

THE NEBRASKA COOPERATIVE SOIL SURVEY PROGRAM - 1953 THROUGH 1995

An addendum to History of Nebraska Soil Survey

An Addendum to the History of Nebraska Soil Survey. By: Jim Culver, Nebraska State Soil Scientist from 1971- 1988 and Norm Helzer, Nebraska State Soil Scientist from 1988 - 1995

Overview of Making the Second Generation of Soil Maps for all Lands in Nebraska

The Nebraska Cooperative Soil Survey Program has a rich history of making and publishing beginning in the early 1900's. Dr. George Condra, Director of the Conservation and Soil Survey unit at the University of Nebraska received the State legislature's first appropriation of funds in the amount of \$1,000 for soil surveys in 1909.

The United States Department of Agriculture in cooperation with the Nebraska Soil Survey mapped and published between 1905 and 1940 soil surveys for all counties in Nebraska except for six counties in the Sandhills. These counties were Grant, Arthur, Hooker, McPherson, Thomas and Logan counties. Soil survey work for the purpose of publications was limited during World War II. Beginning in 1952 a national priority was put forth to again make and publish soil surveys for lands nationally.

During the period from 1952 to August of 1995 field mapping to make soil surveys for all lands in the State of Nebraska was completed using in general a uniform set of guidelines and procedures. Nebraska county soil surveys were published cooperatively by the United State Department of Agriculture- Soil Conservation Service and or Natural Resource Conservation Service in cooperation with the Conservation and Survey Division - University of Nebraska.

A 215-page booklet entitled "History of Nebraska Soil Survey" prepared by the Nebraska Society of Professional Soil Scientists provides excellent detail of the soil survey work through the years of making a county soil survey for all lands in the state.

This so-called second generation of soil surveys for the state of Nebraska was made under the management direction of three different State Soil Scientists. The three State Soil Scientists were Lloyd Mitchell from 1952 to June of 1971 – about 19 years; Jim Culver from June of 1971 to June of 1988 – about 17 years and Norm Helzer from June 1988 through 1995- about 7 years.

The approximate percent of soils mapped in Nebraska during the time of each State Soil Scientist is as follows: Mitchell – about 40 percent of Nebraska. Culver – about 45 percent Nebraska. Helzer – about 15 percent of Nebraska. The field work over this period of about 43 years was done by about 165 different field soil scientists.

This document discusses management, staffing, the processes, and procedures used in conducting the Nebraska soil survey. Basically, during Mitchell's time the second generation of soil surveys was started with some soil surveys published. During Culver's time as State Soil Scientists a large acreage of the soil surveys were mapped and published. Helzer was the State Soil Scientist that provided the leadership in the completion of the soil survey field mapping for all remaining counties in the state.

The contents and references in this document are from a variety of sources. To the best of our ability, we feel the information contained reflects the condition of the times and provides a good insight as to how the Nebraska soil survey program was managed during this period of 43 years. We trust the important soil survey events have been correctly recorded with the number of oversights and omissions held to a minimum.

Nebraska State Soil Scientists from 1952 through 1995



Lloyd Mitchell "Mitch" — State Soil Scientist from 1952 -1971 on right and Don Yost, Soil Scientist on left. Mitch worked on many mobile soil survey details early in his career. Graduate of University of Nebraska.



Jim Culver — State Soil Scientist from 1971—1988

Graduate of Oklahoma State University. Worked as field soil scientist in Oklahoma, Soil Specialist in Iowa and Assistant State Soil Scientist in Iowa prior to moving to Nebraska in 1971 as State Soil Scientist.

Norm Helzer — State Soil Scientist from 1988—1995

Graduate of University of Nebraska and Graduate study at Iowa State University. Field soil scientist in Iowa, Foreign assignment in Saudi Arabia 1982-1984; Project Leader in Nebraska 1977-1982 and Assistant State Soil Scientist in Nebraska 1985-1988.



Respectively Submitted by:

Jim Culver

Jim Culver - Nebraska State Soil Scientist

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Norm Helzer— Nebraska State Soil Scientist

Lloyd Mitchell, Nebraska State Soil Scientist during the years of 1947 - 1971

Lloyd Mitchell was the Nebraska State Soil Scientist during the period 1947 to mid-1971. In the early 1950's the National Cooperative Soil Survey with the United States Department of Agriculture (USDA) – Soil Conservation Service (SCS) as the lead agency initiated a highly successful program of field mapping, correlation interpretation and publication of soil surveys of the United States.

This redirection of making and publishing soil surveys for all lands in the United States was a goal of the newly reorganized soil survey program at the Federal level. The soil survey program of the Bureau of Plant Industry, Soils and Agricultural Engineering (BPI) and the USDA-SCS were consolidated and the SCS was directed as the lead Federal Agency for making, correlating and publishing soils surveys in 1953.

Lloyd Mitchell was commonly called “Mitch”. His career was quite variable, and he worked during two major time frames of the U.S. soil survey. He graduated from the University of Nebraska in 1929 and worked as a Geologist with Skelly Oil Company in Tulsa, Oklahoma from 1929-31. He was an instrument man with the Nebraska State Highway Department out of Lincoln, Nebraska from 1931- 36. He began his career as a soil scientist on 4-15-36 as a Junior Soil Surveyor. During this period of time there were numerous mobile soil surveys to make soil maps for special Soil Conservation Service projects across the country. From 1936-1940 Lloyd did soil survey work in Missouri, Wisconsin, Nebraska, Kansas, Oklahoma, Texas and Arkansas. From 1940-1942 he did soil mapping in Nebraska with SCS. He was Area Soil Scientist in Nebraska from 1942 -1947. He began his 24 years tenor as Nebraska State Soil Scientist in 1947.

Soil survey mapping in Nebraska prior to the 1950s was largely for providing soils information for use by SCS in planning. These surveys were commonly called Soil Conservation Surveys. There was no strong effort to correlate soil mapping units for publication, and the soil legend was more of an “open legend” rather than a controlled legend. The local SCS District Conservationist used the interpretative soil information in planning and working with local farmers and ranchers.

There was a significant decline in field soil survey work in Nebraska during the period of World War II.

At the end of World War II there were two well identified groups making soil surveys in the United States. One was the Bureau of Plant Industry, Soils and Agricultural Engineering (BPI). The other was the United States Department of Agriculture -- Soil Conservation Service (SCS).

Each group had a different agenda. The Bureau of Plant Industry, Soils and Agricultural Engineering goal was making and publishing soil surveys with a strong soil science basis. The USDA- Soil Conservation Service (SCS) goal was to make soil conservation soil surveys to

assist with the total SCS program in providing resource assistance to landowners. SCS had significantly more soil scientists than the BPI due to a much larger budget to hire soil scientists. At this time, there was low priority for SCS to publish correlated soil surveys.

Thus, there were frequent disagreements on the process used in making soil surveys and the soil science used in making soil surveys. Cooperation between these two groups was not good. Congress took the matter into their own hands. So, the Secretary Memorandum No 1318 dated October 14, 1952, ended the dispute between the two agencies. The two agencies were consolidated into one agency. The Bureau of Plant Industry Soils and Agricultural Engineering was consolidated into the USDA- SCS. The soil survey program of the Bureau of Plant Industry Soils and Agricultural Engineering no longer existed.

A new National Federal Soil Survey program in USDA- SCS under the Direction of Dr. Charles Kellogg quickly became very structured and organized with the goal of making and publishing soil surveys for all public lands in the United States.

Mitchell had the responsibility in Nebraska to get the new state soils program up and going using the newly installed national guidelines promoted by Kellogg. Soil legends were made or updated for each County. High emphasis was placed on staffing field soil scientists to concentrate their work by completing soil maps on specific scheduled counties and not just doing request mapping all over the place with less emphasis on getting the soils work published. Each soil scientist was assigned a specific county in which to concentrate and accelerate their acreage of soil survey field mapping.

Nebraska from the beginning of making and publishing soil surveys in the United States had a rich history of Federal-State soil survey program accomplishments. From the early 1900's through the late 1930's soil scientists mapped and published 87 of Nebraska's 93 counties. All of these soil surveys were published using a very similar format. The soil maps were mainly one inch per mile (1:26,960) on colored, non-photographic base line maps, except for the Soil Survey of Cherry County that was published on a series of maps at a scale of 1:63,630. The soil surveys that were not completed during this time era were the Sandhill's counties of Grant, Arthur, Hooker, McPherson, Thomas and Logan.

Over the years almost all of the Nebraska counties had conservation planning type soil maps that had been made on some lands in each county. These soil surveys were made more based on soil properties and a national or state modified mapping code. The new soil surveys made under Kellogg's direction were to be made using the soil series concept, correlated using a national soil classification system. All soil maps were to be joined within and between counties for a continuum across the county.

Quality Assurance was given high priority by Kellogg in making and publishing soil surveys by the United States Government Printing Office (GPO). The entire process of making and documenting soil surveys abruptly changed. Standard Soil Survey legends were prepared for each county – commonly the soil survey area in Nebraska. Project Leaders were assigned and responsible for the county soil survey. Acreage goals were established for each Project Leader and members of the soil survey party. There was a daily record of how each soil scientist charged their time, and reported the acres mapped. Code 31 that was used for field mapping and code 32

that was used for describing soils and other soils related activities. Also, there were other codes used to provide support to SCS field offices such as code 39.

The acreage goals of all Project Leaders and soil scientists were aggregated for a state soil mapping goal. The state goal was sent to Kellogg's office. The National office summarized each state soil mapping accomplishment by months and informed each State Soil Scientist if they were meeting soil mapping goals. If states field soil mapping accomplishments were significantly lower than what they had projected, it was not uncommon for Kellogg to write the SCS State Conservationists and State Soil Scientists that they were not meeting their soil mapping goals. Thus, there was always a lot of pressure on State Soil Scientists, Area Conservationists, and in the end, the field soil scientists to meet their projected soil mapping goals.

One of the big problems was the weather from year to year was often quite variable and the amount of possible field time was less due to long rainy periods during prime soil mapping time or early snow in the fall or a late winter. Also, the potential acres mapped by each soil scientist varied greatly depending on the complexity of soils in the area. For example, a field soil scientist in the Nebraska Sand Hills area was able to map many more acres than a soil scientist in, for example, Saunders County where the soils were more complex and time consuming to make a quality soil map.

During Lloyd Mitchell's guidance as Nebraska State Soil Scientist from the beginning of the 1953 consolidated National Soil Survey program to Mitchell's retirement in 1971 excellent progress was made in soil survey mapping, completion of field work by counties and publication of soil surveys by counties.

Making and completing a soil survey ready for publication by the Government Printing Office required a lot of hard work and coordination from many people. The field time for an average county in the loess- type landscapes commonly required about 12 man years of field work. There was a Party Chief (later named changed to Party Leader) and one to three or more other assigned soil scientists to do the field work. Once the field work was done the soil descriptions, soil maps and supporting documentation for the soil survey went through a process called Soil Correlation. The soil correlation process ensured each soil mapping unit was unique and met the standards for the National Soil Classification.

During the course of the soil survey there were usually what was called Soil Survey Field Reviews that were made to check the quality and progress of the soil survey by the Soil Correlator and State Soil Scientist. There were Initial, Progress and Final Field Reviews made during the course of the county soil survey. A report was written and sent to Kellogg's office for review and information. At the end of the field mapping a final field review was made to firm up the name of each soil mapping unit and to review the information that had been prepared for the soil survey manuscript that became the text part of the published soil survey.

After the Final Field Review a soil correlation report was prepared. Ross Greenawalt was the Nebraska Soil Correlator during this period of time. For the most part each state had a soil

correlator responsible for the quality assurance of field work and documentation of the soil survey. Once a final draft of the soil correlation had been prepared by the state there were Regional Soil Correlators who reviewed and approved the Final Soil Correlation Report for the soil survey area. In Nebraska, the Northern Great Plains Soil Correlation staff located in Lincoln, directed by Dr. Andy Aandahl, approved this soil correlation document. The soil survey publication printed by the Government Printing Office used the soil names and soil classification approved in the Final Soil Correlation Report.

Field soil mapping was done on aerial photography. On completion of the field work and the Final Soil Correlation document, the soil maps were compiled on a mosaic rectified map for publication. This was a very tedious and time-consuming job done by the cartographic staff at the USDA-SCS Regional Cartographic Units. One such unit was in Lincoln, Nebraska and they did the final compilation of soil maps used in the publication of several Nebraska Counties. Joe Casey was the Head of the Lincoln Cartography Unit for a good number of years during this phase of the Nebraska soil survey program.

At the time of Mitchell's retirement there were 15 Nebraska Counties published by the United States Department of Agriculture – Soil Conservation Service in cooperation with the Conservation and Survey Division – University of Nebraska. Each county soil survey was printed by the Government Printing Office (GPO). Each soil survey report contained detailed soil maps with aerial photography background, soil descriptions, soil interpretations and other scientific soil information.

Nance County was the first soil survey published in this new modern series of Nebraska soil surveys. It was previously almost all mapped by SCS using the National Code system in doing farm requested mapping for planning. Herb Kollmorgen, Soil Scientist was assigned the task of reviewing this mapping, describing the representative series, preparing soil correlation documents and the manuscript for publication. Fieldwork for Nance County was completed in 1954 and published in 1960.

The National Cooperative Soil Survey Program included all of the partners who were involved in making soil surveys in the United States. For the most part it included the USDA-SCS, and the University lead agency responsible for the coordination of soil survey work. In Nebraska this agency was the Conservation and Survey Division- University of Nebraska (CSD-UNL).

The cooperative Extension Service was also very active in assisting with the distribution and education of newly released published soil survey. County meetings were held shortly after the newly published soils survey was released by the Government Printing Office. There were enough of the publications available to provide a copy of each soil survey to all interested farmers and ranchers in the county. Several state and county leaders assisted with this successful education work. Harold Gillman was the University of Nebraska Extension person who coordinated many local county soil survey educational meetings. The program for the newly released soil survey usually included the Party Leader who made the soil survey, State Soil Scientist, local District Conservationists, local Extension County Agent, representative of the

CSD – UNL and the Soils Research Professor at UNL. The numbers of meetings ranged from one to several depending on the size and number of interested people in the subject county.

In addition to the 15 published county soil surveys at the time of Mitchell's retirement in 1971 there were 21 counties with the field work completed but at some stage of preparation for publication by the Government Printing Office. There were soil surveys conducted in 18 counties. For the most part all of the soil mapping in each county was being done by one person – the Party Leader.

At the time of Mitchell's retirement an excellent foundation had been laid for completing quality soil surveys in the state. A lot had been done in terms of mapping acres of soil survey, but much remained to be done. There was an excellent core of project leaders who for the most part were quite experienced and knew how to do quality soil survey field work.

Ross Greenawalt, the Nebraska Soil correlator, also retired about the same time as Mitchell. Two other people who had lead roles in the Nebraska soil survey program during Mitchell's time as State Soil Scientist were Herb Kollmorgen, Assistant State Soil Scientist from Nebraska and Dr. Jim Drew soils department at University of Nebraska. Dr. Drew did considerable research on soils, remote sensing and served as an instructor in soil morphology and classification and provided guidance to many soils' graduate students. Also, Don Yost transferred from Scottsbluff in 1970 to the Nebraska Soils State Office staff to assist with the review and editing of soil survey manuscript.

Jim Culver followed Mitchell as Nebraska State Soil Scientist for the USDA-SCS from 1971 – 1988.

In 1971 the conservation farmers and ranchers in Nebraska voted to change their organizational structure. Rather than to continue with the traditional Soil and Water Conservation District in each County along with other types of Districts such as Irrigation and drainage, the people voted to have conservation districts based on hydrologic units. The people voted for the formation of 24 new Natural Resource Districts (NRD's). Each NRD had the ability to get operating funds through the process of local taxation.

During the early 1970s there was strong interest from the NRD's, County Commissioners/Supervisors, and the Nebraska Department of Revenue to accelerate the total soil survey program. The NRD's wanted the soils information to assist with their soil and water conservation work, and the Nebraska Department of Revenue wanted soils information to help in the fairness or equalization process in valuation of all agricultural lands in a county.

Jim Culver, Vince Dreezen, Director of the Conservation and Survey Division (CSD)-UNL, John Elder, Principal Soil Scientist at CSD, Marvin Carson, Assistant Director (the money and how to do it man) of CSD and Dayle Williamson, Director of the Nebraska Natural Resource Commission provided the direction in developing a plan that became the Nebraska Accelerated Soil Survey Program. John Elder and Jim Culver went to many local meetings throughout the state to meet with local NRD people, County Supervisors and County Commissioners to encourage local cooperative funding to use in hiring new soil scientists, buy probe trucks, and secure high flight aerial photographs used in making the soil map. Agreements were prepared between the SCS, NRD's, County Commissioners/Supervisors and CSD-UNL to accelerate soil survey field work in many counties.

Acceleration of soil mapping began in 1973 with monies from the NRD's and County Commissioners/Supervisors to hire more field soil scientists. These new field soil scientists were hired by the Conservation and Survey Division- University of Nebraska using these local monies. These Conservation and Survey Division soil scientists were assigned to work in counties already staffed with a SCS soil scientist Project Leader. Cooperative agreements were prepared and signed each year until the county soil survey was completed- usually about four years in duration.

There was an initiative to get State funding from the Nebraska Legislator for accelerating the state soil survey program. This initiative was led by groups such as the Nebraska State Department of Revenue, Nebraska Association of County Officials, Nebraska Association of County Assessors, Nebraska Association of Natural Resource Districts, County Commissioners, County Supervisors, Nebraska Department of Natural Resources and the University of Nebraska – Conservation and Survey Division. This movement was successful as Legislative Bill 180 – Nebraska Soil Survey Fund sponsor by Senator Burbach, Knox County passed. This Nebraska State funding in the annual amount of 350,000 dollars along with funding from the Natural Resource Districts, County Commissioners, County Supervisors and funding from the Old West

Regional Commission really provided the additional monies that accelerated the soil survey program forward. New soil scientists were hired, soil probe trucks purchased, high flight aerial photography secured and enabled additional support needed to successfully move the accelerated soil survey forward.

A successful 12- Year Accelerated Soil Survey Plan for Nebraska was prepared. Total cost projected ranged from about 1 million to 1.6 million dollars per year. During this period of time an accelerated state effort was made to map, complete and publish soil surveys for all counties in the state.

A booklet entitled “History of Nebraska Soil Survey” provided some excellent detail of events from 1971 through 2000. Some good charts on acreage production show up to 3 million acres mapped in 1985 and up to 45 field soil scientists in 1979.

The process of making, correlating and publishing the soil survey 1971 through 1988 was similar to what was done in prior years. There were several areas of modernization of how things were done. Progress Field Reviews, Final Field Reviews and Final Soil correlations were done. More effort was made to have soil correlation samples from representative soils for correlation and more effort to have additional quality soil descriptions, more on composition of soil mapping units. New soil series were identified as soil mapping progressed, and we learned more about the complexity of soils across the state.

One of the pioneer processes to use computers to store soil descriptions was led by Lou Buller, Soil Correlator. There was a big change in how soil interpretations were prepared for use in soil survey manuscripts. Support staff no longer used long carriage typewriters to do engineering and other tables in manuscripts. Soils -5 Soil Interpretations and Soils- 6 Forms were used to computer prepare interpretative tables in soil survey manuscripts.

Keith Young began his career as a soil scientist in Nebraska. He later was on the soils staff at the SCS South Technical Center in Ft. worth Texas. He was one of the led individuals in the early 1970s to develop prototypes in preparing computer generated soil interpretations. Keith was later on the National Office soils staff in Washington D.C. There he worked with Harvey Terpstra and others at Iowa State University Statistical Laboratory to develop the famous soils SOI-5 and SOI-6 forms. These forms were used to record soils information and prepare by computer soil interpretative tables for the soil manuscripts. This was a big step forward and the process was used throughout the nation. Later years, through a series of process, this soils database became known as NASIS.

Keith had a son – Phil who also became a soil scientist employed by the Conservation and Survey Division-UNL that did soil survey work in several Nebraska counties.

More emphasis was made on sending soil samples to the laboratory at the Nebraska Department of Roads Soils Laboratory and the USDA-SCS National Soil Survey Laboratory to get analysis data to assist in correlation and making soil interpretations.

There was an excellent soils staff during the 1970's and 1980's. In 1971 there were about 18 field soil scientists who were Soil Survey Party Leaders. Each was assigned a specific county in which to do block soil survey field mapping. Each of the Project Soil Survey Leaders was required to do what was called request soil mapping. Request soil mapping was done on specific tracks of land in other counties that did not have a soil survey. This soil survey information was needed by the SCS District Conservationist or others in doing resource planning. All of the 18 Soil Survey Project Leaders were very experienced and knew the soils of the area. Many of them were Veterans of World War II and came to work with SCS after their college graduation in Soils and Agronomy through the Veterans Administration (VA) programs. AS the Conservation and Survey Division-UNL hired new soil scientists the total number of field soil scientists making soil maps in the state increased to about 45.

Annual Plans of Soil Survey Operations were prepared each year for each Project Soil Survey. An annual meeting was held usually during the less productive field time in the winter with the Area Conservationist, State Soil Scientist and staff, Soil Survey Project Leader and members of the field soil survey party. Goals were established and agreed on by management and the field soil scientists. Schedules were prepared for writing various parts of the soil survey manuscripts and the kind of assistance needed to prepare sections of the soil survey manuscript such as range, agronomy, windbreaks and etc. were identified.

The Federal part of funding the Nebraska soil survey program was from the United States Department of Agriculture – Soil Conservation Service annual budget allocations to each state. There were activities codes to specifically indicate the intent of where the budgeted monies from the SCS National Office should go. For example, the monies for soil survey were coded CO-02 while those for general soil conservation operations were coded CO-O1. There were other codes for watershed activities, Great Plains etc. The SCS State Conservationist had some latitude on how the funds were spent in each state. The Nebraska funds identified a CO-O2 were used to pay the salary of all SCS soil scientists, support staff, equipment, operations cost such as gas, repairs of equipment, aerial photography etc. As a State Soil Scientist, one always closely reviewed how these funds were used and at times there was opportunity to use other funds such as CO-O1 to assist in paying for some of the soil survey related work. This was always a big help as with more monies one could do some of the extra things to make the total soil survey program run more smoothly.

As State Soil Scientist, there were a few select people one wanted to have a good working relationship with in order to get the total job done and have fun at the same time. At the top was the State Conservationists as he had responsibility of managing the total SCS program in the state. Overall, the State Conservationists in Nebraska were very supportive of the Nebraska soil survey program. From 1971 through 1988 the State Conservationists were as follows: Keith Meyers, Bill Parker, Benny Martin, Gene Sullivan and Ron Hendricks. There were three groups of people in the state office that were important for your success. These people were the budget people as there were always needed adjustment in the budget and if you could work with them effectively life was better, second were the people in procurement and contracts as getting equipment, aerial photography and etc. without snags was good, and the third group of people

were those in personnel as they were important in hiring new people, promotions of staff and soil scientists. Also, quality relations with the Area Conservationists were important as they had responsibility for all employees in their area including soil scientists.

Continuous training was a big part of the total soil survey program. Area soils workshops and state soils workshops were held on a usually annual basis. Project Leaders and members of the soil survey party were scheduled to attend soil correlation workshops, workshops to prepare soil survey manuscripts, training on soil engineering properties, Soil Science Institute and various other kinds of workshops to assist the soil scientists to be more effective in doing their assigned work.

Don Yost was the lead soil survey manuscript review person and a Soil Specialist who assisted with soil survey field reviews. Don retired in 1980. Lou Buller was the State Correlator from 1971 through 1974. Lou joined the Midwest National Technical Center as a Soil Correlator in 1975 and retired in 1989. Marvin Dixon from Texas followed Lou Buller as the Nebraska Soil Correlator from 1975 through 1985 when he moved to the Midwest National Technical Center Soils staff as a specialist who reviewed soil survey manuscripts. Marvin retired from SCS in 1988.

Herb Kollmorgen, Assistant State Soil Scientist retired in 1973 and John Brubacher, from Colorado, was selected as Nebraska Assistant State Soil Scientist. In 1979 John went to Madison, Wisconsin as State Soil Scientist and retired in 1986. Bob Pollock was a Soil Specialist on the state staff from 1981 -1985. Larry Ragon followed Bob to the Nebraska State Office soils staff in 1985 and retired in 1995.

Dr. Jim Drew left Nebraska in 1972 to head up the Experiment Station at the University of Alaska, Fairbanks. Dr. Dave Lewis, one of Drew's graduate students, became head of the soil department at the University of Nebraska in 1972 and held several leadership positions through 2000.

John Elder, Principal Soil Scientist at the Conservation and Survey Division and UNL retired in 1977 and Dr. Mark Kuzila became Principal Soil Scientist at the Conservation and Survey Division in 1977 and later Director of the Conservation and Survey Division-UNL.

Jim Culver moved to the Midwest Regional Technical Center in 1988 as lead soil scientist on the Ecological, Science and Environment staff at the Midwest National Technical Service Center in Lincoln.

Steve Schaeffer was the lead cartographer who coordinated the soil map finishing in Nebraska. Steve worked from 1972 through 2000 in the Nebraska State office. Soil map finishing was very tedious, and time consuming. Steve supervised many part time people, many who were college students. A series of overlays with stick on symbols were required, the booklet on History of Nebraska Soil Surveys" gives a good, detailed look at the process used. Steve was also a lead person on some of the first work to digitize soil surveys. A system called MIADS (Map Information and Display System) where soils were coded by various cell sizes was used and a variety of different kinds of soil interpretative maps were prepared. The scale of input cells was

for the most part either 10 acres or 2 and 2/3 acres in size. Many county soil surveys in northeast Nebraska were coded using the 2 and 2/3 acres cell size. The interpretative maps were used by Districts Conservationist and others in carrying out the soil conservation work of the Agency.

A major project was initiated in the late 1970's to prepare a more detail General Soil Map of Nebraska at a scale of 1:250,000. This is the scale of the common USGS Quad maps. Jim Culver, Bill McKenzie, a retired soil scientist who had much experience in Nebraska and on the Midwest Regional Soil Correlation Staff and John Elder, Principal Soil Scientist at the Conservation and Survey Division-UNL were the lead technical people who worked with field soil scientists and others on this project. A considerable amount of field work was done in coordination with published soil maps and other available pertinent resource information. The first map to be done was for the McCook Quadrangle at the 1:250,000 scale. The McCook map was compiled by the Lincoln Regional Cartographic Unit and printed in color. A General Soil Map was prepared for all of the 11 USGS Quads in the state and published in color. The General Soil Map of the McCook quads was the first prototype of the state general soil map series promoted by the USDA-National soils office. Bill Reynold, a soil scientist on the National office staff was in Lincoln and liked the map scale, detail and content of the published McCook General Soil Map. Bill took the idea back to Washington and it became later on known as SSURGO. Many national soil interpretations have been made using the- SSUGGO general soil maps of all states at the 1:250,000 scale.

Several of the Secretary-Office management staff during this period of time included Chris Tucker, Merna Perry, Nerine Newsham, Beverly Petri, and Linda Bouc. Chris Tucker later became the Administrative Office Manager for the Nebraska State Conservationists and Linda Bouc the Administrative Office Manager for the Director of the National Soil Survey Center.

The National Cooperative Soil Survey Program was very active throughout the United States in promoting quality working relationship between all Federal, State and University people involved in state soil survey programs throughout the country. Annual Regional Cooperative Soil Survey Conferences were held each year. The conference alternated between regions one year and National the next year.

Nebraska was in the North Central Regional Cooperative Soil Survey Conference area and the host for the Conference in 1987. Norm Helzer, Larry Ragon and Jim Culver were the Nebraska host coordinators. The conference was held at North Platte, Nebraska with a field trip to the Nebraska Sandhills. The conference was highly successful. Norm Helzer took care of all arrangements including an evening at a North Platte Celebration rodeo. Larry Ragon managed the very enjoyable and informative field trip the see soils and their landscapes in the Nebraska Sandhills. Two large buses provided transportation for this excellent and informative field trip.

Quality progress was made during the 17 years from 1971 to 1988 in the acceleration and completion of soil survey in Nebraska. In October of 1987 soil surveys had been published in Nebraska for 75 counties, field work completed and awaiting publication in 10 counties and 8 soil surveys in progress.

The USDA farm bill in the late 1980's required use of soil survey information. In 1987 a soil survey had been made on most all cropland in the state except for a large block of about 55,000 acres near Scottsbluff on high terraces of the North Platte River. A special detail of 9 field soil scientists in October of 1987 completed the soil survey for this last remaining large area of cropland in Nebraska.

A brief summary of soil survey field work and publication on soil survey in Nebraska for 1971 and 1987 is as follows: (See Figure 1 – Status of Recent Soil Surveys in Nebraska – July 1, 1971, and Figure 2 Status of Soil Surveys Nebraska - October 1987)

July 1, 1971

Published -- 15 Soil Surveys

Completed – Not Published -- 21 Soil Surveys

In Progress -- 18

October - 1987

75 Soil Surveys

10 Soil Surveys

8 Soil Surveys

As plans for completion of the once over of a soil survey for each Nebraska County it was apparent that some of the already completed soil surveys like Gage, Hall, Saunders, Washington counties were more than 25 years old and needed update. A long-range maintenance plan to periodically updated soil survey was needed to for the public to have current reliable soil information.

During the mid-1980's a proposal entitled "A Current Inventory of Soil Resources for Each Nebraska County" was prepared. This document outlined the reasons and needs for updating some of the older outdated county soil surveys. It outlined some of the resources and, number and kinds of people needed to do this work. It provided an excellent framework to periodically updated soil information over time.

One could envision that once the entire field mapping was done for the once over that someone could easily say that job is done and we can stop making soil maps. Not a good thought as updating of old county soil surveys and all counties needing some maintenance level in the long term would not be possible. To the extreme, potentially all funding could abruptly end with no more field soil scientists to update soil surveys, and the state could easily lose the current capacity to have a quality long term county soil survey maintenance plan.

Norm Helzer, Nebraska State Soil Scientist from 1988 through 1995

Norm Helzer became the Nebraska State Soil Scientist in 1988 and retired in 1995. In the mid 1980's the National Soil Survey Division created a new system of keeping track of all soil surveys. This tracking system included the schedule of various kinds of soil survey field reviews, targeted dates for soil correlation, date of field mapping completed, dates of when soil survey manuscripts are due to be completed, dates when soil map compilation are due to be completed, dates of when the soil survey is due to be published etc. This very complex tracking instrument was called CASPUS (Computer-Assisted Scheduling Program).

The CASPUS was used as a document to assist in allocation of monies for publication, schedule field work and many other soil survey activities. States were held accountable by the Washington Soil Survey Division on the schedule data that states entered on CASPUS and when they were going to accomplish specific soil survey tasks.

Norm Helzer, State Soil Scientist had the task of providing the leadership to complete the soil survey field work and getting the remaining soil survey published for the state. Except for Knox County the remaining counties to be completed were in western Nebraska. The eight remaining counties to have soil survey mapping to be completed were Knox, Sioux, Sheridan, Cherry, Garden, Cheyenne, Keith and Dundy Counties.

There were major shifts and redefining of the state soil survey program for Nebraska. Soil scientists were redirected to help District Conservationist and other users of the soil survey to use the vast amount of information contained in the published soil survey. Positions such as Resource Soil Scientist were established in each area. They were usually located in the Area Office on the Area staff as interdisciplinary people to promote effective use and education of all soils information.

One of the big difficulties of doing soil mapping in some of the remaining western counties was the vast space and limited number of towns. There were more details in counties like Cherry County where the field soil scientists were on detail in the field – often camping out for the entire week. Also, there were more adjustments of work schedules such as 10 hour days to assist in getting in more field time and spending less overall time on the road driving from duty station to place of soil survey field work in the county.

Ensuring a quality high level of local - County Commissions/Supervisors, Natural Resource Districts (NRD) and state funding became more of a challenge as the number of soil surveys in progress became less. Most of the counties with high local interest to have a new complete modern soil survey completed were already done. The remaining counties to be completed were not the most receptive to contribute to the effort of accelerating the soil survey work.

Through Norm's coordination and skillful management style the completion of all soil survey field mapping on this second round of soil mapping by counties in Nebraska was completed for

the entire state as noted in CASPUS on August 7, 1988. As Norm was always foremost and positive he personally sent Jim Culver a copy of the August 7, 1988, CASPUS document showing the field soil mapping for all Nebraska Counties was now completed. See Figure No. 3.

Figure No. 4 dated June 1995 is Major Land Resource Area and Status of Soil Surveys for Nebraska. This soil survey progress map for Nebraska shows all of the state being mapped a part of the once over of soil survey for the state. There are four counties in the progress of being updated Gage, Hall, Deuel and Washington Counties. A soil survey updated has been completed and published for Dundee and Saunders Counties and a need to update the soil survey for another 17 counties.

Cherry County was the last county in the state for a soil survey to have completed soil maps. Cherry County is one of the largest counties in the United States. Total area is over 3.8 million acres. The soil survey started in 1982 and was completed in 1995. There were 19 field soil scientists who worked in the county at various times over this period of time. Mapping the final acres were Roger Hammer, Project Leader, Casey Latta, Soil Scientist, Chuck Markley, Soil Scientist and David Vyain, Soil Scientist.

The soil survey field work for large number of county soil surveys was completed in the 1980's. This created a giant workload in terms of transferring the filed soil survey work through a series of overlays on a controlled base as a required part of getting the soil maps ready for publication by the Government Printing Office. A large number of student part-time help was used to assist in doing this work. Steve Schaefer, a Cartographic Technician, was the lead person who managed the scheduling of work and quality assurance of the many, many soil maps that were prepared on a control base ready for publication. At times there were 10 to 20 students helping with various parts of the soil map compilation process.

The students were a big help to Norm Helzer's staff in getting a lot of time-consuming and repetitive soil map compilation done. One of the lead staff individuals in the Nebraska State office was Clayton Lee, Assistant State Soil Scientist. Clayton came to Nebraska from Missouri in 1992 and left in 1995. Larry Ragon, Assistant State Soil Scientist for correlation was a long-time member of the state office soils staff and continued to ensure uniform quality soils work was done across the state. Renee Gross, Assistant State Soil Scientist, was the State Soil Database Manager. The use of soils database was critical in the development of the tables used in the published soil survey reports. During this period of time a strong effort was made to review all of the soil data and interpretations for each soil series and their respective soil mapping units. This was a big job as there were about 500 different kinds of soils i.e. Monona soil series and about 3,000 different soil mapping units i.e. Monona silt loam, 7 to 11 percent slopes in the state.

The Conservation and Survey Division- University of Nebraska had two employees located with the state office soils people. Margaret Warner worked a good number of years assisting with various phases of the soil map compilation and with the state soils survey database. Francis Belohlavy worked on soil databases and soil interpretations. Francis was a soil scientist and

worked in several central and western counties assisting with soil mapping work from 1973 to 1988.

Quality Secretary support staff work was provided by Clarissa M. Babcook, Janet Bauer, Linda Bouc and Lori Gottula during the last years of the work for the completion of the soil survey field work for all Nebraska Counties.

Each state had a list of soils identified as “Benchmark Soils”. This was a list of some of the more important soils in the state both in terms of extent and variability. The Benchmark soils served as a good reference in directing research and investigations for preparing and making improved soil interpretations for all soils in the state. There were about 25 or more soils identified in Nebraska as Benchmark soils.

National Inventories of Soil Resources and Soil and Water Conservation Needs have been made on a periodical basis since the early 1930’s. Soil scientists always had a lead role as a soil survey map to identify the soils was needed as well as appropriate interpretations about the soil properties such as soil depth, soil erosion factors etc. A brief listing of some of the more documented Resources Inventories included the 1934 National Erosion Reconnaissance survey directed by Hugh Bennett, a soil scientist, 1945 Consecration Needs Inventory, 1958 Soil and Water Conservation Needs Inventory (CNI), 1967 Soil and Water Conservation Need Inventory (CNI), 1975 Potential Cropland Study, 1977 National Resources Inventory, 1982 National Resource Inventory, 1987 National Resources Inventory and the 1992 National Resources Inventory.

This National Resources Inventory’s for the most part was quite detailed and gathered selected information and other kinds of resource data for statistical areas. The data was expanded to state data and national level for use in making national state decisions on how to go about in addressing the resource concerns for all private lands in the nation.

Most Nebraska soil scientists in the early days of these inventories helped by making the soil survey maps for the designated sample area called Primary Sample Units (PSU’s). Herb Kollmorgen, Assistant State Soil Scientist in the 1960’s and 1970’s was the person who coordinated this work at the state level. Herb traveled to many Nebraska counties to work with local people in completion of the CNI. Jim Culver, State Soil Scientist, and John Brubacher, Assistant State Soil Scientist, assisted with several of the National Resource inventories in the 1970’ and 1980s. Doug Garrison was the State Resource Inventory Specialist in the 1990s working with Helzer and others in doing this work.

This Resource Inventory work was a very time-consuming project as there were many sample areas and it required a lot of time to review the data, assist field people and others in preparing the soil resource information. The statistical Laboratory at Iowa State University was involved in preparing data in a format that could be analyzed by management people to assist in the assessments of National Soil and Water Resources.

The 1985 Farm bill required more detailed soil information on identification of wetlands soils and erodibility of soils. One of the big jobs in the 1990's by Helzer was as a member of the state wetland appeals team and training employees on soil wetlands relationships. Even though the soil maps were not made specifically for wetlands determinations the soils as mapped were very accurate for use in wetlands determinations. Norm noted that not once was a wetland appeal overturned because of an inaccurate soil map.

This 2nd generation of soil survey maps was being completed as the new era of digitizing soil survey maps was just emerging. Currently all of the soil maps for each Nebraska County can be viewed digitally on the USDAS-NRCS Soil Web site.

The demand for new soil information has required an update of some of the older soil surveys made in the 1950' through the 1970's. As technology continues to move forward, in terms of for example, use of GPS in large farm equipment to plant, fertilize and harvest crops, drones to monitor crops, new techniques to build homes, creative initiatives to enhance recreation and wildlife, more new soils information will be required.

As in any industry the need to update your product is nothing new. For example, computer technology, cars and medical advances continue to make huge advances and improvements. Soil survey is no different – they periodically need to be updated and modernized to meet current times and needs.

A letter dated February 27, 1968 – over 50 years ago by Charles Kellogg, Deputy Administrator of Soil Survey USDA-SCS – Washington D.C sent to the Soil Survey Directors and Principal Soil Correlators introduces a guide when people criticize us for making new published soil surveys of areas having old, published soil surveys. This guide prepared by Kellogg is entitled “Why Soil Surveys are Remade in Many Counties”. A copy of this letter and the guide “Why Soil Surveys are Remade in Many Counties” is included at the end of this document for reference.

Even though this letter was prepared many years ago as we go forward into the 2000's and beyond the same philosophy and principles will apply to keep current and modern soil survey information readily available to the new users of the times.

Through Norm's guidance and work with the cooperating agencies such as the Conservation and Survey Division-University of Nebraska, Lincoln and Nebraska Natural Resource Districts the Nebraska soil survey program skillfully moved into an update of soil survey information for some of the older soil surveys. A May 1991 Status of Soil Surveys in Nebraska shows three counties, Dundy, Saunders and Washington counties, to be in the process of being updated by field soil scientists.

During the early 1990s, a national effort was made to update soil survey by Major Land Resource Area (MLRA). Norm and his staff worked with the National Soil Survey Center staff located in Lincoln, Nebraska and the Kansas soils staff to begin an update process for the soils in MLR 106 – Nebraska and Kansas Loess Drift Hills. An excellent project plan was prepared in

1991 to move this activity forward. The MLRA approach was a favorable process to ensure a common scale of mapping, uniform soil legends for the entire area and consistent soil interpretations. A productive and cost-effective way to do soil survey work.

The completion of a 2nd generation soil survey maps for all Nebraska Counties was an outstanding accomplishment. It required a dedicated group of soil scientists, management people and many other disciplines over the 47 years to complete the enormous task. Job Well Done!!

A “Last Acre Ceremony” was official held on September 29, 1995, at the Mahoney State Park PETER Kiewit Lodge. The Nebraska Society of Professional Soil Scientists presented Steve Chick, State Conservationist and a Conservation and Survey Division-UNL representative a plaque commemorating the completion of this round of soil survey maps for all private lands in the state. Appreciation was expressed to Steve Scheinost and Tyler Labenz for organizing this special event and to Glenn Borchers for his work in a commemorative mug for all soil scientists.

STATUS OF RECENT SOIL SURVEYS IN NEBRASKA

JULY 1, 1971

Figure No. 1



SCALE 50 0 50 100 MILES
SCALE 1/3,000,000

LAMBERT CONFORMAL CONIC PROJECTION

REV. 9-15-71
S.L.-25690

USDA-SCS-LINCOLN, NEBR. 1971

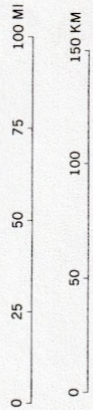
Figure -- No 2



LEGEND

- 75 MODERN PUBLISHED SOIL SURVEY
- 10 MAPPING COMPLETE - AWAITING PUBLICATION
- 8 SOIL SURVEY IN PROGRESS

STATUS OF SOIL SURVEYS NEBRASKA OCTOBER 1987



SOURCE: Family of Maps SCS Drawing 5-S-32930 (6-76) and information from SCS Field Personnel.
Albers Equal Area Projection.

Figure No. 3

Total Initial progress across reported this Fiscal Year	----- 87421
Total updated progress across reported this Fiscal Year	----- 151860

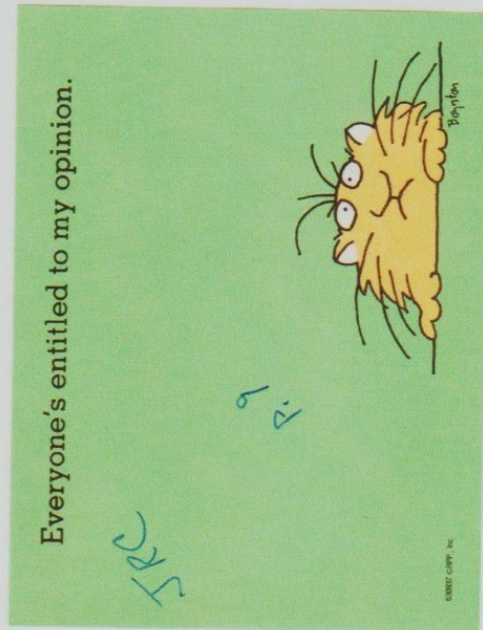
STATE SOIL SURVEY SCHEDULE --- August 7, 1995

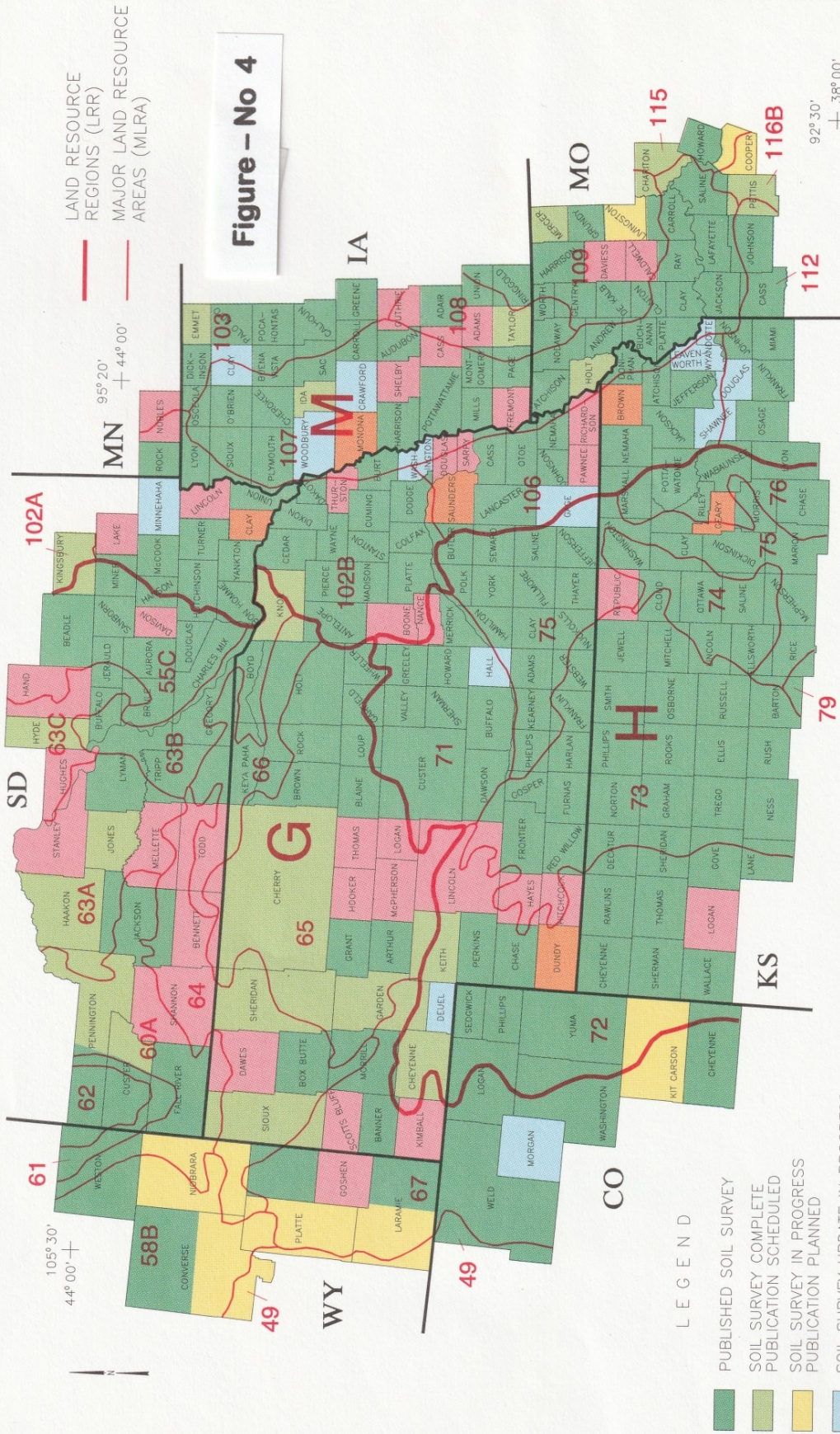
NEBRASKA

[illegible]

Percent of state complete ----- 99

Total Acres = 49,507,291





MRTSC, SCS
LINCOLN, NEBRASKA

ARA...
RWE...
WMcK...
RIT...
...
FILE...

same

UNITED STATES DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
Washington, D. C. 20250

February 27, 1968

To: Soil Survey Directors
Principal Soil Correlators

From: Charles E. Kellogg, Deputy Administrator
for Soil Survey

Subject: SOILS - Why soil surveys are remade in
many counties

I wrote the attached only as a guide when people
criticize us for making new published soil surveys of
areas having old published soil surveys.

Attachment

cc:
R. D. Hockensmith
A. A. Klingebiel
Guy D. Smith
C. W. Koechley
Roy W. Simonson
A. J. Baur, NERTSC
SCS, Upper Darby, Pa.
L. J. Bartelli, SRTSC
SCS, Fort Worth, Texas
J. E. McClelland, MRTSC
SCS, Lincoln, Nebraska
W. M. Johnson, WRTSC
SCS, Portland, Oregon

RECEIVED

FEB 29 1968

RTSC
LINCOLN

WHY SOIL SURVEYS ARE REMADE IN MANY COUNTIES

The Department's soil survey program began in the old Division of Soils, later the Bureau of Soils, in 1899. At that time little was known about the soils of the United States or how the many combinations of soil characteristics affected soil use and management. It was through field studies in the Soil Survey over the years, supplemented by important laboratory methods, that knowledge about American soils became available. It was not until about 1940 that dependable methods could be used for determining the kinds and amounts of clay minerals in soils--a very important characteristic of soils that affects their relations to water, plants, and soil management practices.

Also when the Soil Survey began, its prime objective was to suggest to farmers and potential farmers areas with soils suitable for the different kinds of crops and pasture with the current known practices. Since then, these practices have changed enormously. For example, fertilizers have steadily increased in quality and decreased in cost. We have many improved crops. Many kinds of soil that were not considered suitable for farming in 1900, or even in 1930, are now considered highly suitable with modern fertilizers, systems of water control, new varieties, and so on.

Thus, the basic knowledge required for making soil surveys to meet current problems of soil use has steadily expanded since the first ones were made. Probably it would be fair to say that in each

10-year period a great deal more was learned than in the previous 10-year period. This is partly because scientists in geology, chemistry, physics, and plant physiology were also expanding their knowledge, much of which directly assists in the development of new principles and new methods in soil science. Of course, we have had similar advancements in farm machinery, plant and animal breeding, water control, and other aspects of soil management.

With these developments the on-farm labor has been reduced and the amount of capital required for machines, chemicals, and all the rest has greatly increased.

Since about 1930, and especially since 1950, soil surveys have proved to be extraordinarily useful in suggesting what sorts of soils make good foundations for highways, homes, and other structures. People need to know what kinds of soils can have local sewage fields without danger.

In the early 1930's aerial photographs became available. These are used as field sheets for plotting soil boundaries and other features that has made possible more accurate soil maps. In fact, now nearly all soil surveys are published with the aerial mosaic background.

Thus, the soil surveys today are used to help people solve problems that were not even considered when the work began in 1899. Further, to serve people now with the great investments involved,

much greater precision is required in the classification, the mapping, and the interpretation of how different kinds of soil respond to management treatments and manipulation by machines.

Although the old soil surveys were highly useful in previous years, they do not meet the requirements people have today. As a sort of rough figure, experience has shown that our knowledge has increased so much, and the problems facing people have changed so much, that most soil surveys in areas of reasonably intensive use cannot be expected to furnish the detail required longer than about 25 years. This figure would be greater in areas of low intensity of use and it would be lower in areas where population and industry are rapidly expanding and soil use is now changing from moderately intensive to highly intensive use with large private and public investments.