USDA – Natural Resources Conservation Service
Office of Farmland Protection and Community Planning

User Manual for LESA-CALES:

Computer-Assisted Land Evaluation System

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1   Acknowledgements

necessary knowledge and assistance in accessing the NASIS soils database. Her knowledge of the database structure and queries was invaluable. A thank you also goes to Sherri Martinez for creating this CALES User Manual. For my part, I provided analysis, guidance, and review during the CALES development process.

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2   Introduction to the LESA-CALES System

2.1   Background

The Computer-Assisted Land Evaluation System (CALES) is an outgrowth of the NRCS Agricultural Land Evaluation and Site Assessment (LESA) program. The LESA program is designed to determine the relative quality of land for agricultural uses, including their economic viability. The CALES system is designed to be an aide in obtaining the necessary soils information and doing the calculations for the land evaluation part of LESA. The CALES system does not include the site assessment part.

A user should be familiar with the Land Evaluation part of the LESA handbook and the Soil Potential section of the NRCS National Soil Survey Handbook before running the CALES system.

In agricultural land evaluation, soils are rated from the best to the worst for a specific agricultural use based on an indicator crop. A relative value is determined for each group based on the cost of overcoming soil production limitations. The group with the highest relative value, the best for agricultural use, is assigned a value of 100 and all other groups are assigned lower values. The land evaluation is based on soils data from the National Cooperative Soil Survey, local conservation practice and economic information.

Before this program can be run on a county, the soil map unit data must be available. The soils must be mapped and a certified map unit legend must be available in the NRCS NASIS database.

2.2   NASIS Soil Survey Database

The soil survey data used in this implementation of CALES is accessed from the NRCS NASIS database. This NASIS database is used by soil scientists to manage the data for soil surveys from all parts of the country, but was not originally intended to be directly used for access by national programs, such as CALES. The variations among the different regions in managing their soil survey data sometimes makes consistently retrieving the proper data for a national purpose very difficult.

The CALES program has the following NASIS data requirements. The soil survey data retrieved must be stored as "Non-MLRA Soil Survey Area" legends under the "NSSC Pangaea" database name. Legends retrieved must be marked with a "legend suitability for use" of 2, meaning that the legend is ready for use. For the retrieval of county data, the legend area overlap table and the map unit area overlap table must be properly and completely populated for the county selected. Otherwise no map units can be retrieved for the county. The overlap acres must also be entered in the map unit area overlap table, or CALES acres will be missing.

If the county or survey area you want to process with CALES is not available from the NASIS database, or if the data retrieved appears to be incomplete or incorrect, contact the NRCS state soils staff to discuss your CALES needs and the status of the data. The above description may not mean much to many CALES users, but will be useful in discussions with the NRCS soils staff.

In the future, the CALES system will likely access soils data from the NRCS soils distribution warehouse, which should simplify data access and consistency. But that system is not yet developed.

2.3   Overview of the CALES Web System

The current version of CALES has been developed with a web user interface, which can be accessed at the following URL "http://www.nrcs.usda.gov/fpcp/cales/". It is designed for use by those within NRCS having land evaluation responsibilities, as well as others interested in the land evaluation process.

Certain information must be known and entered into the CALES system to perform the land evaluation portion of LESA and to determine soil potential. Prior to beginning a CALES web session, you should have the following information available:

1. County or area to be evaluated.

2. List of important farmland soils of local and state significance.

3. Identified soil limitations.

4. Conservation measures needed to overcome identified soil limitations and their related annual costs.

5. Strategy for defining agricultural groups of soils based on characteristics of land capability class, important farmland and productivity index.

When using the CALES web system, you should follow the CALES steps in order to properly complete the land evaluation process. Some steps may be skipped if they are not useful for the particular evaluation. At any time in the CALES process, you may save your work and then, if desired, come back to it at a later time.

At the beginning of a CALES session, you will be asked to enter a userid and password. You can select whatever userid and password you would like, as long as they are unique to CALES. This same userid and password should be used each time you come into CALES. These are used in saving files and in later retrieving saved files. Do not forget the userid and password you have chosen. Saved files will be kept for six months, after which time they will automatically be deleted. Userids and passwords will be removed if no saved files remain.

The CALES program creates and utilizes two different worksheets. Worksheet #1 is a list of the soil map units for the selected area. This list is edited in various ways as part of the CALES process. Worksheet #2 is the final result of the CALES process, showing acreage totals and relative value for the various agricultural groups. Final CALES results for a county will provide the information needed to fill out the soils portion of FPPA Form 1006.

2.4   Getting Help

Help in understanding and using the CALES system is available both in the user's manual and in the on-line help screens in the program. CALES questions can also be directed to Cheryl Simmons, NRCS Office of Farmland Protection and Community Planning (202-720-8890 or

cheryl.simmons@usda.gov), Ray Sinclair, NRCS National Soil Survey Center (402-437-5699 or ray.sinclair@nssc.nrcs.usda.gov), or Harvey Terpstra, Iowa State University, Statistical Laboratory (515-294-8177 or hpterp@iastate.edu).

2.5   *Important NRCS Sources of Information*

The detailed land evaluation procedure is in the "*National Agricultural Land Evaluation and Site Assessment Handbook*, 310-IV. Issue 1" issued by NRCS (formerly SCS) February 3, 1983, and in "*Soil Potential Ratings*", National Soil Survey Handbook, Section 621, issued by NRCS July 2001.

Please read the land evaluation part of the national LESA handbook and the soil potential part of NSSH before you run this program. This CALES computer assisted procedure follows the same steps that appear in the national LESA handbook, once logging in procedures are completed. Details about particular steps are given in the user's manual and the on-line help screens.

3   Selecting an Area for CALES Processing

After logging into the CALES system, you must first select the county or survey area for CALES processing. You have the option of selecting a file for a previously saved area or of selecting a new county or survey area from the soil survey database.

The initial screen for this selection process presents a listing of the county or survey area files, if any, that you previously created and saved in CALES. If you have not previously saved any files, no list is presented. Any of these saved files can be retrieved if you want to do further work on them or want to review the previous results. You also have the option to remove selected saved files if you choose to do so.

If you want to select a new county or survey area for CALES processing, this initial screen asks you to select one or more states from the scrollable state list and then also to designate whether you want to select county data or survey area data. That distinction may not be clear to many users, but does significantly effect how data is retrieved from the soils database. CALES land evaluations will normally be done by county. Under special land evaluation circumstances or when the county data is not available in the soils database, it may sometimes be useful to select survey area data. Thus, the survey area option is made available.

As stated above, this initial selection screen asks you to select a state in which your land evaluation is located. The next selection screen will present a list of counties or survey areas available in the soils database for the selected state. You have the option of selecting more than one state from the list provided, if your land evaluation area crosses state boundaries. To select multiple states from the list, you may need to hold down the control key while clicking on the state names.

Note that the options to retrieve or remove saved files or to select new county or survey area data are mutually exclusive. You can only select one of the four options.

Following your selection of options, you must then click on the "Continue" button to continue.

4 Selecting a County or Survey Area

Once the state containing your land evaluation area has been selected, you are presented with another screen displaying a scrollable list of counties or survey areas available for the state in the soil survey database. If more than one state was selected, you will see a list of counties or survey areas for each selected state.

Select a county or survey area from the list displayed. Multiple counties or survey areas may be selected to be combined and evaluated as a single larger area for CALES processing. You may need to hold down the control key while clicking to select multiple entries.

A maximum of eight counties or survey areas can be selected. Also a maximum of 2000 map units can be processed in a CALES run. If these maximums are exceeded, the program will advise you of the problem and then ask for fewer counties or survey areas.

If the county or survey area you want to process does not appear in the county or survey list for a state, or no map unit data is returned for the area chosen, then the soil survey database does not contain certified data for that area. Contact the NRCS state soils staff to discuss your CALES data needs and the status of the data.

Click on the "Continue" button to continue.

5 County/Survey Area Indicator Information

If you have selected more than one county or survey area, you are required to enter a short, abbreviated name to refer to this set of counties or survey areas. This name is used to identify the set of data in displays and saved files. Enter a name of up to eight alpha-numeric characters, without spaces.

This screen also provides for the entering of various county/survey area information needed during CALES processing.

Choose the indicator crop that best represents the measure of soil productivity for the area. The crops shown in the pop-up list are those currently available in the NASIS soils database for the county/survey area selected.

Choose the temperature regime that best applies to the selected area. The pop-up list only displays temperature regimes applicable to the map units in the selected area.

The wind erosion "C" factor is an indication of the susceptibility of an area to wind erosion. For CALES, whole number entries are used. Enter a value between 1-200 from the most susceptible month. If wind erosion is not a problem in the selected area, enter a small number such as 5, which is the default value if no entry is made.

Is irrigation water generally available and used in the selected area? Select "yes" or "no" from the selection box. The CALES default is "no".

In the soils database, soil map units are often made up of more than one type of soil, called components of the map unit. The CALES program attempts to use only the named or major components by using only those components making up 15% or more of the map unit acreage.

The CALES user can choose to enter a different percentage number to be used for selecting map unit components, if desired. The default value is 15% if no entry is made.

After making your entries, click on the "Continue" button to continue.

6 CALES Command Center Menu

Upon entering the CALES program, you had to identify a state and then a county or survey area within that state. You then had to additionally select an indicator crop, a temperature regime, etc., after which you arrived at this main CALES menu.

This is the "CALES Command Center" menu. All operations are initiated from this menu, and you will return to it at the completion of the options listed. Four of the menu options lead to submenus. You will stay within the submenus until you exit from them, whereupon you will return to this menu.

Because the CALES web-based program is not continuously connected to any server, your session must maintain several temporary files to hold data while you work. You will periodically see references to "tmp" files being written. These notes are assurances to you that your data is being correctly maintained. See the section on "Temporary Files in Web CALES" for a more detailed explanation about the temporary files. When you have completed your processing with CALES, the "Quit CALES" option closes and removes these temporary files. We therefore ask that you select Quit when you are finished to properly exit a CALES session. Also, if you want to save your data for future reference, be sure to use the save option before quitting.

As you run the various steps in the CALES system, you will have menu selections and a "Continue" button at the bottom of every page. This is how you will navigate through the system.

CALES reports can be printed or downloaded by using the print or save options of your web browser while the report is displayed on the screen. See the section "Printing or Downloading CALES Reports" for more detailed information.

CALES Help Screen information is included in this CALES User Manual. To print selected Help information directly from the screen, use the copy/paste function (highlight Help text and then right-click the mouse and select the Copy option) to copy the Help screen information into a word processor document from which it can be printed.

The Command Center menu is as follows:

○ List Worksheet #1	○ Determine Important Farmland	○ Help
○ Sort Worksheet #1	○ Conservation Yield Adjustments	○ List stored files/Start over
○ Edit Worksheet #1	○ Group Soils of Worksheet #1	○ List Prime Farmland
○ Save Worksheet #1	○ Generate Worksheet #2	○ Quit CALES

Click on "Continue" to continue.   [Continue]

The following is a brief description of each menu item. See the following manual sections for a more detailed explanation of each function.

The **List Worksheet #1** option presents you with the list of map unit records as obtained from the NASIS database for the county or survey area that you specified. The listing will occur in whatever sort order you have selected.

The **Sort Worksheet #1** option enables you to determine the order of the map units. The default sort order is by Land Capability Classification (LCC). Other sort orders are by PI (Productivity Index), map unit symbol and map unit name.

The **Edit Worksheet #1** option provides a menu with a set of options to edit the map unit data. You can change the data values of the map unit records shown in Worksheet #1 or you can add and delete map unit records. See Help under "Edit Worksheet #1" for a limitation in adding map unit records.

The **Save Worksheet #1** option enables you to save the map unit records for later access and processing. The save retains whatever state the records are in, as determined by sorting or editing or further processing (see the next two menu items). That is, the save option saves the map unit data with all of the changes made up to the point of the save. Use the save option often as you progress through the CALES process to avoid accidentally losing your work.

The **Determine Important Farmland** option provides a menu with a set of options enabling you to specify Important Farmland criteria for statewide and local farmland. You can then apply these criteria to the soil map unit records to determine whether any of the non-prime soils qualify for statewide or locally important status.

The **Conservation Yield Adjustments** option provides a menu with a set of options enabling you to adjust map unit yields based on the cost of needed conservation measures to overcome the soil limitations.

The **Group Soils of Worksheet #1** option provides a menu with a set of options enabling you to group the soil map unit records of Worksheet #1 into agricultural groups. These groupings are by land capability classification, important farmland (P, S, L, O, U), and productivity index.

The **Generate Worksheet #2** option uses the groups defined in the previous option and groups the soil map units into the designated groups. The result of this grouping is reported as Worksheet #2.

The **Help** option is used to access on-line documentation on how to use this web-based CALES program.

The **List stored files/Start over** option enables you to go back almost to the beginning and restart the program using a different county or survey area. If you go to this screen, which lists your saved county files, you can either just select "Continue" to return to the current county/survey area set of soils records, select one of your saved files, or select a state to reinitiate CALES with a different county or survey area. In these latter two choices, the temporary files associated with any previous work will be deleted and the new set of data placed into the tmp file.

The **List Prime Farmland** option enables you to display a list of the current Prime Farmland definitions as stored in the NASIS database.

The **Quit CALES** option deletes your current set of tmp files – thank you for using it and helping clean up the sets of tmp files – and returns you to the CALES introductory/information screen.

CAUTION: If you should use your browser "Back" option after selecting "Quit" and "Continue", your tmp files will have already been deleted. You must either close your browser or go back to the "List stored files/Start over" option and start over.

7 Temporary Files in Web CALES

The web version of CALES, like all web programs, is a stateless facility, meaning that there are no connections to any computer or program when you are accessing it with a browser. Only when you press an action item, like, "Continue", does the browser send the screen contents somewhere for processing. As a result, all data required for processing must be held in temporary files, accessible each time your web program returns to the server. These files are referred to as "tmp" files and you will periodically see references to them as "tmp files" being "written". These messages are assurances to you that your data is being correctly maintained.

When you first enter CALES, you are prompted for a userid and password. The userid is used to identify files for you so that you can save data for later processing. These "saved" files are generally versions of the tmp files. The password authenticates you as the owner of the userid.

Upon further entry to the CALES program, you are also asked to select a county or survey area. When the soils map unit data associated with this county is fetched from the NASIS database, it must be stored for ongoing access and processing by your web requests. This will be your first tmp file.

CALES tmp files are also generated for IF criteria data, adjustment of yield data and the grouping of data for the generation of Worksheet #2. You will not see these files, but only periodic reference to them as being written. If the system cannot find or read one of these files, you will be told so and you may have to quit and start over.

These tmp files are not available between web sessions. Thus "save" options are provided to retain the contents of the files for later processing and/or application. They are saved on a county level basis, i.e., specific to the county you are working on.

When you enter CALES and identify yourself, a list of counties that you have previously saved is displayed. If you choose to retrieve one of these saved counties, the saved map unit list will be brought into your current map unit tmp file. If you also previously saved other tmp file data for this county, such as IF criteria or grouping data, it also can be retrieved into your current session at the appropriate time in the process.

When you are finished using the CALES program, we ask that you select "Quit" to end your session. This will remove the session tmp files and help us keep a cleaner system. Thank you.

8 Printing or Downloading CALES Reports

CALES reports can be printed by simply using the print option of your web browser while the report is displayed on the screen. The CALES reports themselves are presented as preformatted text within the HTML file displayed. If your printed CALES report does not fit nicely within the page width, you will need to check the default setting for fixed-width font size in your web browser.

In Netscape, click on the "Edit" dropdown menu and select "Preferences". In the Preferences menu, click on "Fonts". For good CALES printing, the "fixed width font" should be set to Courier New, size 10. If your size is set to something larger than 10, change it down to 10 and see how that prints. If set to something larger than 10, some reports will be chopped off when printed in normal portrait mode.

In MS Internet Explorer, you can make a similar change by clicking on the "View" dropdown menu and selecting "Text size". The size should be set to "medium". If your text size is set to "larger" or "largest", try setting it down to "medium" for good portrait printing.

Other browsers should have their own option for setting the fixed-width font size.

Another option is to leave your font size larger than we are recommending here and to print the report in landscape mode. That could work as well.

If you want to download and save the CALES report to your local system, you can use the "Save as" option in the "File" dropdown menu. After using the "Save as" option, you may want to edit the saved file to remove the HTML text and formatting tags, leaving only the preformatted CALES report.

9 List Map Units (Worksheet #1)

The List option presents you with the list of map unit records as obtained from the NASIS database for the county or survey area that you specified. This listing format is called CALES Worksheet #1. The default map unit sorting for Worksheet #1 is by land capability class. The user can choose to sort the map units in a different order and then list Worksheet #1 again, if desired.

Typical output is of the form:

```
County/Parish:   Mason, Illinois (IL125)
                 85 map units


Indicator crop:          corn
Temperature Regime:      mesic
C factor:                0.07
System irrigated?:       no
Minimum Component:       15%
```

line no.	map symbl	soil name	slope	lc	NIRR yield	prd ind	i f	acres number	pct
1	198	Elburn silt loam	0–2	1	161	99	1	4,964	1.4
2	43	Ipava silt loam	0–2	1	163	100	1	3,144	0.9
3	36A	Tama silt loam	0–2	1	155	95	1	3,018	0.8
4	199A	Plano silt loam	0–2	1	151	93	1	2,898	0.8
	. . .								
83	30G	Hamburg silt loam	20–60	7e		0	0	708	0.2
84	54E	Plainfield sand	15–30	7s	50	31	0	1,956	0.5
85	W	Water	–	0		0	0	18,313	5.1
								360,510	

- "map symbl" is the map unit symbol

- "slope" is the slope range of the soil map unit

- "lc" is the land capability classification

- "nirr yield" is for non-irrigated yield; irrigated yield would be "irr"

- "prd ind" is the productivity index; it is 100*yield/maxyield

- "if" is the Important Farmland value: 0-10, S, L, U

- "acres number" is the number of acres of that map unit in the county or survey area; "acres pct" is the percentage of the total, which is shown at the end.

Note that there are no yield data nor productivity values for the non-farmland map units.

Note also that the CALES system identifies a problem handling the important (prime) farmland code of 10 because of report column width restrictions. Thus, using an old hexadecimal number convention, the code of 10 is displayed as A in Worksheet #1. We hope this convention causes minimal confusion.

The listing displayed in CALES is by map unit, but some of the data elements shown are generated from the map unit component information as entered in the NASIS database. These component generated data elements are land capability, yield, and productivity index. Map unit component data is selected based on the component percentage in the map unit. In an attempt to use data for the major map unit components, a default component percentage of 15 is used, but you can change this when defining the indicator crop, et al., when entering the program.

Land capability class values for complexes, including urban land complexes, are determined from the dominant capability among the map unit components. The yield and resulting productivity index values are determined by a weighted average yield from the map unit components. The user may edit these values if needed.

When the yield data has been adjusted for conservation measures needed to overcome soil limitations, this "map unit list" display will appear very similar. The conservation adjustment is a yield reduction based on the "cost of conservation". It can be computed based on the selection of various conservation measures, or entered directly as an alternate value. When the

conservation measures/yield adjustment have been applied, the yield column will be headed with the name "adj (n)irr yield". Also, the adjusted map unit records are marked with an asterisk, "*", following the yield data.

When the "Important Farmland" criteria have been applied to the map unit data, a message will appear following the "Minimum Component" line to that effect.

When a county yield value has been entered to rescale the productivity index, a message to that effect is displayed, viz., County yield: ### – productivity index weighted. ### denotes the county yield value entered for the rescaling. This line appears under the "Indicator crop" line, when relevant.

9.1   Important Data Checking Step

After you have listed Worksheet #1 initially, an important step is to check for errors in the soils data. For example, check to make sure all the map units are listed, the acreages are correct, and the yields and land capability are correct for the county. The soils data used in CALES should match that in the Field Office Technical Guide for the county. Any necessary changes can be made with the editing function.

10   Sort Options for Map Units

This function presents a list of the sort options available for the map units in Worksheet #1. The sort options are as follows:

- Sort by LCC: Land Capability Class and Subclass
- Sort by PI: Productivity Index
- Sort by Map unit Symbol
- Sort by Map Unit Name

After sorting, the map units will remain in the selected order when doing other CALES processes, such as listing, editing, saving, etc. The map units can be resorted at any time during the CALES process to suit your needs. By default, the map units are originally sorted by land capability class when Worksheet #1 is initially created.

11   Editing Worksheet #1 Map Unit Data

The "editing" of the map unit data enables you to make changes to the data if and when you deem it necessary. You should review the Worksheet #1 listing carefully to determine if any changes are needed.

Upon selecting this option, you will be presented with another small menu:

○ List map units   ○ Edit map unit data   ○ Help

○ Save map unit records   ○ Append map unit records   ○ List Prime Farmland

                          ○ Delete map unit records   ○ Return to Main menu

○ Replace maximum yield in productivity calculation   ○ Restore PI calc

Click on "Continue" to continue.   [Continue]

The **List map units** option presents you with the list of Worksheet #1 map unit records.

The **Save map unit data** option enables you to save the current set of Worksheet #1 map unit records for later retrieval.

The **Edit map unit** data option enables you to make changes to the map unit data.

The **Append map unit records** and **Delete map unit records** options enable you to append and/or delete map unit records, respectively. Note that the appending of map unit data does not provide for the fetching of component data for the map units, so any later determination of *Important Farmland* cannot be done for these added records. Those Important Farmland values must be separately determined and entered manually.

The **Help** option displays this help screen.

List Prime Farmland provides a listing of the prime farmland definitions.

Return to Main menu returns you to the main CALES processing menu.

The **Replace maximum yield in productivity index (PI) calculation** option allows you to enter a selected maximum yield value different from the maximum yield in the map unit list to be used in recalculating the PI for all of the map units. After you have entered a new maximum yield value and clicked on the "Continue" button, the PI values will be recalculated. To see these new PI values, select the "List map units" option to list the revised Worksheet #1. To restore the PI calculation to use the maximum yield in the map unit list, either enter a 0 for the new maximum yield value, or select the **Restore PI calc** option.

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Note: If this replacement is done, the restoration to the original calculation must be done before Worksheet #2 can be generated.

A need has been expressed by CALES users to be able to directly enter predetermined productivity index (PI) values. Since PI values are automatically generated from the yield values, CALES does not allow the direct entry of PI values. The following method can be used for those cases where predetermined PI values exist for a county. Enter the predetermined PI values for all map units into the yield column of Worksheet #1 using the map unit editor. The resulting calculated PI's will be recalibrated to a base value of 100, but will be arrayed proportially to the predetermined PI values entered as yields.

12   Saving Worksheet #1

This option enables you to "save" a semi-permanent (for six months, or so) copy of the Worksheet #1 map unit data you are currently processing. This saved data can be retrieved at a later time to finish processing or to review the data. You are encouraged to use the save option frequently during a CALES session to prevent accidental loss of information. If a saved file already exists for a county or survey area, saving will replace the existing file with your most current information.

13   Determining Important Farmland

As a recommended alternative to manually entering the statewide and locally important farmland with the map unit editor, this option facilitates the automatic determination of statewide and locally important farmland. Using important farmland criteria defined by the State Conservationist or modified by the user, CALES will check each non-prime map unit to see if it qualifies as statewide or locally important farmland, as defined in the criteria. A state can change their official statewide important farmland criteria in CALES by notifying Cheryl Simmons, NRCS Office of Farmland Protection and Community Planning, of the needed change.

Note: The current programming within CALES for determining important farmland was copied from the original implementation of CALES. If states require more sophisticated important farmland criteria not covered by the current program, changes may be needed in the CALES program to properly handle the refined criteria.

Upon selecting the "Determine Important Farmland" option, you will be presented with another small menu:

○ List IF criteria   ○ New/Edit IF criteria   ○ Help

○ Save IF criteria   ○ Apply IF criteria   ○ Return to Main menu

Click on "Continue" to continue.   [Continue]

The **List** option presents you with a list of the following three sets of Important Farmland (IF) criteria parameters:

- Set 1: your working tmp file, generated by you for this particular county or survey area,

- Set 2: generated by you perhaps at some earlier date and saved, and

- Set 3: identified by State Conservationists as official criteria for a state.

If you have not entered or retrieved a set of criteria during this session, Set 1 will not appear. Set 1 is a list of your current tmp file of IF criteria. This is the set of criteria used by the program to determine important farmland. You must populate it before applying IF criteria. Set 2 will appear only if you previously generated a set of IF criteria for the current county or survey area and saved it, or you have saved the current set, in which case the first and second sets of criteria will appear the same. Set 3 is a set of official state criteria. This is not populated for all states, in which case the criteria elements will be all zero or blank.

From the **List** option, you can retrieve either the saved or the state set of criteria into your tmp workspace.

The **Save** option enables you to save the current set of criteria for archiving and later retrieval.

The **New/Edit** option enables you to either generate a new set of IF criteria or edit the contents of your current working set, which is referred to as your criteria tmp file. With this editor, you can enter criteria parameters for statewide and/or locally important farmland. See the **Important Farmland Criteria** section for details on entering criteria.

The **Apply** option enables you to apply the criteria to the existing set of map units in Worksheet #1. This will change the state and locally important farmland in your Worksheet #1 map unit data based on your specification of Important Farmland criteria.

Soil map units with components of important farmlands are:

1. prime where 50 percent or more of the components in the soil map unit are prime;

2. statewide importance where less than 50 percent of the components in the soil map unit are prime, but a combination of prime and statewide importance are 50 percent or more of the soil map unit; and

3. local importance where less than 50 percent of the soil components in the soil map unit are prime and statewide importance, but the total prime, and statewide, and local importance are 50 percent or more of the soil map unit.

All other soil map units should be shown as not important farmland soil map units unless they meet the criteria for statewide or local importance as defined by state or local units of government or are unique.

Soil map units which are already marked as prime or important farmland in CALES Worksheet #1 are not reevaluated in this program.

The **Help** option displays an on-line help screen.

Return to Main menu returns you to the main CALES processing menu.

13.1   Important Farmland Criteria

The CALES Important Farmland (IF) criteria are used to determine if non-prime map units qualify as statewide or locally important farmland. The criteria considered in CALES are as follows:

1. AWC within 40 in.
2. depth to pan or rock
3. $K \times$ slope is less than
4. $I \times C$ does not exceed
5. permeability within 20 in.
6. rock fragment > 3 in.
7. slope limit
8. flooding freq. (n,vr,r,o,f,vf or b)
9. land capability class (xx-yy or b)
10. eroded phase excl? (y or n or b)
11. sev erod phase excl? (y or n or b)

For some states, a set of official state criteria is provided and thus should be used for the statewide important farmland determination. For other states, the official criteria is not populated. The "List" option enables you to see the official state criteria and to retrieve it if it is completed. If not completed, you will see entries of zeros or blanks for all criteria items in the display.

When entering or editing the IF criteria, you will see a column for both statewide and locally important farmland criteria parameters. You may enter criteria values for both columns or for only one, as fits your purpose.

An explanation of entries you can make for each of the IF criteria features follows. Only fill in values that are used in the criteria for your state or local area. Leave the unused features as zero or blank, as they are presented to you. If the soil qualifies for all of the criteria features for which values are entered, the soil will be marked as important farmland.

1. Available water capacity (AWC) within 40 inches – Using the mean AWC for each soil horizon in the soils database, a total AWC within the top 40 inches is calculated and compared against the criteria value in inches. A calculated database value greater than or equal to the criteria value would qualify as important for this criteria feature. This AWC value should be entered in units of inches per inch.

2. Depth to bedrock or cemented pan – The program determines the depth to bedrock or cemented pan from the soils database and compares it against the criteria value. A database value greater than or equal to the criteria value would qualify as important for this criteria feature. This depth value should be entered in inches.

3. K * slope – The program determines the K erosion factor for the surface horizon and the mean slope value from the soils database and calculates the "K*slope" value. This calculated value is compared against the criteria value. A calculated database value less than or equal to the criteria value would qualify as important for this criteria feature. A criteria value larger than 2 would make a more relaxed standard than that for prime farmland.

4. I * C – The program determines the wind erodibility index (I) from the soils database and multiplies it by the wind erosion C factor, which is entered by the CALES user and converted to a decimal number by dividing by 100. The calculated I*C value is compared against the criteria value. A calculated value less than or equal to the criteria value would qualify as important for this criteria feature. A criteria value larger than 60 would make a more relaxed standard than that for prime farmland.

5. Permeability within 20 inches – The purpose of this criteria check is to identify whether all permeability values in the top 20 inches are too fast. Using the representative permeability for each soil horizon, the program determines the slowest permeability value within the top 20 inches. This slowest permeability database value is compared against the criteria value. A database value less than or equal to the criteria value would qualify as important for this criteria feature. This permeability criteria value should be entered in units of inches per hour.

6. Rock fragments > 3 inches – Using the representative "fraction 3 to 10 inch" value and the representative "fraction >10 inch" value from the database for the surface horizon, the sum of these two database values is compared against the criteria value. A database value less than or equal to the criteria value would qualify as important for this criteria feature. A criteria value larger than 10 would make a more relaxed standard than that for prime farmland.

7. Slope limit – The program determines the maximum slope from the soils database and compares it against the criteria value. A database slope value less than or equal to the criteria value would qualify as important for this criteria feature.

8. Flooding frequency – The user should select the flooding frequency at or above which the soil would be excluded as important farmland. From the soils database, the program determines the maximum recorded flooding frequency during any growing season month. If the database flooding frequency matches or is worse than the criteria value, the soil would be excluded as important for this criteria feature. A criteria entry of "f" (frequent) would give the same standard as for prime farmland. A criteria entry of "vf" (very frequent) would give a more relaxed standard than that for prime farmland. A criteria entry of "b" would blank out the field, removing any previous entry.

9. Land capability class (LCC) – The user should enter an LCC range (e.g., 1-2s) or a single LCC value (e.g., 3w). Using the LCC from the soils database, the database LCC value is compared against the LCC criteria value to see if the database LCC is contained in the LCC range entered in the criteria. The order of LCC hierarchy used in this determination is: 1, 2e, 2c, 2w, 2s, 3e, 3c, 3w, 3s, 4e, 4c, 4w, 4s, 5w, 5s, 6e, 6c, 6w, 6s, 7e, 7c, 7w, 7s, 8e, 8c, 8w, 8s, 8. If the database LCC value is contained in the criteria LCC range, the soil would qualify as important for this criteria feature. A criteria entry of "b" would blank out the field, removing any previous entry.

10. Eroded phase excluded – From the "erosion class" element in the soils database, the program determines whether the soil is eroded. If the criteria value is yes and the soil is eroded, the soil would not qualify as important for this criteria feature. All other cases would qualify. A criteria entry of "b" would blank out the field, removing any previous entry.

11. Severely eroded phase excluded – From the "erosion class" element in the soils database, the program determines whether the soil is severely eroded. If the criteria value is yes and the soil is severely eroded, the soil would not qualify as important for this criteria feature. All other cases would qualify. A criteria entry of "b" would blank out the field, removing any previous entry.

Remember, for the soil component to qualify as important farmland, it must qualify for all of the individual criteria features for which non-zero or non-blank values are entered. For the soil map unit to qualify as important farmland, more than 50% of the component acreage must qualify.

14 Adjust Yields for the Cost of Conservation Practices

Yields listed for the soil map units in Worksheet #1 may need to be adjusted based on conservation measures needed to overcome soil limitations. For a particular soil, yield adjustments should be made based on the cost of conservation needed.

Information needed for completing the adjustments should be available in the field office technical guide.

Since soils which are land capability class 1 usually do not need conservation measures, they do not usually need adjustment. Yield adjustments to other cropland soils are recommended.

For example, if Worksheet #1 includes soils with land capability class 3w, the cost of drainage could be included in a yield adjustment. After the proper adjustment parameters are entered, CALES will calculate the yield equivalent of the cost of treatment and then subtract that from the yield value.

Before you begin adjustments, you should identify which soils require particular conservation practices. If some soils need more than one conservation practice, you may repeat the yield adjustment process more than once on the same set of soils.

Upon selecting the "Conservation Yield Adjustment" option, you will be presented with another small menu:

○ List Adjustment data   ○ New/Edit Adjustment data   ○ Help

○ Save Adjustment data   ○ Apply Adjustment data   ○ Return to Main menu

                            ○ Undo Yield Adjustment

Click on "Continue" to continue.   [Continue]

First select the **New/Edit** option to generate a set of adjustment parameters. Note that you can only generate one set of conservation adjustments at a time. You would then apply (see below) these adjustments and then generate the next set and apply them, and so on, when different conservation adjustments are required for different parts of the soils data. You can save any one of these adjustment sets for later reference with the Save option.

The **List** option enables you to see what you have generated and what you may have saved during a previous session. If you have Saved a set of adjustment data during a previous session, you may retrieve that set and edit and/or use it. (You must enter or retrieve a set of adjustment parameters before you can apply them.) Since specific adjustment data usually only applies to a specific subset of map units within a county, the value of saving adjustment data may be minimal, but we provide the saving option for whatever benefit it might have for you.

To apply the conservation yield adjustments to redefine the yield values and the associated productivity index values, select the **Apply** option. This will present you with a listing of the soil map unit records from which you can select those you want to adjust with the data just entered. Simply highlight the desired records by clicking on the lines. This may require holding down the CTRL key while clicking to select multiple lines. For long continuous groups of lines, you may find it easier to list them as ranges, such as 10-21, for example, in the entry box provided.

After selecting or specifying the lines to be adjusted, click the Continue button. You will then be presented with a screen showing the calculated yield reduction and a breakdown of its components. You can enter an alternative yield reduction value, if desired, on this screen. Click Continue to apply the conservation cost yield reduction to the lines specified.

As noted above, you will need to repeat this process of entering/editing and applying these adjustments until all desired changes are made. Then go back to the main menu and list Worksheet #1 to see the results of your adjustments.

Note: In the original CALES, there was a short-cut adjustment method whereby you could go directly to the yield reduction calculation to enter your own reduction value. This can be achieved in this web version by entering a single dummy value into one of the adjustment "New/Edit" screen fields, such as the "Type of limitation" field, and then continuing. The calculated value is then just ignored and the alternative value entered when prompted for the desired adjustment.

The **Undo Yield Adjustment** option will undo all yield adjustments made to the current set of map units.

Help displays an on-line help screen.

Return to Main menu returns you to the main CALES processing menu.

14.1 Yield Adjustment Parameters

The user is asked to enter the following adjustment parameters so that yield adjustments can be calculated.

Type of limitation. The user selects from e, w, s, and c to indicate the general type of soil limitation to be overcome.

Conservation measure code. The user selects from a long list of conservation practices to indicate the specific conservation measure that should be applied.

Amount of conservation measure per acre. This entry should be in the standard units of measure for the conservation practice selected.

Installation cost of conservation measure ($). This entry should represent the cost per unit of measure. It will be multiplied by the value above to get the cost per acre.

Life span (years). This entry should indicate how long the conservation measure is expected to function before needing to be redone.

Annual maintenance cost ($). This entry should represent the maintenance cost per unit of measure for the conservation practice.

Land lost to installation (% of average yield). This entry should be an integer number reflecting the percentage that the average yield per acre would be reduced because of land lost to the installation of the conservation measure.

Interest rate (%). This entry should be a decimal number representing the interest rate for borrowing money to install the conservation measure.

Price per unit of indicator crop ($). This entry should represent the market price for a unit of the indicator crop.

After entering these adjustment parameters, the CALES user should apply this information to a selected set of soils in Worksheet #1. After these adjustments are applied, the user can repeat the entry and application steps until all necessary yield adjustments are completed.

15   Grouping Soils for Worksheet #2

In preparing to generate Worksheet #2, the agricultural groups to be used in the county need to be designated. These groupings are by land capability class, prime farmland, and productivity index. Careful grouping of soils into agricultural groups will always result in the soils in group 1 having the highest weighted average yield and so on down the list. Review the LESA handbook for guidance in creating these groups.

Groups should be designed so that all map units are included in a group. If some map units in Worksheet #1 do not have a land capability class (LCC), you must enter an appropriate LCC using the map unit editor before grouping the soils. Your goal should be to end up with no map units in the ungrouped list. A maximum of 15 groups can be defined.

Upon selecting the "Group Soils of Worksheet #1" option, you will be presented with another small menu:

○ List grouping data   ○ New/Edit group definitions   ○ Help

○ Save group definitions   ○ Append/Insert group definitions   ○ Return to Main menu

                              ○ Delete group definitions

Click on "Continue" to continue.   [Continue]

The **List** option presents you with a list of the current set of grouping data, if any (see tmp files), and any that you may have saved for this county or survey area. If you have a "Saved" set of grouping data, you may retrieve it through this option. If you do not see a "tmp" set of grouping records in the list of sets, you have not defined a current set.

The **Save** option saves the current set of grouping records for later retrieval and usage (see List above).

Note: You must enter a new set of grouping records or retrieve a set of existing grouping records into your current session (i.e., your tmp file) to be able to group the map unit records of Worksheet #1.

The **New/Edit** option enables you to enter complete sets of grouping records and to change them if desired/required.

The **Append/Insert** and **Delete** options enable you to append and delete groups to an already existing set of grouping records. Group definition records are sorted by group number and lcc after entry so the order of adding definition records is immaterial.

The **Help** option redisplays an on-line help screen.

Return to Main menu returns you to the main CALES processing menu.

For land capability class, enter a single class or a range of classes, separating the lower and upper with a dash. When a range is entered, the group includes the two classes listed plus all classes in between. Note the order of the classes for grouping from low to high is: 1, 2e, 2c, 2w, 2s, 3e, 3c, 3w, 3s, 4e, 4c, 4w, 4s, 5w, 5s, 6e, 6c, 6w, 6s, 7e, 7c, 7w, 7s, 8e, 8c, 8w, 8s, 8.

For important farmland, the acceptable grouping entries are P, S, L, O, and U, with the following meaning. These codes used for grouping are a little different than those used for important farmland in Worksheet #1.

P – prime farmland

S – statewide important farmland

L – locally important farmland

O – other land

U – unique farmland

This system is designed to avoid entering any data that duplicates data in existing groups. The program will check your grouping entries for duplication when your entries are processed. A message is generated telling you which lines have duplicate, overlapping entries. The program will not allow you to generate Worksheet #2 until you have corrected the grouping problems.

The same group number can be used in more than one line within the grouping records. This can allow you to include more soils in a single group. For example, to define one group to include soils in land capability classes 3e and 4e, line one could be defined as group 1 for 3e soils and line 2 could be defined as group 1 for 4e soils. This approach for 3e and 4e is needed due to the required sequence for LCC classes to be grouped on one line.

An example of grouping definitions follows:

Group Number (1–15)	lcc (1–8s)	Important Farmland (P, S, L, O, U)	Low Prod Index (0–100)	High Prod Index (1–100)
1	1 – 2w	P	90	100
2	1 – 3w	P	80	89
3	2e – 4e	P	50	79
4	2w – 3w	S	50	79
5	2w – 4e	S	30	49
6	3s – 4w	O	25	60
7	6e – 8w	O	0	0

16   Generating Worksheet #2

Worksheet #2 puts the soils of Worksheet #1 into agricultural groups and calculates a relative yield value for each group. All changes to the map unit data, yield adjustments for the cost of conservation measures, and agricultural groupings should be completed for Worksheet #1 prior to generating the Worksheet #2 results.

The Worksheet #2 listing first displays the map units that are included in each of the designated agricultural groups, as well as those map units in the ungrouped category. A user goal should be to have all map units in a defined group and nothing in the ungrouped category.

Following these group listings is the actual Worksheet #2, which displays a line for each agricultural group showing acreage totals and a relative yield value for each group. These final CALES Worksheet #2 results for a county will provide the information needed to fill out the soils portion of FPPA Form 1006.

17   On-Line CALES Help

The Help option in the CALES menus is used to access on-line documentation on how to use this web-based CALES system. Help screens are available for most of the functions of the CALES process.

When Help is selected from a CALES menu, the help information is displayed in a separate window, which allows you to keep it on your screen with the CALES web browser window, or at least to toggle back and forth between the two if desired.

At the bottom of each Help screen, you will see a "Back" button and a "Close" button. The "Back" button allows you to backup within the Help screens. The "Close" button allows you to close the Help window.

18   Quitting CALES

You can exit from the CALES system at any time during the CALES process, whether you have finished a CALES evaluation by generating Worksheet #2 or are in the middle of an evaluation. Before quitting, be sure to save your work. When you select the **Quit CALES** option and click on the Continue button, your current temporary files will be removed and you will be routed back to the main CALES web page. Your session is then complete.