



The World's Largest Open Access Agricultural & Applied Economics Digital Library

This document is discoverable and free to researchers across the globe due to the work of AgEcon Search.

Help ensure our sustainability.

Give to AgEcon Search

AgEcon Search

<http://ageconsearch.umn.edu>

aesearch@umn.edu

*Papers downloaded from **AgEcon Search** may be used for non-commercial purposes and personal study only. No other use, including posting to another Internet site, is permitted without permission from the copyright owner (not AgEcon Search), or as allowed under the provisions of Fair Use, U.S. Copyright Act, Title 17 U.S.C.*

No endorsement of AgEcon Search or its fundraising activities by the author(s) of the following work or their employer(s) is intended or implied.

Historic, Archive Document

Do not assume content reflects current scientific knowledge, policies, or practices.

A56.22
S03C

AD-33 Bookplate
(1-68)

NATIONAL

**A
G
R
I
C
U
L
T
U
R
A
L**



LIBRARY

A56.22

72704

S03C

THE COLLECTION OF BASIC DATA
ON
SOIL AND LAND-USE CONDITIONS 1/

Henry R. Adams, Soil Scientist (Retired)
Soil Conservation Service
USDA

It is the policy of the Soil Conservation Service to assemble, maintain, and analyze basic data on soil and land-use conditions in the United States. This report describes the procedure used in carrying out this policy and explains the present status of the data.

USES OF DATA

This work was begun in 1956. By 1959 enough basic soil and land-use information had been assembled by counties that it was used as a basis for developing the National Inventory of Soil and Water Conservation Needs.

The data are also used by:

- (1) The Secretary of Agriculture and special committees appointed by him to develop various policy statements and programs.
- (2) The Economic Research Service as a basis for economic studies of watersheds, river basin areas, and/or other land economic studies.
- (3) Various Federal and State agencies and individuals in various types of economic and geographic studies and papers.
- (4) The Soil Conservation Service in studies of special areas such as the Great Plains, the Northern Lake States, and the Appalachian Region.
- (5) The Soil Conservation Service in answering inquiries from Congressmen about conditions in their districts.
- (6) Soil conservation district governing bodies in developing or revising district programs and work plans.

The sample units have been used in locating sites for studying the availability of areas suitable for outdoor recreation. They may also be used as a permanent set of sites for making observations of flood damage, changes in land use, and growth studies of various types of vegetation.

COLLECTION OF DATA

The basic data are derived from soil surveys in every county except those strictly metropolitan in character. If adequate data were available

1/ Procedure used by the Soil Conservation Service in collecting and assembling sample unit data by counties, 1956-1959.

from completely mapped and measured areas they were used. In most counties, however, soil surveys were made of sample units and the surveys were measured and expanded so that representative data were available for all non-urban, non-Federal land in every county.

The acreage figures are identified so they can be compiled by any grouping of counties within a State and by major land resource areas, watersheds, soil conservation districts, or other desired areas that can be shown by boundaries on a map. Such compilations and summaries can be made by soil types, slope classes or erosion classes or by combinations of these, or by land-capability units, subclasses or classes. The major land use for each of the above is also shown.

The collection and analysis of the data involved steps in the following order:

- (1) Selecting area samples.
- (2) Checking or revising existing soil surveys or making soil surveys on sample units.
- (3) Measuring maps and recording data on tally sheets.
- (4) Transferring coded data from tally sheets to punch cards.
- (5) Expanding acreage data from sample units.
- (6) Tabulating and analyzing data.

AREA SAMPLING

Some of the data were from completely mapped and measured counties but most of them were obtained from soil surveys of sample units. Stratified, random sample units were selected according to standard statistical procedures for each county in the country, except those strictly metropolitan in character. This set of sample units will serve as a continuing base for the study of soil and land-use conditions and may also be used for other purposes.

The Biometrics Unit at Cornell selected the samples for the thirteen Northeastern States (Maine, New Hampshire, Vermont, Massachusetts, Connecticut, Rhode Island, New York, Pennsylvania, Maryland, Delaware, New Jersey, West Virginia, and Virginia). The Statistical Laboratory at Iowa State University drew the samples for the rest of the country.

To determine a sampling procedure that would give a set of estimates of acceptable accuracy, preliminary tests were made by the laboratories. Samples of different rates and sizes were laid out on maps of completely mapped and measured counties. Rates of sampling and optimum sizes of units were decided upon by comparing the expanded measurements of the samples with the 100 percent data from counties with completed soil surveys of the entire counties.

Sampling Rate and Size of Sample Unit

The basic sampling rate is 2 percent. As standard procedure, the statistical laboratories selected two separate sets of sample units for each county, each set representing approximately 2 percent of the county.

Nearly half of the counties in the country fall within the 250,000 to 500,000 acres size group. In these counties only one set of samples was mapped. In larger counties the rate of sampling was reduced, while in smaller ones it was increased to maintain the same degree of precision in the estimates.

The standard size of sample units in the Northeast is 100 acres. In the rest of the country it is 160 acres. Since most of the counties are sectionized, the use of 160-acre quarter section sample units greatly facilitates the locating of these both on aerial photographs and on the ground.

Under special conditions the SCS State conservationist and the laboratory agreed on a different rate of sampling or size of sample unit. In some cases additional sample units were selected. In practically all of these special cases the precision of the survey estimates is equal or even superior to that obtained by use of the standard rates. Supplemental sampling by the same method may be done at any time in counties or areas where a need develops.

Standard Sampling Error

The estimated acreage figures from a 2 percent sample of 160-acre units have the following relative standard of errors:

Percent of Area Having the Condition	Relative Standard Errors	
	Average-sized	Average-sized
	County ^{1/}	State ^{2/}
	(Percent)	(Percent)
1	59	5.9
5	26	2.6
10	18	1.8
25	10	1.0
50	6	0.6
75	3	0.3
100	0	0.0

Thus, if any condition of soil type, slope, erosion or land use actually occurs on 1 percent of the county, or say about 4,000 acres, it may be missed completely or the acreage may be exaggerated. But two times out of three, the estimated figure plus or minus 59 percent will enclose the true figure. For an item such as cropland that may include 25 percent of the county, the standard error expected would be 10 percent.

This indicates that rather wide fluctuations may exist in the estimates for individual counties. As county data are put together for larger areas, the extremely high and low estimates tend to balance each other, so the standard error for a major land resource area, river basin, or State is much smaller than for a county.

^{1/} Assumes 48 blocks of 160 acres each in sample.

^{2/} Assumes 4,800 blocks of 160 acres each in sample.

Selecting Sample Units

The laboratories used the following procedure in selecting sample units.

The county or land-resource unit within the county was divided into blocks (called "strata") which were then further subdivided into 48 (at Iowa State) or 49 (at Cornell) equal-sized sample units. One sample unit was selected at random from each stratum for the sample. One additional sampling unit was selected in each stratum to serve as a second 48 sample. Farm boundaries were ignored but in sectionized areas each stratum consisted of twelve sections (one-third of a township) and each sample unit was a quarter section (160 acres).

Sampling by strata insures good distribution of sample units throughout the county. Randomized selection eliminates bias or personal opinion in the choice of the individual sample units.

Base Maps

The laboratory located the sample units accurately on duplicate copies of county base maps, one set of samples being outlined in red and the other in blue. One copy of each map was returned to the State SCS office and the other was retained at the laboratory.

These maps, usually county highway maps with a scale of 1 inch equals 2 miles or larger, were provided by the State SCS office. They show boundary lines and symbols of subdivisions of the county that were considered in the selection of samples or that may be used in making tables of the data. Acreage figures for each subdivision are also available.

If there is Federally-owned land in the county, its boundaries are shown on the map. Sample units were drawn on this land even if they were not mapped in the initial program. The acreage of Federal land other than cropland was subtracted from the total land area of the county in determining the rate of sampling needed to represent the non-Federal land.

The consideration of land-resource units in the selection of samples was optional. The State SCS office informed the laboratory if it wanted samples drawn by land-resource units or on a countywide basis, or if it wanted a higher or lower sampling rate for some land resource units than for others. Even if land resource units were not considered in the sampling, all sample units are not identified by major land-resource areas according to the January 1963 map titled "Land-Resource Regions and Major Land-Resource Areas of the United States." The data may now be assembled on that basis.

Some county maps carried the boundaries of watersheds with a maximum area of 250,000 acres. In few, if any cases, were these given consideration in the selection of the samples. In these counties the watersheds and sample units have since been keyed to the larger drainage basin with a minimum area of 750 square miles (480,000 acres) shown on maps in the Atlas of River Basins of the United States, June 1963. In

the rest of the counties the sample units are identified directly by these larger watersheds, using the nationwide code symbols given in the Index of Rivers and Tributaries attached to River Basins Memorandum SCS-4, September 1961.

In counties that are divided by soil conservation district boundaries, these boundaries are shown on the base map and the sample units are identified accordingly.

Locating Sample Units

Upon the return of a copy of the base map to the State, the sample unit boundaries were transferred from it to the aerial photographs on which mapping was to be done or on which previous mapping was to be measured. Wherever possible the location of a sample unit was shown entirely on a single aerial photograph instead of being divided among two or more.

In sectionized country the designated quarter sections were delineated. Elsewhere, one or two corners of sample units were located by measuring from road intersections, bridges or other features easily identified on both the base map and the photograph. The boundary was then completed by drawing around a square of cardboard or other material cut to the proper size to represent the acreage.

Incorrect scales of either the highway map or the photograph made it difficult in some cases to duplicate exactly the location on the photograph. Since the samples were selected at random, however, a slight difference in the location of the sample on the photograph was not important so long as the change was not purposely made to avoid or include certain land conditions.

Boundary lines of sample units on the photographs were temporary and were removed after the mapping, measuring, and photocopying of the sample units were completed. The boundaries were outlined in ink on the back of the photographs, however, with the sample unit number recorded in the delineated space. Also, the photograph number was written beside the sample unit outline on the county base map. The county base map is kept on file.

SOIL SURVEYS

Soil survey data are available for millions of acres of previously mapped and measured counties or other large blocks of land. Since data from large areas are usually more accurate than those from samples, all possible use was made of this existing survey information. Any previous mapping on the sample units was field-checked to determine if the soil separations were delineated and identified properly, and to delineate land use according to prescribed definitions. In many counties with completed soil surveys no additional field work was needed. In other instances it was necessary only to map land use. In the majority of counties soil surveys had to be made or revised on the sample units in parts or all of the counties.

In Kansas the data were derived by interpreting measurements from low intensity or so-called "reconnaissance" maps covering the entire area in every county. In Arizona and Nevada there were good figures for the irrigated land, which includes practically all of the cropland, but the job of mapping samples in the dryland areas is still in progress (January 1964). In Missouri the original job of mapping sample units was confined to a small subsample, set up on a basis of a six-county block with a minimum of 8 sample units per county. Mapping of the remainder of the sample units is still in progress (January 1964).

In Alaska no special program has been set up for mapping sample units. The data used are from mapping that has been done in regular soil surveys now in progress.

There are scattered counties in other States where, because of the pressure for data at the time the mapping was in progress, use was made of some maps and data from surveys that do not qualify as standard soil surveys. Although the separations were adequate for determining the acreages of land-capability units to meet the full use anticipated for the data, it may be necessary to remap the sample units in those counties according to an up-to-date legend for standard soil surveys.

Surveys of Sample Units

In the majority of counties a 2 percent sample (approximately) was mapped. The red (or blue) set of samples was used with no substitution or intermingling of the two sets being permitted.

The soil separations outlined on maps are identified by a three-part symbol, with soil type, slope class, and erosion class indicated separately. Land use is divided into four general groups--cropland, pasture and range, forest and woodland, and other land. Definitions of these land uses are given below.

The above separations are the minimum requirements in all soil mapping. If a finer classification of any item was desired for local purposes, it was done by mapping subdivisions of the items; as for example, the separation of smooth slopes from broken or irregular slopes, or the mapping of orchards as a subdivision of cropland.

Normally the mapping does not show areas of less than 2 or 3 acres in size. Therefore, as is usual in soil surveys, some conditions such as small seepage spots or small rock outcrops were mapped as part of the surrounding soil type. Similarly many small farmsteads and other house sites and also the majority of roads and railroads were mapped and measured as a part of an adjoining land use.

The work was done on aerial photographs at the scale in use locally--usually 4 inches = 1 mile (1:15840). Insofar as possible, all new mapping was done according to legends used in standard soil surveys. In partially mapped counties the surveys were made according to the legend in use in the county.

A complete set of copies of the soil survey of the sample units is on file in each State. These copies are usually kept in the work unit offices.

Urban and Federal Land Areas

In mapping the samples, urban and built-up areas were classified as to land use only.

Immediate priority was not given to mapping or measuring Federally-owned land administered by the Forest Service, Bureau of Land Management, Bureau of Reclamation, Bureau of Sport Fisheries and Wildlife, National Park Service, Tennessee Valley Authority, Atomic Energy Commission, and agencies of the Department of Defense. This Federal land is identified on the sample unit maps and, if mapped, was measured separately. If the Federal land included cropland farmed under lease or permit rather than by the agency, and if a total acreage of such land in the county could be obtained from the agency, that falling in sample units was mapped. On Indian lands the Bureau of Indian Affairs assisted in getting the soil survey information.

Mapping Land Use

One of the major values of the soil survey data is to show the relation of land use to the physical conditions of the land. Land use was mapped, therefore, on all sample units. The condition found at the time of the mapping was shown with no attempt to predict the intent of the operator.

Land use is designated by the following classes. Further subdivisions were recognized in some States or counties if the information was deemed to be of value. All land was included under one of the following broad categories and no area was left unclassified.

Cropland. Land currently tilled, including cropland harvested, crop failure, summer fallow, cropland in cover crops or soil-improving crops not harvested or pastured, orchards and vineyards, pasture in the crop rotation, cropland being prepared for crops, and newly seeded crops. Cropland includes all tame hay and all harvested areas of wild hay east of the Mississippi River.

Pasture and Range. Land in grass or other long-term forage growth that is used primarily for grazing. This class includes grassland, non-forested pasture, and other grazing land excepting pasture in the crop rotation. It includes wild hay land west of the Mississippi River. It may contain shade trees or scattered timber trees with a canopy covering less than 10 percent of the area, but the principal plant cover is such as to identify its use primarily as permanent grazing land. In some States or counties, pasture composed primarily of introduced grasses was mapped separately from range composed of native grasses.

Forest and Woodland. (a) Lands that are at least 10 percent stocked with forest trees of any size and capable of producing timber or other wood products; (b) land from which the trees described in (a) have been removed to less than 10 percent stocking and which has not been developed for other uses; (c) afforested (planted) areas; and (d) chaparral areas. (This definition was a change from the one used in previous soil surveys. The change makes it comparable to the one in use by the Forest Service in making forest surveys in 1957, and permits the use of information from one agency to supplement data collected by the other. The Forest Service prepared descriptions for use in identifying areas of forest and woodland and assisted in interpreting conditions that might give rise to questions.) Where necessary, this land use was subdivided as follows:

1. Undergrowth not suitable for grazing. Land on which forest trees occupy 10 percent or more of the area and the remainder does not have a cover of grass and other plants suitable for and used for grazing.
2. Undergrowth suitable for grazing. Land on which forest trees occupy 10 percent or more of the area and the remainder has a cover of grass and other plants suitable for and used for grazing. (Areas mapped as cropland or pasture and range according to the above definitions were not duplicated under this definition.)

Other Land. Farmsteads, idle land (as formerly mapped in the soil survey), wildlife areas, and other land not classified into other land uses.

Urban and Built-up Areas. Cities, villages, other built-up areas of more than 10 acres, industrial sites, railroad yards, cemeteries, airports, golf courses, shooting ranges, institutional and public administrative sites, and similar types of areas. This separation does not necessarily include all land inside city and village limits and includes some land outside of such limits. Where the acreage covered by roads and railroads was large enough to be significant, it was calculated and included under this item.

Water and Wet Areas

Water and wet areas are identified in the following categories:

1. Areas excluded from the 1954 Census figure for "total land area." In 1940 the Bureau of the Census established figures

for the "total land area" of each county in the United States. Excluded from this figure were permanent lakes, reservoirs, and ponds more than 40 acres in size; streams, sloughs, estuaries, and canals more than one-eighth of a statute mile in width; and coastal waters. This figure was revised about 1948 to account for the area of reservoirs constructed or filled since 1940 and to recognize some changes in county boundaries. This is the figure used in the 1954 Census of Agriculture. Any part of such a body of water that is included in a sample unit is identified on the soil survey map, but its area is not included in the soil survey area.

The Census definition also excludes from the total land area figures, tidal flats below mean high tide. However, an extended study of Census figures for coastal counties before and after 1940, and of the tidal marsh acreage in numerous soil survey reports, showed little or no evidence that tidal marsh as mapped in soil surveys was excluded from county land areas given by the Census. Therefore, tidal marsh was mapped as land with the usual symbols for soil and land use.

The Census figure also excludes islands of less than 40 acres in size in any of the excluded water areas. When such islands occur, they were mapped as land areas in the soil survey.

2. Areas included in the 1954 Census figure of "total land area."
 - a. Any part of a permanent body of water less than 40 acres in size that is included in a sample unit was identified as permanent water and included in the soil survey data.
 - b. Any part of a playa lake or similar intermittent water area of any size on which it was not possible to map land use or sufficient soils information to permit classifying the land as to its capability was mapped as intermittent water. No further classification of any conditions was made on these areas unless desired locally.

There is also a considerable acreage of land subject to intermittent flooding for which soil conditions can be identified sufficiently to assign a land capability classification and on which the land use can be mapped. These intermittently flooded areas were mapped as land, with the features identified, wherever possible, so that the figures on land area and land use for the county are in agreement with similar data from other sources. These areas are considered as land, intermittently flooded.

MEASURING MAPS AND RECORDING DATA

In completely mapped and measured counties where no revision of the maps was needed, the existing figures were used. One disadvantage of this system is that unless subdivisions of the county such as major land-resource areas or watersheds were recognized and measured separately, the only way to get data for them is to prorate the county figures. This was done in a few counties, principally in the States of Kansas, Louisiana, and North Carolina.

Where adequate previous data did not exist, the revised or new maps of sample units were measured and the data expanded to give county figures. If existing data were available for part of a county, expanded data from sample units in the remainder of the county were added to the existing figures to give county totals.

Measuring was commonly done by the use of a grid although a planimeter or the cutting and weighing method was used in some cases.

Recording Data

The data from each sample unit were recorded on a separate tally sheet. Each sheet is identified by State, county, and sample unit, also by land resource unit, watershed or river basin, soil conservation district or other subdivision of the county, and in a few States, by ownership.

Only one line on the tally sheet is used for each separation shown on the map. This line carries the soil symbol, slope class symbol, erosion class symbol, and the land-use symbol as well as the measured acreage. Normally it was not necessary to identify each individual line by the areas listed in the preceding paragraph.

To make sure that no areas had been omitted or duplicated in measuring, and for use in developing and applying the expansion factor, the following items were measured and the acreage recorded.

Items not used in developing the expansion factor:

1. Federal non-cropland.
2. Any part of a body of water that is 40 or more acres in total size and streams more than one-eighth mile wide.
3. Islands smaller than 40 acres in these water bodies.
4. Urban and built-up areas when the total county area of these had been predetermined from some other source of information.

Items used in developing the expansion factor:

1. Crop, pasture, woods, and "other" land.
2. Urban and built-up areas where the soil survey was the only source of information for this acreage.
3. Permanent water in bodies smaller than 40 acres and streams less than one-eighth mile wide.
4. Bodies of intermittent water.

A copy of the tally sheet for each sample unit is filed with the copy of the soil map.

EXPANSION OF ACREAGE DATA

The figure used as the basis of expansion is the total land area of the county as given in the 1954 Census of Agriculture, with the following adjustments:

1. The acreage of Federally-owned land (minus the acreage of Federal cropland) is subtracted from the Census figure.
2. The acreage in water bodies greater than 40 acres in size that have been created since 1948 is subtracted from the Census figure.
3. Any predetermined figure of acres in urban and built-up areas or in roads and railroads is subtracted from the Census figure.

When data are expanded by land-resource units the acreage of these units must add up to the adjusted total land area of the county.

Expansion Factors

The factor to be used for expanding the data was obtained by dividing the adjusted total land area of the county or subdivision by the adjusted total area mapped in the sample units in the county or subdivision. The mapped area was adjusted by subtracting the same items that were excluded from the total land area.

The factors obtained by this method vary from county to county, or even among land-resource units within a county, especially if different sampling rates were used. Therefore, the expansion factors were determined separately for each county or subdivision. It should not be assumed that the figure of 48 (or 49) used in the sampling procedure is adequate for use as the expansion factor.

Expanding Data

Only the original acreage measurements recorded on the tally sheets are expanded. This was done by multiplying each figure by the expansion factor and recording the result as the estimated acreage in the county represented by the condition. These expanded acreages are used in developing county, State or national tables of acreage of basic soil and land-use conditions. They may also be interpreted to prepare tables of land-capability units by land uses.

If the sample units include islands of less than 40 acres in large bodies of water excluded from the total land area, the expanded figures from these areas are recorded and included with the other expanded figures in making any summaries. This makes the recorded county total land area exceed the adjusted figure used in developing the expansion factor.

In developing estimates for the National Inventory of Soil and Water Conservation Needs, the land-use figures were adjusted in some counties to conform to figures from other sources. Where this was done, it required refactoring of the land-capability unit acreages also.

Hence, the figures for land-capability units, subclasses and classes, and land uses in various publications of the inventory data are not necessarily identical with the basic data from the measured soil survey maps of sample units expanded to county totals.

PROCESSING DATA BY MACHINE

The Soil Conservation Service entered into cooperative agreements whereby the data are recorded on punch cards and the expansion, compilation, analyses, and summarizations of the information are done by automatic data processing machines. Under these agreements the Biometrics Unit at Cornell University is handling the work for thirteen Northeastern States; the Data Processing Center at Texas A&M College has the material from Arkansas, Louisiana, New Mexico, Oklahoma, and Texas; and the Statistical Laboratory at Iowa State University is doing the work for the rest of the country. Most of the States have taken advantage of the machine facilities at these laboratories from the inception of this data collection project. In a few States, the original expansion and compilation of the data were done locally but the information has since been sent to the laboratories for entry on punch cards, so that various intrastate or interstate assemblies may be made by the machines. At this time the only exceptions to this are Arizona and Nevada where the original collection of data is still in progress, and Missouri where additional data are being collected to strengthen the very low sampling rate that was used originally.

Standard Data Cards

To facilitate the processing of the data, especially in combining figures from two or more States, a sample punch card was developed for use in all three laboratories. The format of this card is shown on page 17. The fields on the card are arranged in a definite order with enough columns in each field to allow for subdivision of some items. In many cases it was not necessary to use all of the columns in each field. One card is used for each line on a tally sheet so there may be a hundred thousand or more cards for some States. Each card gives the acreage of a particular combination of soil type, slope class, erosion class, and land-use class. Separate cards show the acreages of urban and built-up areas and of water.

Work is just starting at the statistical laboratories to transfer all of the information from the cards to magnetic tapes. When this transfer is completed the computing machines will be able to turn out analyses of the data much faster and cheaper than at present.

Coded Symbols on the Punch Cards

Only Arabic numerals and capital letters are used in recording the data on the cards. Mapping legends containing such symbols as plus or

minus signs, overscores, or parenthesis, or that used both capital and lower-case letters, were recoded to eliminate these symbols. Thus the symbols in the printed tables from the machines are not always the ones that are found on the soil survey maps or the tally sheets. For local use it may be necessary to decode the tables.

A national coding was adopted for some items as shown below and for other items the States developed their own codes as needed.

States. The symbol for each State is the number given in the following alphabetical list.

Counties. The symbol is the number of the county in an alphabetical list.

Sample Units. At the time the samples were drawn, numbers were assigned by the laboratories to identify both the stratum and the sample unit. Normally these are the code symbols used on the cards, but numbering systems developed by the State have been used in some cases.

Sample Unit Size. The following list includes the sample unit sizes and the code numbers assigned:

- | | | |
|--------------|--------------|--------------|
| 1. 40 acres | 3. 160 acres | 5. 640 acres |
| 2. 100 acres | 4. 400 acres | |

Land-Resource Units and Major Land-Resource Areas. When land-resource units were identified on the county base maps the symbols were provided by the State with a legend showing the relation of the land-resource units to major land-resource areas. These are identified on the cards and the symbols on the cards are the same symbols as shown on the map of Land-Resource Regions and Major Land-Resource Areas of the United States, printed January 1963. In any case, a statement is on file in the State and at the laboratory relating any local coding to the national map.

Soil Conservation Districts. Many districts consist of single counties and can be identified by the county symbol. When separate code symbols were used they were assigned by the State.

Ownership. The following symbols were used:

1. Non-Federal land
2. Federal land

Other breakdowns were optional and if used, were coded by the State.

Soil Types. Soil types with modifying factors such as salinity, depth to water table, flood hazard, etc., were coded by the States. Slope and erosion information is shown in separate columns.

Slope. Mapping separations are coded by the State. The standard punch card has enough columns to permit the recording of the slope class range in percent, dominant slope, slope modifier such as K, and slope class letter. In most cases only the slope class letter was used.

Erosion. The first column is used for recording broad classes, but additional columns are provided for State coding of finer separations for which information needs to be preserved.

Land Use. The following code was used:

1. Cropland
2. Pasture and Range
 - 21 Pasture } when these two were separated
 - 22 Range }
3. Forest and Woodland
 - 31 Forest and Woodland, undergrowth not suitable for grazing
 - 32 Forest and Woodland, undergrowth suitable for grazing
4. Other Land
5. Urban and Built-up Areas
6. Water

Only the broad classes were required; the use of subdivisions was optional with the States. These breakdowns of land uses were coded by the States.

Measured Acreage. Data were recorded directly on the punch cards from the tally sheets.

Land-Capability Units. Arabic numerals are used instead of Roman numerals for the class numbers. Subclass symbols may be recorded as capital letters or they may be a numerical code in which 1, 2, 3, and 4 are used instead of E, W, S, and C. Two more columns are provided for the remaining symbols which were assigned by the State.

Watersheds. A few States recorded watersheds of less than 250,000 acres, from information used in the conservation needs inventory. In these and all other States, however, the cards are now keyed to the Rivers and Tributaries outlined on the maps in the Atlas of River Basins of the United States, June 1963. These drainage areas have a minimum size of 750 square miles (480,000 acres).

Stratum Size. Three columns are allowed for recording information needed by the laboratory.

Because of a change in procedure since the format of the card was developed, columns 60 to 62 were left open. Some States are using them to record information desired locally such as forest-site or range-site identification.

The tables coming from the data processing machines are printed according to code symbols used for identifying the different items. For some purpose it may be necessary to have them decoded using the local symbols and names.

CODE SYMBOLS FOR STATES AND TERRITORIES

Alabama	1
Alaska	2
Arizona	3
Arkansas	4
California	5
Colorado	6
Connecticut	7
Delaware	8
Florida	9
Georgia	10
Hawaii	11
Idaho	12
Illinois	13
Indiana	14
Iowa	15
Kansas	16
Kentucky	17
Louisiana	18
Maine	19
Maryland	20
Massachusetts	21
Michigan	22
Minnesota	23
Mississippi	24
Missouri	25
Montana	26
Nebraska	27
Nevada	28
New Hampshire	29
New Jersey	30
New Mexico	31
New York	32
North Carolina	33
North Dakota	34
Ohio	35
Oklahoma	36
Oregon	37
Pennsylvania	38
Puerto Rico	39
Rhode Island	40
South Carolina	41
South Dakota	42
Tennessee	43
Texas	44
Utah	45
Vermont	46
Virginia	47
Virgin Islands	48
Washington	49
West Virginia	50
Wisconsin	51
Wyoming	52

FUTURE REVISIONS OF THE MAPS

In the initial effort use was made of maps and measured data from some soil surveys that do not qualify as standard although the separations were adequate for determining the acreage of land capability units. With rapidly expanding uses being made of the data, it may be desirable to remap samples from these areas according to an up-to-date legend for standard soil surveys. Or, in counties where the sampling procedure was followed, it may be necessary to map additional sample units to get information about some soil separations which do not occur in the original samples.

The mapping will be revised if the soil classification and delineations are not adequate or if the land-use separations on the map do not agree with the present definitions or with the present conditions on the ground. In most cases, land-use revisions will be all that are necessary.

Any revisions will be made on copies of the maps instead of on the original field sheets. Revised or new work will be measured and the data recorded in the usual manner. File copies of any such maps and tally sheets will be dated and retained.

Sample Card

		State
		County
		Sample Unit
		Size Land Resource Unit
		SCD
		Water-shed
		Ownership
		Soil Type, etc.
		Slope
		Erosion
		Land Use
		Present Acreage
		Land Cap. Unit
		Stratum Size
0	0	0
1	1	1
2	2	2
3	3	3
4	4	4
5	5	5
6	6	6
7	7	7
8	8	8
9	9	9
0	0	0
1	1	1
2	2	2
3	3	3
4	4	4
5	5	5
6	6	6
7	7	7
8	8	8
9	9	9
0	0	0
1	1	1
2	2	2
3	3	3
4	4	4
5	5	5
6	6	6
7	7	7
8	8	8
9	9	9
0	0	0
1	1	1
2	2	2
3	3	3
4	4	4
5	5	5
6	6	6
7	7	7
8	8	8
9	9	9
0	0	0
1	1	1
2	2	2
3	3	3
4	4	4
5	5	5
6	6	6
7	7	7
8	8	8
9	9	9
0	0	0
1	1	1
2	2	2
3	3	3
4	4	4
5	5	5
6	6	6
7	7	7
8	8	8
9	9	9
0	0	0
1	1	1
2	2	2
3	3	3
4	4	4
5	5	5
6	6	6
7	7	7
8	8	8
9	9	9
0	0	0
1	1	1
2	2	2
3	3	3
4	4	4
5	5	5
6	6	6
7	7	7
8	8	8
9	9	9
0	0	0
1	1	1
2	2	2
3	3	3
4	4	4
5	5	5
6	6	6
7	7	7
8	8	8
9	9	9
0	0	0
1	1	1
2	2	2
3	3	3
4	4	4
5	5	5
6	6	6
7	7	7
8	8	8
9	9	9
0	0	0
1	1	1
2	2	2
3	3	3
4	4	4
5	5	5
6	6	6
7	7	7
8	8	8
9	9	9
0	0	0
1	1	1
2	2	2
3	3	3
4	4	4
5	5	5
6	6	6
7	7	7
8	8	8
9	9	9
0	0	0
1	1	1
2	2	2
3	3	3
4	4	4
5	5	5
6	6	6
7	7	7
8	8	8
9	9	9
0	0	0
1	1	1
2	2	2
3	3	3
4	4	4
5	5	5
6	6	6
7	7	7
8	8	8
9	9	9
0	0	0
1	1	1
2	2	2
3	3	3
4	4	4
5	5	5
6	6	6
7	7	7
8	8	8
9	9	9
0	0	0
1	1	1
2	2	2
3	3	3
4	4	4
5	5	5
6	6	6
7	7	7
8	8	8
9	9	9
0	0	0
1	1	1
2	2	2
3	3	3
4	4	4
5	5	5
6	6	6
7	7	7
8	8	8
9	9	9
0	0	0
1	1	1
2	2	2
3	3	3
4	4	4
5	5	5
6	6	6
7	7	7
8	8	8
9	9	9
0	0	0
1	1	1
2	2	2
3	3	3
4	4	4
5	5	5
6	6	6
7	7	7
8	8	8
9	9	9
0	0	0
1	1	1
2	2	2
3	3	3
4	4	4
5	5	5
6	6	6
7	7	7
8	8	8
9	9	9
0	0	0
1	1	1
2	2	2
3	3	3
4	4	4
5	5	5
6	6	6
7	7	7
8	8	8
9	9	9
0	0	0
1	1	1
2	2	2
3	3	3
4	4	4
5	5	5
6	6	6
7	7	7
8	8	8
9	9	9
0	0	0
1	1	1
2	2	2
3	3	3
4	4	4
5	5	5
6	6	6
7	7	7
8	8	8
9	9	9
0	0	0
1	1	1
2	2	2
3	3	3
4	4	4
5	5	5
6	6	6
7	7	7
8	8	8
9	9	9
0	0	0
1	1	1
2	2	2
3	3	3
4	4	4
5	5	5
6	6	6
7	7	7
8	8	8
9	9	9
0	0	0
1	1	1
2	2	2
3	3	3
4	4	4
5	5	5
6	6	6
7	7	7
8	8	8
9	9	9
0	0	0
1	1	1
2	2	2
3	3	3
4	4	4
5	5	5
6	6	6
7	7	7
8	8	8
9	9	9
0	0	0
1	1	1
2	2	2
3	3	3
4	4	4
5	5	5
6	6	6
7	7	7
8	8	8
9	9	9
0	0	0
1	1	1
2	2	2
3	3	3
4	4	4
5	5	5
6	6	6
7	7	7
8	8	8
9	9	9
0	0	0
1	1	1
2	2	2
3	3	3
4	4	4
5	5	5
6	6	6
7	7	7
8	8	8
9	9	9
0	0	0
1	1	1
2	2	2
3	3	3
4	4	4
5	5	5
6	6	6
7	7	7
8	8	8
9	9	9
0	0	0
1	1	1
2	2	2
3	3	3
4	4	4
5	5	5
6	6	6
7	7	7
8	8	8
9	9	9
0	0	0
1	1	1
2	2	2
3	3	3
4	4	4
5	5	5
6	6	6
7	7	7
8	8	8
9	9	9
0	0	0
1	1	1
2	2	2
3	3	3
4	4	4
5	5	5
6	6	6
7	7	7
8	8	8
9	9	9
0	0	0
1	1	1
2	2	2
3	3	3
4	4	4
5	5	5
6	6	6
7	7	7
8	8	8
9	9	9
0	0	0
1	1	1
2	2	2
3	3	3
4	4	4
5	5	5
6	6	6
7	7	7
8	8	8
9	9	9
0	0	0
1	1	1
2	2	2
3	3	3
4	4	4
5	5	5
6	6	6
7	7	7
8	8	8
9	9	9
0	0	0
1	1	1
2	2	2
3	3	3
4	4	4
5	5	5
6	6	6
7	7	7
8	8	8
9	9	9
0	0	0
1	1	1
2	2	2
3	3	3
4	4	4
5	5	5
6	6	6
7	7	7
8	8	8
9	9	9
0	0	0
1	1	1
2	2	2
3	3	3
4	4	4
5	5	5
6	6	6
7	7	7
8	8	8
9	9	9
0	0	0
1	1	1
2	2	2
3	3	3
4	4	4
5	5	5
6	6	6
7	7	7
8	8	8
9	9	9
0	0	0
1	1	1
2	2	2
3	3	3
4	4	4
5	5	5
6	6	6
7	7	7
8	8	8
9	9	9
0	0	0
1	1	1
2	2	2
3	3	3
4	4	4
5	5	5
6	6	6
7	7	7
8	8	8
9	9	9
0	0	0
1	1	1
2	2	2
3	3	3
4	4	4
5	5	5
6	6	6
7	7	7
8	8	8
9	9	9
0	0	0
1	1	1
2	2	2
3	3	3
4	4	4
5	5	5
6	6	6
7	7	7
8	8	8
9	9	9
0	0	0
1	1	1
2	2	2
3	3	3
4	4	4
5	5	5
6	6	6
7	7	7
8	8	8
9	9	9
0	0	0
1	1	1
2	2	2
3	3	3
4	4	4
5	5	5
6	6	6
7	7	7
8	8	8
9	9	9
0	0	0
1	1	1
2	2	2
3	3	3
4	4	4
5	5	5
6	6	6
7	7	7
8	8	8
9	9	9
0	0	0
1	1	1
2	2	2
3	3	3
4	4	4
5	5	5
6	6	6
7	7	7
8	8	8
9	9	9
0	0	0
1	1	1
2	2	2
3	3	3
4	4	4
5	5	5
6	6	6
7	7	7
8	8	8
9	9	9
0	0	0
1	1	1
2	2	2
3	3	3
4	4	4
5	5	5
6	6	6
7	7	7
8	8	8
9	9	9
0	0	0
1	1	1
2	2	2
3	3	3
4	4	4
5	5	5
6	6	6
7	7	7
8	8	8
9	9	9
0	0	0
1	1	1
2	2	2
3	3	3
4	4	4
5	5	5
6	6	6
7	7	7
8	8	8
9	9	9
0	0	0
1	1	1
2	2	2
3	3	3
4	4	4
5	5	5
6	6	6
7	7	7
8	8	8
9	9	9
0	0	0
1	1	1
2	2	2
3	3	3
4	4	4
5	5	5
6	6	6
7	7	7
8	8	8
9	9	9
0	0	0

BIBLIOGRAPHY

1. Taylor, Howard L., Statistical Sampling for Soil Mapping Surveys, Mimeo-Multilith Series No. 5, Statistical Laboratory, Iowa State University, Ames, Iowa. pp. 66-70.
2. Soils Memorandum SCS-21 (Revised), Developing Basic Data on Soil and Land-Use Conditions.
3. Agriculture Handbook No. 210, Land Capability Classification.
4. Budget Bureau No. 40-5759, Policy and Procedure for Development of National Inventory of Soil and Water Conservation Needs.

U. S. DEPT. OF AGRICULTURE
NATIONAL AGRICULTURAL LIBRARY
SEP 17 1964
C & R-PREP.

