CREATING A **FHX** DATA FILE
USING SPREADSHEET SOFTWARE AND A TEXT EDITOR

The programs FHX2 and FHAES require that injury data be input in a very specific format. It is rather idiosyncratic due to the nature of the data and memory requirements for the computations. FHX2 has its own data entry module that is relatively easy to use: FENTER3 (if you would like to use this application, please download it from the FHAES website at: http://frames.nbii.gov/fhaes/download/tools/FENTER3.EXE, or you can obtain the full FHX2 program at: http://www.forestresearchtools.com/fhx2.html); however, for convenience of entry, visualization, and editing, using a spreadsheet and a text editor to prepare data files for FHX2 and FHAES is also a good option. Our examples are in Microsoft Excel© and Notepad© but any spreadsheet software and text editor with similar functionality should work. The example files shown in this document are available at: http://frames.nbii.gov/fhaes/download/samples/samples.zip.

This approach was developed originally by Dr. Emily Heyerdahl[1]. Mr. David Wright[2] developed the first version of this explanatory document, which was further revised by Dr. Elaine Kennedy Sutherland[2]. We hope to acquire the resources to develop a data entry and editing module in FHAES. Please visit the FHAES website at: http://frames.nbii.gov/fhaes/ for the latest release and most up to date information on FHAES.

Please read Chapter 2 of Dr. Henri Grissino-Mayer's User's Manual:
http://web.utk.edu/~grissino/downloads/fhx2_manual.pdf
before entering data. Dr. Grissino-Mayer[3] is the technical expert regarding FHX data and the format of FHX data files.

[1] US Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory, Missoula, Montana, USA.
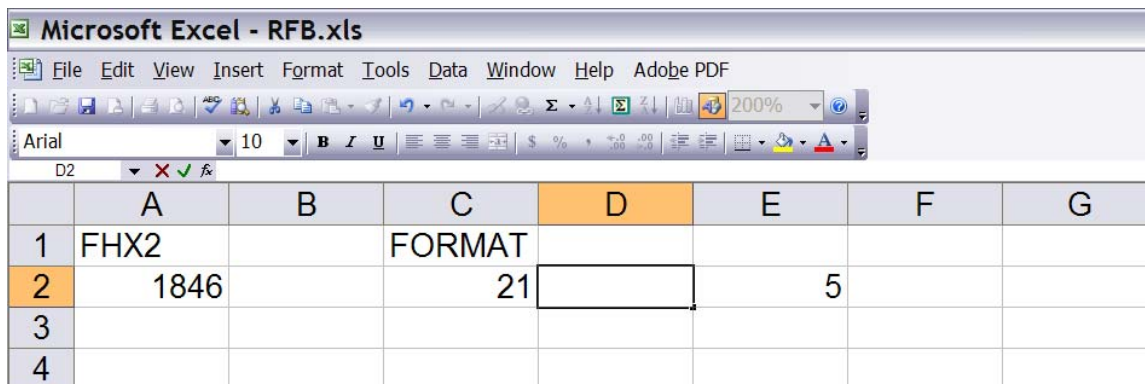[2] US Forest Service, Rocky Mountain Research Station, Forestry Sciences Laboratory, Missoula, Montana, USA.
[3] Department of Geography, University of Tennessee, Knoxville, Tennessee, USA.

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Dr. Elaine Kennedy Sutherland at esutherland@fs.fed.us

In your spreadsheet you are creating the "data matrix" referred to in Dr. Grissino-Mayer's FHX2 manual:

1. Open a new spreadsheet file and save it.
2. Create the header:
   a. In cells A1 and C1 type, respectively, FHX2 and FORMAT.
   b. In cells A2, C2, and E2 type, respectively:
      i. earliest inner year from all of the samples for this data set (here, it is 1846)
      ii. total number of samples in the data set (here, we have 21)
      iii. maximum number of characters that make up the label of each sample (here, it is 5).
   c. In cells B1, B2, and D2 type one blank space (" ").
   d. Save the file.

Microsoft Excel - RFB.xls

File Edit View Insert Format Tools Data Window Help Adobe PDF

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D2
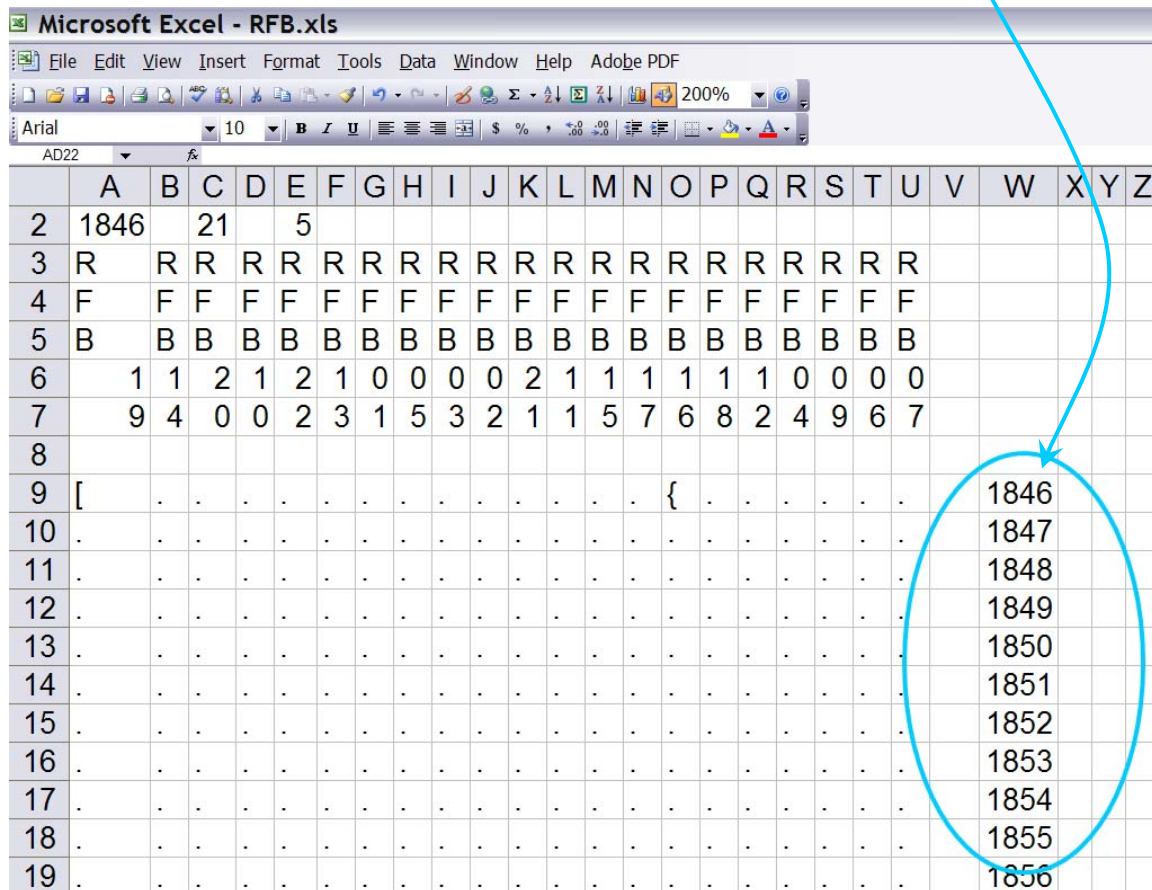
	A	B	C	D	E	F	G
1	FHX2		FORMAT				
2	1846		21		5		
3							
4							

3. Label each sample.
   a. NOTE: here we have narrowed the column widths to help view the worksheet.
   b. In as many columns as you have samples, type in the labels. As you see, we have 21 samples. They do not need to be in numerical order.
   c. Make sure that all the cells of each row within the label of each sample contain characters.
   d. For those samples that have less than the maximum number of label characters, enter spaces (" ") into these empty cells. This avoids format output errors when you import the file into FHX2.
   e. Leave a blank row after the labels:

Microsoft Excel - RFB.xls

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A8

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W
1	FHX2		FORMAT																				
2	1846		21		5																		
3	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R		
4	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F		
5	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B		
6	1	1	2	1	2	1	0	0	0	0	2	1	1	1	1	1	1	0	0	0	0		
7	9	4	0	0	2	3	1	5	3	2	1	1	5	7	6	8	2	4	9	6	7		
8																							
9																							
10																							

4. For visual ease of locating years for each sample or "series", create a column of years next to the last series' column, ranging from the earliest to the latest year in the column:

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
2	1846		21		5																					
3	R		R	R		R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R				
4	F		F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F				
5	B		B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B				
6		1	1	2	1	2	1	0	0	0	0	2	1	1	1	1	1	1	0	0	0	0				
7		9	4	0	0	2	3	1	5	3	2	1	1	5	7	6	8	2	4	9	6	7				
8																										
9	[	.	.	.	.	.	.	.	.	.	.	.	.	{	.	.	.	.	.	.		1846			
10	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.		1847			
11	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.		1848			
12	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.		1849			
13	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.		1850			
14	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.		1851			
15	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.		1852			
16	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.		1853			
17	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.		1854			
18	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.		1855			
19	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.		1856			

…. etcetera

Table 1. Symbols used in the FHX2 data format and their explanations.

[pith date, the very inside date possible on the tree

]   bark date, the very outside date possible on the tree

{   the innermost date possible on the tree – pith is not present

}   the outermost date possible on the tree – bark is not present

.   a "null" year – a dated tree ring for which no information on fire history is available, *e.g.,* the ring formed prior to the initial scarring event

| a "recorder" year – a dated tree ring that formed after the initial scarring event, but contains no scar

D,d   a fire scar (uppercase) or injury (lowercase) situated in the dormant position, between the previous years's latewood and the current year's earlywood

E,e   a fire scar (uppercase) or injury (lowercase) situated in the early (one-third) portion of the earlywood

M,m   a fire scar (uppercase) or injury (lowercase) situated in the middle (one-third) portion of the earlywood

L,l   a fire scar (uppercase) or injury (lowercase) situated in the latter (one-third) portion of the earlywood

A,a   a fire scar (uppercase) or injury (lowercase) situated in the latewood

U,u   a fire scar (uppercase) or injury (lowercase) for which the position could not be determined

5. Begin entering data for each sample within a column using the standard characters as used by the FHX2 program (explained in Grissino-Mayer's manual and summarized on the manual's page 70, Table 1):

    a. In each series column locate the row of the year and mark the inner/pith year, the injury years, recorder years, and outer/bark year.
        i. "[" is the symbol for a pith year
        ii. "{" is the symbol for the innermost year, when the pith date is unknown.

Microsoft Excel - RFB.xls

File Edit View Insert Format Tools Data Window Help Adobe PDF

Arial — 10 — B I U | $ % | 150%

AC13

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y
1	FHX2		FORMAT																						
2	1846		21		5																				
3	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R				
4	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F				
5	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B				
6	1	1	2	1	2	1	0	0	0	0	2	1	1	1	1	1	1	0	0	0	0				
7	9	4	0	0	2	3	1	5	3	2	1	1	5	7	6	8	2	4	9	6	7				
8																									
9	[												{										1846		
10																							1847		
11																							1848		
12																							1849		
13																							1850		
14																							1851		

b. Continue to add data, using appropriate symbols for seasons when the tree was injured; if seasons are unknown or were not evaluated, then enter "U" (for fire scar) or "u" (for scar of unknown origin).

Middle-earlywood fire scar

Dormant season fire scar

Season undetermined scar origin unknown

Row																		Year
91																		1928
92	D														u			1929
93																		1930
94					D			D										1931
95							D									D	D	1932
96				M					D									1933
97							D							u				1934
98										D								1935
99																		1936
100																		1937
101		u										u						1938
102																		1939
103																		1940
104		u																1941
105																		1942
106																		1943
107		U																1944
108																		1945
109									U									1946
110										D								1947
111																		1948

Fire scar but season undetermined

c. Once all data is entered for all series, block the data section and use the find- and-replace function to replace all blank cells with a period.

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA
1	FHX2		FORMAT																								
2	1846		21		5																						
3	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R						
4	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F						
5	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B						
6	1	1	2	1	2	1	0	0	0	0	2	1	1	1	1	1	1	0	0	0	0						
7	9	4	0	0	2	3	1	5	3	2	1	1	5	7	6	8	2	4	9	6	7						
8																											
9	[															{							1846				
10																							1847				
11																											
12																											
13																											
14																											
15																											
16																											
17																											
18																											
19																							1856				
20																							1857				

Find and Replace ? X

Find | Replace

Find what:

Replace with: .

Options >>

Replace All | Replace | Find All | Find Next | Close

6. For each series, put in the vertical line "|" (also known as the "pipe" symbol or "Shift \") in years when the tree is recording fires:
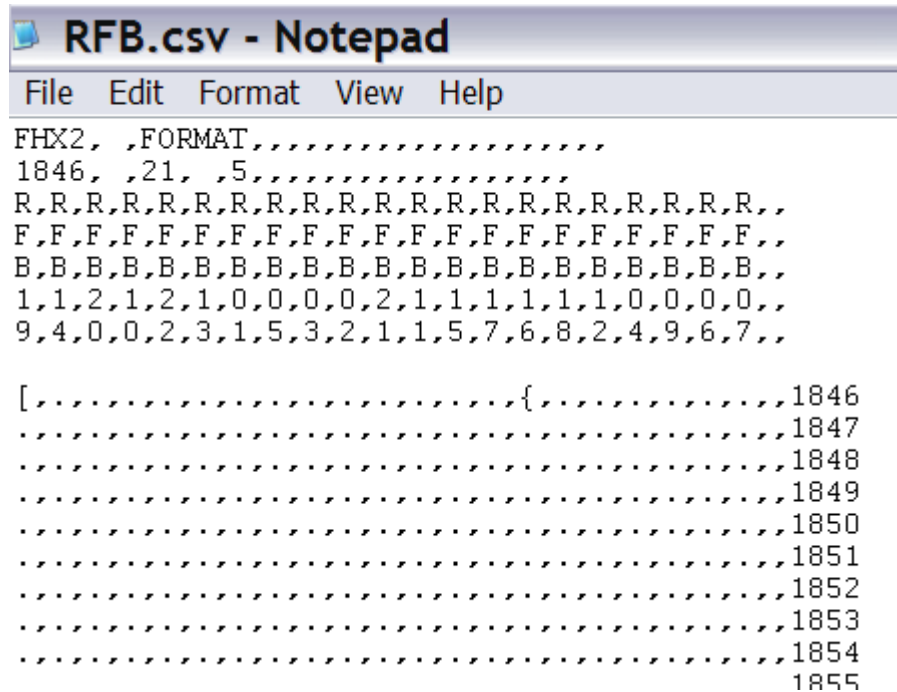
94	|	| |	.	.	| |	D	.	.	.	D	.	.	.	.	.	.	.	.	.	.	.	.							1931
95	|	| |	.	.	| |	|	.	.	.	D	.	.	.	.	.	.	.	.	.	.	D	D			1932
96	|	| |	.	M |	|	.	D	|	.	.	.	.	.	.	.	.	.	.	.	.					1933
97	|	| |	.	|	| |	D	|	|	.	.	.	.	.	.	.	u	.	.	.					1934
98	|	| |	.	|	| |	|	|	|	.	D	.	.	.	.	.	.	.	.	.					1935
99	|	| |	.	|	| |	|	|	|	.	.	.	.	.	.	.	.	.	.	.					1936
100	|	| |	.	|	| |	|	|	|	.	.	.	.	.	.	.	.	.	.	.					1937
101	|	| |	u	|	| |	|	|	|	.	.	.	.	.	u	.	.	.	.	.					1938
102	|	| |	.	|	| |	|	|	|	.	.	.	.	.	.	.	.	.	.	.					1939
103	|	| |	.	|	| |	|	|	|	.	.	.	.	.	.	.	.	.	.	.					1940
104	|	| |	u	|	| |	|	|	|	.	.	.	.	.	.	.	.	.	.	.					1941
105	|	| |	.	|	| |	|	|	|	.	.	.	.	.	.	.	.	.	.	.					1942
106	|	| |	.	|	| |	|	|	|	.	.	.	.	.	.	.	.	.	.	.					1943
107	|	| |	U	|	| |	|	|	|	.	.	.	.	.	.	.	.	.	.	.					1944
108	|	| |	|	|	| |	|	|	|	.	.	.	.	.	.	.	.	.	.	.					1945
109	|	| |	|	|	| |	|	|	|	.	.	U	.	.	.	.	.	.	.	.					1946
110	|	| |	|	|	| |	|	|	|	.	.	.	.	D	.	.	.	.	.	.					1947
111	|	| |	|	|	| |	|	|	|	.	.	.	.	.	.	.	.	.	.	.					1948
112	|	| |	|	|	| |	|	|	|																1949

Etcetera, to the end of recording years.

Please note: Many fire historians (see Manual) fell that the tree is not "recording fires" (forming scars readily) until it has been scarred at least once and is "fire susceptible." This is probably true in high-frequency low-intensity fire regimes, such as many ponderosa pine forests. In this case, the pipe symbol (indicating that the tree is recording) is inserted in non-fire years after the first fire, as is shown here. Other researchers feel that some trees can be recorders of fire throughout most of their lives, and the pipe symbol follows immediately after the beginning year bracket, such as for lodgepole pine in the northern (US) Rockies. Stand age data will usually be helpful in determining which recording period is appropriate, because period of fire record can influence the fire regime statistics.

7. Finally, save the file as a ".csv" (comma delimited file). In this case, "RFB.csv"

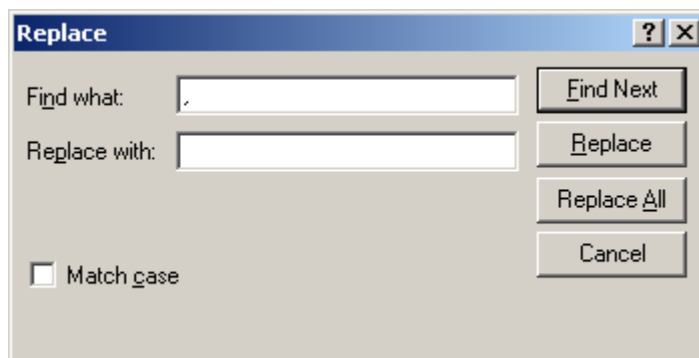**In your text editor you will now transform the ".csv" file into an ".fhx" file:**

1. Open your text editor, and then open the ".csv" file you created in the spreadsheet.

```
RFB.csv - Notepad
File  Edit  Format  View  Help
FHX2, ,FORMAT,,,,,,,,,,,,,,,,,,,
1846, ,21, ,5,,,,,,,,,,,,,,,,,,
R,R,R,R,R,R,R,R,R,R,R,R,R,R,R,R,R,R,R,R,R,,
F,F,F,F,F,F,F,F,F,F,F,F,F,F,F,F,F,F,F,F,F,,
B,B,B,B,B,B,B,B,B,B,B,B,B,B,B,B,B,B,B,B,B,,
1,1,2,1,2,1,0,0,0,0,2,1,1,1,1,1,1,0,0,0,0,,
9,4,0,0,2,3,1,5,3,2,1,1,5,7,6,8,2,4,9,6,7,,

[,..,.,..,..,.,..,.,..,.,..,.,..,{,..,.,..,.,..,,1846
..,.,..,.,..,.,..,.,..,.,..,.,..,.,..,.,..,.,..,,1847
..,.,..,.,..,.,..,.,..,.,..,.,..,.,..,.,..,.,..,,1848
..,.,..,.,..,.,..,.,..,.,..,.,..,.,..,.,..,.,..,,1849
..,.,..,.,..,.,..,.,..,.,..,.,..,.,..,.,..,.,..,,1850
..,.,..,.,..,.,..,.,..,.,..,.,..,.,..,.,..,.,..,,1851
..,.,..,.,..,.,..,.,..,.,..,.,..,.,..,.,..,.,..,,1852
..,.,..,.,..,.,..,.,..,.,..,.,..,.,..,.,..,.,..,,1853
..,.,..,.,..,.,..,.,..,.,..,.,..,.,..,.,..,.,..,,1854
                                                  1855
```

2. The process of creating the ".csv" file put in all the commas, so use the find and replace option and replace all "," (commas) with a blank " " (i.e. null value).

```
Replace                                    ? X
Find what:     [,]                    Find Next
Replace with:  [           ]          Replace
                                      Replace All
                                      Cancel
□ Match case
```

Which produces the following:

```
RFB.csv - Notepad

File   Edit   Format   View   Help

FHX2    FORMAT
1846    21    5
R R R R R R R R R R R R R R R R R R R R R
F F F F F F F F F F F F F F F F F F F F F
B B B B B B B B B B B B B B B B B B B B B
1 1 2 1 2 1 0 0 0 0 2 1 1 1 1 1 1 0 0 0 0
9 4 0 0 2 3 1 5 3 2 1 1 5 7 6 8 2 4 9 6 7

[ . . . . . . . . . . . . . . . { . . . . . .   1846
  . . . . . . . . . . . . . . . . . . . . . .   1847
  . . . . . . . . . . . . . . . . . . . . . .   1848
  . . . . . . . . . . . . . . . . . . . . . .   1849
  . . . . . . . . . . . . . . . . . . . . . .   1850
  . . . . . . . . . . . . . . . . . . . . . .   1851
  . . . . . . . . . . . . . . . . . . . . . .   1852
  . . . . . . . . . . . . . . . . . . . . . .   1853
  . . . . . . . . . . . . . . . . . . . . . .   1854
  . . . . . . . . . . . . . . . . . . . . . .   1855
  . . . . . . . . . . . . . . . . . . . . . .   1856
  . . . . . . . . . . . . . . . . . . . . . .   1857
  . . . . . . . . . . . . . . . . . . . . . .   1858
```

3. Finally, give a visual check to make sure that there are no data placement anomalies, and then save it.

4. Rename the file with an extension of ".fhx" (e.g., RFB.fhx). It is now ready for use in FHX2 or FHAES. (NOTE: some text editors or operating systems may try to append an extra ".txt" extension to the file, or give you an error message about changing the file extension - so be sure that the file has only one extension, and that it is ".fhx".)

5. We suggest you place the data file in a directory near the FHAES or FHX2 program. For instance, if the FHAES program is in a directory called "c:\FHAES" then you might want to put it in a directory called "c:\FDATA" (directory name must be shorter than 8 characters!)

In your text editor you will enter the site information (optional):

Although the site information is not required by the FHX2 or FHAES programs in order to process a data file, it is strongly recommended that this important metadata be included. The site information is placed in the first 30 lines of the FHX files, with one line for each of the following items, in the following order (maximum character limits are listed in parentheses): Name of site(70), Site code(3), Collection date(20), Collectors(70), Crossdaters(70), Number samples(3), Species name(70), Common name(70), Habitat type(70), Country(20), State(15), County(30), Park/Monument(40), National Forest(40), Ranger district(25), Township(5), Range(5), Section(2), Quarter section(6), UTM easting(20), UTM northing(20), Latitude(15), Longitude(15), Topographic map(30), Lowest elev(4), Highest elev(4), Slope(10), Aspect(5), Area sampled(10), Substrate type(70).

Comments may be added following the site information by including the line "Begin comments BELOW this line:" directly below the site information. Up to 80 lines of comments (each with a character limit of 70) can then be added, followed by the line "End comments ABOVE this line:".

The site information can be entered using any text editor. Each line of the site information begins with the appropriate label, followed by a colon (NOTE: the labels are all a fixed width of 16 characters, with trailing spaces between the field name and the colon when necessary).

1. Open your text editor, and add lines with the appropriate label for the site information.

```
siteinfo.txt - Notepad
File  Edit  Format  View  Help
Name of site    :
Site code       :
Collection date:
Collectors      :
Crossdaters     :
Number samples  :
Species name    :
Common name     :
Habitat type    :
Country         :
State           :
County          :
Park/Monument   :
National Forest:
Ranger district:
Township        :
Range           :
Section         :
Quarter section:
UTM easting     :
UTM northing    :
Latitude        :
Longitude       :
Topographic map:
Lowest elev     :
Highest elev    :
Slope           :
Aspect          :
Area sampled    :
Substrate type  :
Begin comments BELOW this line:
End comments ABOVE this line.
```

2. Enter the appropriate site information on each line.

3. Copy the site information and paste it into the beginning of your FHX data file. Be sure to include a single blank line after the site information and before the start of the data matrix (i.e., the line that says "FHX2 FORMAT").

RFBSITE.fhx - Notepad

File Edit Format View Help

```
Name of site    : Name of the site - RFB example site.
Site code       : RFB
Collection date: Date(s) of collection
Collectors      : Name(s) of collectors
Crossdaters     : Name(s) of daters
Number samples  : 5
Species name    : Latin name of species sampled
Common name     : Common name of species sampled
Habitat type    : Type of habitat at site
Country         : Name of country
State           : Name of state
County          : Name of county
Park/Monument   : Name of National Park or Monument
National Forest: Name of National Forest
Ranger district: Name of Ranger District
Township        : UNK
Range           : UNK
Section         : UNK
Quarter section: UNK
UTM easting     : UNK
UTM northing    : UNK
Latitude        : UNK
Longitude       : UNK
Topographic map: Topo map containing site
Lowest elev     : UNK
Highest elev    : UNK
Slope           : UNK
Aspect          : UNK
Area sampled    : UNK
Substrate type : Type of substrate at site
Begin comments BELOW this line:
Up to 80 lines of comments may be included here.
UNK has been used in the above lines where the character limits for
the field are too short to allow for an expanded description.
End comments ABOVE this line:

FHX2 FORMAT
1846 21 5
RRRRRRRRRRRRRRRRRRRRR
FFFFFFFFFFFFFFFFFFFFF
BBBBBBBBBBBBBBBBBBBBB
112121000021111110000
940023153211576824967

[.............{...... 1846
.................... 1847
.................... 1848
.................... 1849
```