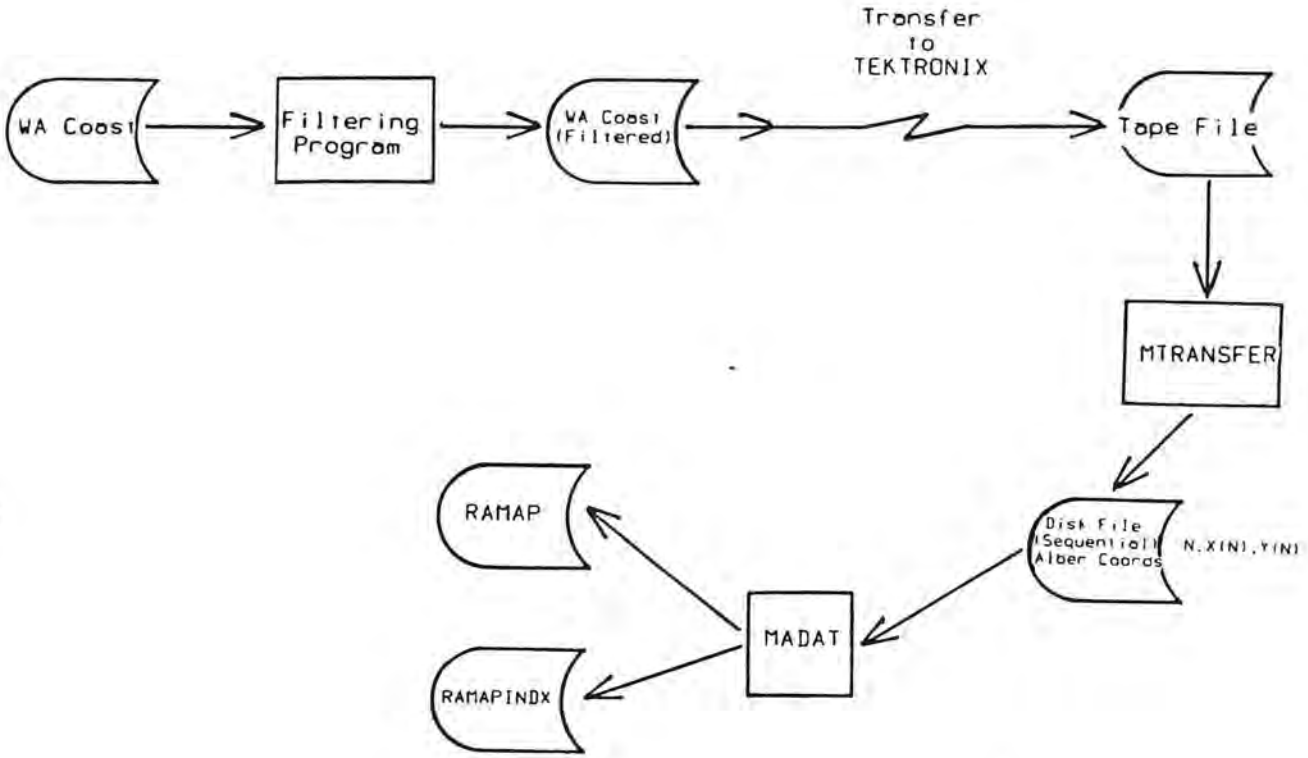


Fig. 5.4 Coastline Coordinate Processing

document, steps one to four with the exception that the FLORAPLOT UTILITIES disk should be inserted into drive Ø instead of the FLORAPLOT disk. Then type in the following command

OLD "MADAT"

Remove the UTILITIES disk and insert and mount the FLORAPLOT disk into drive Ø Then type

RUN

The program prompts for the operator to insert the disk containing the sequential coastline data into drive 1.

The program then prompts with

<TEK> NO. OF POINTS PER SECTION

A section is the size of the buffer that contains the map data in the TEKTRONIX memory. If the buffer is too large the memory capacity of the TEKTRONIX may be exceeded when the FLORAPLOT program is plotting the coastline. If it is too small then I/O times become unacceptably large. Experience has shown that a value of 10 points per section is a good compromise.

At this point the program executes its first phase - Sectioning the data and writing it to a random access file. When this phase is complete the program halts temporarily and prints the message

<TEK> TYPE: 'RUN 1000' THEN RETURN TO CREATE INDEX

Type in as required. The program then enters the second phase - index creation.

At this point the screen is paged and the W.A. coastline is plotted. Then, in the top left hand corner of the screen, the following prompt is issued:

<TEK> NO. OF WINDOWS

This refers to the number of rectangles the coast is to be divided into. Figure 5.5 shows an example.

After entering the number of windows to be used the program then waits for the operator to enter them.

Once the cross hairs appear, enter the windows as follows:

(1) Position the intersection of the cross hairs at the top left corner of the desired window. Press the 'RETURN' button. At this a point will be drawn at the cross hair intersection.

(2) Reposition the cross hairs at the bottom right hand corner of the desired window. Press the 'RETURN'

NO. OF WINDOWS 20
INPUT WINDOWS

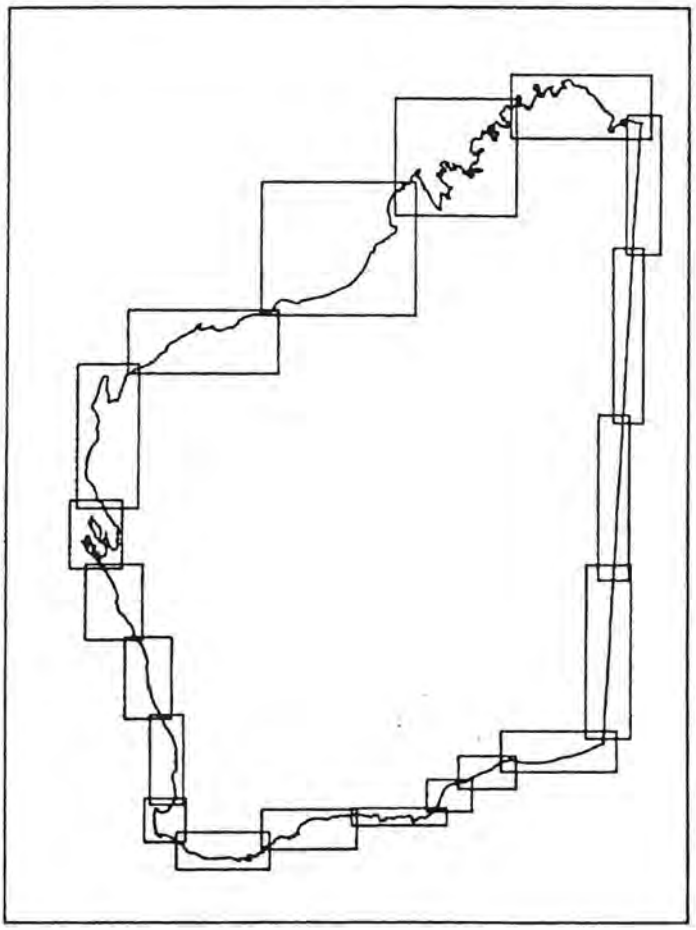


Fig. 5.5 Indexing The Coastline

button. At this the window selected will be drawn on the screen. The next window should now be entered once the cross hairs have re-appeared.

(3) Continue the process until all of the windows have been entered in.

Note: The windows should be entered anti-clockwise. The first window should include the top right corner of the coast. The last window should also include that point.

Adjacent windows should overlap slightly to ensure that all coordinates are covered.

Once the entry of windows is complete the program prints the contents of the index as shown in Figure 5.6.

1813	10	3	20	
-20	-8	-4	-16	1
-34	-11	-20	-25	10
-50	-21	-32	-37	27
-66	-36	-48	-44	35
-72	-43	-64	-60	40
-72	-50	-66	-67	48
-71	-67	-64	-76	81
-66	-75	-60	-85	90
-63	-85	-50	-95	99
-63	-95	-50	-100	111
-60	-99	-40	-104	120
-50	-96	-38	-101	134
-30	-96	-28	-98	147
-30	-92	-25	-96	158
-26	-90	-20	-94	163
-21	-87	-8	-92	169
-12	-67	-6	-88	178
-10	-40	-7	-68	179
-8	-20	-5	-50	180
-7	-13	-3	-30	181
-7	-13	-3	-30	182

Fig. 5.6 Index Contents

APPENDIX 1 Flora Data Format

This appendix describes the format of flora data as transferred from the CYBER to a TEKTRONIX tape. This is the format that is required by DTRANSFER to read and reformat the data into an indexed format.

Referring to Figure A1.1, the flora data file consists of two types of records.

(a) The header record. This is the first record and there is only one header record. It contains four ten-character values indicating the size of the data to follow.

(b) Flora records. These records start after the one and only header record. These records are sorted using the first seven characters as the sort key. This corresponds to being sorted by species code.

Data Format on Tape

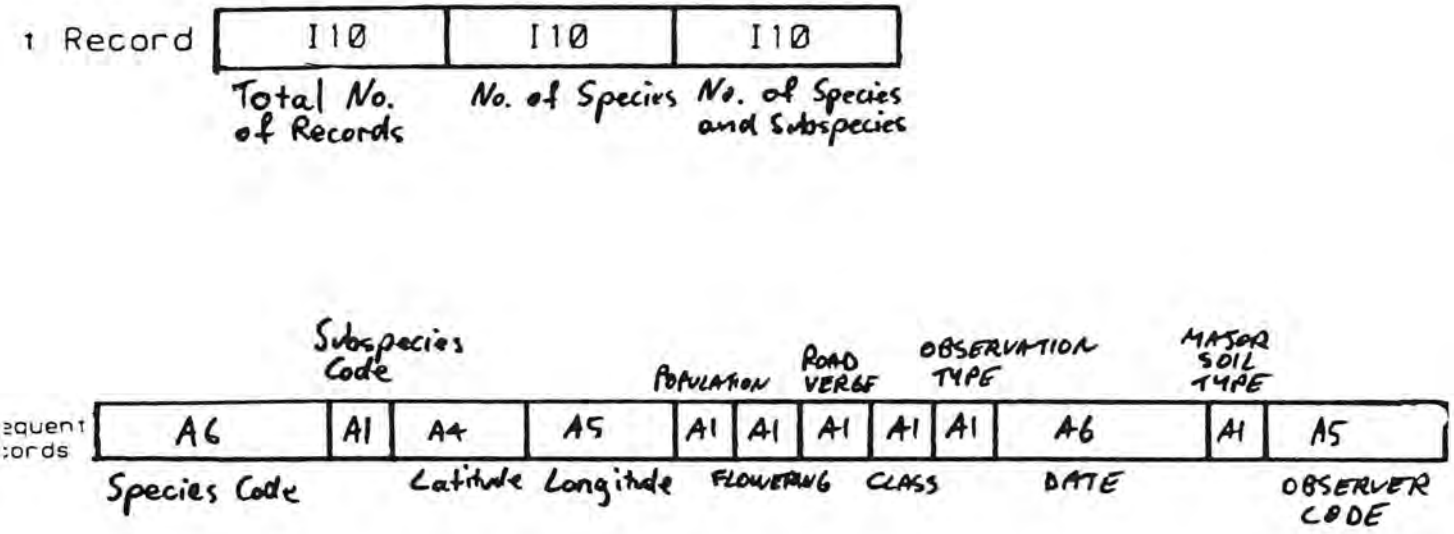


Fig. A1.1 Flora Data Format

APPENDIX 2 Coastline Data Format

The coastline data should arrive as a series of data pairs. The format is shown in Figure A2.1.

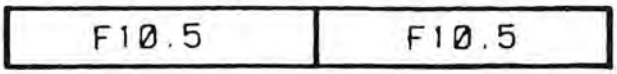


Fig. A2.1 Coastline Data Format