NATIONAL COOPERATIVE SOIL SURVEY

Southern Regional Conference Proceedings

Clemson, South Carolina
July 9-11, 1968

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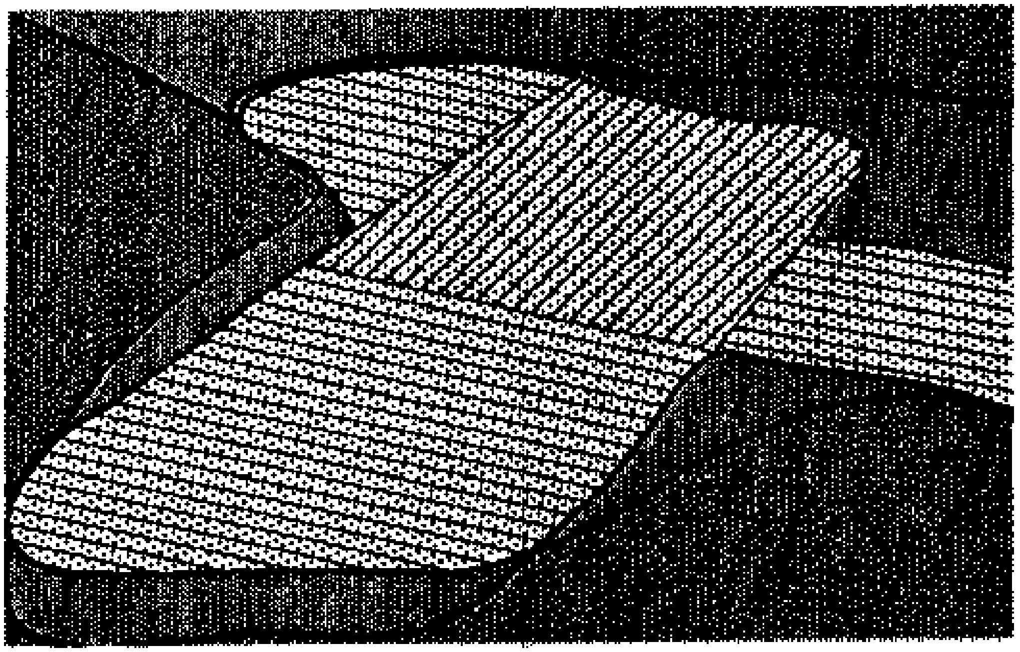
Proceedings of

SOUTHERN REGIONAL TECHNICAL WORK-PLANNING CONFERENCE OF THE COOPERATIVE SOIL SURVEY



CLEMSON UNIVERSITY - CLEMSON, SOUTH CAROLINA - JULY 9-11, 1968

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AGENDA

1968 SOUTHERN STATES SOIL SURVEY WORK PLANNING CONFERENCE
Clemson University. Clemson, South Carolina
July 9, 10 and 11, 1968

Meeting Place: Clemson House

Tuesday, July 9 — C. M. Ellerbe, Presiding

6:30 8:45	Remarks	Dr. Victor Hurst Vice-President for Academic Affair6 and Dean, Clemson University
8:45 9:05	Future of Soil Survey6 in South Carolina	A. T. Chalk State Conservationist Soil Conservation Service Columbia, South Carolina
9:05 9:10	Announcement6	Conference. Committees
9:10 10:00	The Cooperative Soil Survey of-the Future	Dr. Charles E. Kellogg Deputy Administrator for Soil Survey Soil Conservation Service Washington, DC
10:00 10:15	Break	
10:15 11:45	Panel Discussion: Soils Information Used and Needed for Woodland Production George E. Smith, SCS - <u>Soil-Site Relationships</u>. Dr. R. A. Klawitter, USFS- <u>Research Findings</u>. Dr. Jack May, University of Georgia - <u>Requirement4 by Industry</u>.	Carrow T. Prout, Jr. Head Fore6 ter Plant Science6 Division Soil Conservation Service Washington, DC
11:45 1:30	Dinner	
1:30 5:30	Announcement6 and Committee Meetings	
7:30 PM	Ad Hoc Committee on Soil Survey Procedures. Charge: Outline orderly procedures for making changes in the New Classification System.	

Chairman - Dr. M. E. Springer
Associate Professor
of Agronomy
Department of Agronomy
University of Tennessee
Knoxville, Tennessee

(OVER)

Wednesday, July 10

8:00 Review Lawrence Chapel Division Soil Survey
11: 45 Soil-Site Relationship for Woodland Uses

1:30 Committee Sessions Continued
5:30

Thursday. July 11

8:00 Committee Reports - I-IX
11:45

1:30 Special Reports and Business Meeting
3:oo Clemson. Room

3:oo Break
3:15

3:15 Regional Map Project Work Session
5:30 (Experiment Station Representatives and State Soil Scientists)

Friday, July 17.

8:00 Continue Regional Map Project (If needed)
11:30

Southern Regional Technical Work-Planning Conference

of the Cooperative Soil Survey

Clemson University, Clemson, S. C.
July 9-11, 1968

Minutes of the Business Meeting, July 11, 1968

G. R. Craddock, Presiding

A motion was made and passed that a Land Use Specialist, Soils and Fertilizer Research Branch of the Tennessee Valley Authority be granted a one vote membership in the conference. Currently Mr. John M. Soileau represents the T. V. A. group.

Dr. Curtis Godfrey presented a written report on the proposed "Field Workshop in Puerto Rico on Tropical Soils". As reports had been previously distributed the report is not included in the minutes.

Soil study trips will include side study trips to the Virgin Islands in addition to Puerto Rico. Some emphasis will be placed on soils suitable for houses and industry.

Some twenty-five members were reasonably sure of attending the conference August 5-14, 1969. Because of doubt in funding firm commitments could not be given for the majority. The decision was made to proceed with the Tropical Soils Workshop as being planned.

Dr. M. E. Springer reported for the ad hoc Committee consisting of Dr. R. J. McCracken, Mr. David Slusher, Dr. L. J. Bartelli, Mr. Henry Otsuki and Dr. Friedrich Beinroth with Dr. Eric Winters as advisor to the Committee. (See report by Dr. Springer.)

Attention was called to the fact that the constitution (Purpose, Policies and Procedures) of the Southern Regional Soil Survey Technical Work-Planning Conference is published in the 1966 Proceedings of the conference.

Dr. S. A. Lytle extended an invitation for the group to meet on the L.S.U. campus at Baton Rouge, Louisiana in 1970. Dr. Cadwell moved that the group accept Dr. Lytle's invitation and hold the meeting at L.S.U. The motion was seconded by Dr. Obenshain and then passed. The group expressed a desire for a June meeting if possible. In line with the constitution of the group the Experiment Station Representative of Louisiana would be chairman of the 1968 conference, Dr. M. E. Springer expressed thanks to the South Carolina group on behalf of the entire workgroup for a successful conference.

Being no further Conference business the official Work Conference was adjourned. All State Experimentation Station Representatives, all State Soil Scientists and all persons in attendance interested in a Regional Soils Map Project were asked to remain and work on the organization of the map project.

Dr. S. W. Buol, chairman of the Regional Project committee discussed the proposal of a Regional Map as a project for workers of the Southern Soil Survey Work Group. Dr. Buol explained the initial project idea originated within the Experiment Station Group and the Southern Soil Research Committee gave approval for work on the project. The initial committee consisted of S. W. Buol, chairman; G. R. Craddock, C. R. Godfrey, and H. H. Bailey. This committee suggested that the State Soil Scientists, Regional SCS office and other interested persons become involved. After some discussion the following recommendations were made:

I. That the Soil Survey Work Group recommend that the State Experiment Station Representatives, the State Soil Scientists (SCS), the Regional SCS technical office representatives and other interested personnel proceed with the Southern Regional Map Project.

Recommendation approved.

II. That the State Experiment Station Representatives, the State Soil Scientists and Regional Technical Service Center (SCS) representatives present elect a chairman who will in turn select a Steering Committee from the group to proceed with the Southern Regional Map Project.

Recommendation approved.

This action in effect ended the work of the Regional Project Committee.

Mr. Slusher nominated Dr. S. W. Buol as chairman of the Southern Regional Map Project and that Dr. Buol select his committee. A motion was made and seconded that nominations be closed. The motion was seconded and passed.

The minutes of the Southern Regional Map Project Work Session will be circulated to states through State Experiment Station Representatives and State Soil Scientists.

FUTURE OF SOIL SURVEYS IN SOOTH CAROLINA 1/

Mr. Chair&n,,. Soil Scientists, fellow Conservationists, friends all, I welcome you to the fine. State of South Carolina. I am a transplant as many of you are, and I have found that one advantage in being such is that some scales are lifted from one's eyes. A cleaner,. clearer vision results. This has allowed me to see the advantages pertaining to living and working here, and while I am not so naive. as to say there are no disadvantages, I have found them to be sharply outweighed.

I hope that. your working visit here will permit you to, see and learn of some of these advantages. I hope you can look around at our fine Land Grant university. I especially want you to see. Death Valley, although it is somewhat removed from the academic fields of endeavor. Ask any grad what "Death Valley" is.

The preparers of this program did me no favor, although I appreciate the honor. I have never found *it* easy to peer into the future. It is an even more formidable task to try to forecast when a quick view is taken of what has happened in the recent past - and I call the recent past the last twenty-five years.

In this quarter century we have developed more things faster than in the previous 2,500 years. We have more, scientists at work now than at any time in history and they are developing knowledge at such a prodigious rate that no one mortal man can absorb it all. The "knowledge explosion" is greater than in all previous recorded history, and is increasing.

We have developed television; I remember my first radio; we have boats which can stay submerged for months; we have begun travel in space; we have orbited the earth and photographed it with instruments hundreds of miles above the atmosphere with astonishing clarity. We have sent objects spinning around the sun; it is almost commonplace to sand hardware up to relate in some way to the moon - soon we will place a human on that planet. All of this has been made possible by astounding progress in mathematics, physics, cryogenics and dozens, of other disciplines.

Only recently we have learned, rudimentarily to be sure, how to synthesize the structure of life itself in a test tube. We can create a virus that seems to be a living organism because it can reproduce itself.

Therefore a look at the past leaves small wonder that to guess at what is to come is dangerous. As Josh Billings says, "Don't never prophecy, for if you prophecy wrong nobody will ever forget it, and if you prophecy right nobody will ever. remember it."

But despite our progress we remain firmly rooted and dependent still on natural resources - soil and water in particular.. It is trite but true to remind you that though we can transplant a heart from one body to' another we still need three meals per day; that though we can fly at twice

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1/ Talk by A. T. Chalk, State Conservationist, SCS, Columbia, SC at Southern States Soil Survey Work Planning Conference, Clemson, SC, July 9-11, 1968.

the speed of a bullet we need clean water to drink; that in fact, the first task given to the Surveyor Moon device was to dig into the moon's surface to see what kind of soil there was on it.

Therefore despite the Buck Rogers fantasies that are so commonplace that we scarcely turn our heads for them any wore, we are earthbound: the most of us, and will be for the indefinite future so far as food to eat, water to drink, cloth for clothing and fiber for shelter.

But before looking ahead let's see where we are in South Carolina.

It's usually good to learn where you are in plotting a course. That elemental fact I gathered in my first Boy Scout map reading course. Where are we then in South Carolina in soil eurvey?

We are right proud of our progress, though not satisfied. I know each of you State Soil Scientists will immediately compare our progress with yours. and ours will inevitably pale by comparison, but I'll move ahead, knowing that the first speaker never has a chance.

South Carolina has 46 counties -- 11, or 24%,of these are published in what is considered the modern type of soil survey. One county is scheduled for publication in each of the next three years, so three are in the publication pipeline. This will total 14, or 30%.

Next, we have three more on which field work is complete. These are in' that large body of reports awaiting funds for publication. So. counting the 11 published and 6 on which field work is done, we have 35% of South Carolina wrapped up - without regard for the large acreage of standard surveys in the other counties which are not complete. To do this job we are spending about 15% of our State's budgetary allocation based on the latest year of record.

An outstanding reason for this field progress is State aid. South Carolina appropriates $50,000 each year to aid in paying scientists to produce surveys, and to speed laboratory analysis which is done hare at Clemson for us. Also, I give recognition to the U. S. Forest Service for their aid in the last three years; this has totalled 5 man-years of survey time.

Parenthetically, please know that I also know that this "complete" job of which I speak when I mention "completed" counties is in fact not so - we only have down on maps what we now know about soils. Despite all the fun-poking directed at you men about re-mapping what you have already remapped, it is as unreasonable to expect soil scientists to know now all there is ever to be known about soils as for foresters to know now everything that will ever be known about trees, or doctors to be aware of all the secrets of the human body today. We keep learning things, and while this is occasionally disconcerting, it is overall good.

What is the future in South Carolina of the Soil Survey? Gentlemen, I state categorically that I think the soil survey is the brightest star in the conservation crown, with the possible exception of watershed work. I believe this: Why?

Conservation drill begins with soil, water, plants and animals. They are the base. But no, one I know believes that the problems of conservation are exactly the same as they were when we started, or that the solutions are the same, or that farming has not changed, or that the patterns of our society are the same that they were, either in South Carolina, or the United States.

A rural and limited soil conservation concept no longer suffices in a society that now is highly urban and is daily becoming more so, a society in which the users of resources have come to exceed those of the owners of the resources.

Conservation today encompasses the full sweep of interrelated natural resources and their management and use. However, use, restoration and preservation are compatible aims.

Emerging now is the special need to fit the activities and needs of man harmoniously into his total environment. This concept of full use conservation says that as populations grow and people live in greater and greater concentrations, we must consider the total environment.

And if this be so, as I firmly believe it is, is there a better tool to the conservationist or planner than a soil survey? I know of none.

Consider now how this tool is being sharpened and reshaped to fit what once were exotic demands in South Carolina:

1. A soil survey with urban interpretations covering James Island, a Charleston suburb, was an earlyeffort of ours.

2. A soil productivity study in Richland Soil and Water Conservation District river swamps to assist in tax assessment has been made by one of our soil scientists.

3. Aid to U. S. Steel Corporation on soil acidity to determine the types of galvanizing needed over the state for steel culverts was useful to the company, it said.

4. Special urban interpretations for the standard soil survey in an area of rapid urbanization between Aiken, S. C. and Augusta, Ga. as a guide to the County Planning Board are now being made.

5. Surveys for four Air Force, one Naval base and one Marine installation to aid in best location of facilities have resulted from requests.

6. Aid to industrial developers in several places, one of the most unusual of which resulted in location of Campbell Soup at Sumter. The firm wanted an area of deep porous soil on which to spray partially purified and strained plant wastes emanating from their production there of Swanson TV dinners. The water percolating through the soil is purified and returned to the stream pure and fit for use.

7. A soil survey of a state wildlife refuge to help find the firmer marsh area8 upon which to locate dikes. In so doing, annual sinkage and maintenance is diminished.

8. Several surveys in cooperation with the State Geologist and/or local Development Boards, to critically evaluate area6 for potential development.

9. A high intensity survey of a portion of the wooded area under the control of the Forestry Department of Clemson -- for research purposes. You are to see this in your field tour, I understand.

These examples, and that'6 all they are -- not a complete listing -- do illustrate a breadth that would have astounded us only a few year6 ago - yet I dare 6ay each of you could top this list.

1. So. without question in my mind, I list as the first need for soil surveys in the future is a way or ways to wake and interpret them for more urban and varied uses. To actively ferret out what and where we must work to help to the greatest degree the urban, nuburban, industrial or megalopolis type6 with their soil problems. Never can we think that the 20% of the population which way be classified a6 rural in 1980 is our only Clientele. This would be a devastating error, nor are they to be abandoned, I hasten to add.

2. Closely connected, allied, in fact, but not the same, is to make a soil survey more intelligible to the layman who is to use it. This we must do - don't ask me now just how; I look to our fine soil scientist6 headed by Clarence Ellerbe and Clemson's headed by Dr. Craddock, to provide this answer.

   But.1 say that if the user had to understand the workings of TV as a prerequisite to use, not one thousandth as many kids would get crosseyed, and their parent6 cross, from watching TV. TV would exist only for a few.

   A parallel case in point is an auto. How many of us would use a car if we had to know how it was wade? Few.

   We must wake a soil6 map a tool that the average person can use as readily as any other tool which he needs. This is a large order.

3. Next there is a crying need for a better knowledge of soil, in all of its almost infinite characteristics, by the population. Not how to use it necessarily, as in the preceding point, nor by all of the population, though that would be best.

   Isn't it ironic, no, tragic, that the God-given sustainer of our very Life be Looked on, if seen at all, a6 a place to build a road or play a game of ball, or develop a shopping center, or pile up junk?

   We say we have a continuing concern with new aspects of resource conservation, development of outdoor recreation, more beauty and other important problems -- true -- but pray tell, is not the soil the base of each and every facet of the resource diamond?

If this be so, and it is, people desperately need to know of it, We need to tell them, not with success stories on conservation farming, but by sophisticated preparation and modern, means.

We are trying to do this' here' to some extent with our Conservation Education Council for school children. It has caused to be produced a series of teachers' guides which Doubleday and Company is printing, and the soil' is' the subject of many of the lesson plane. Our Soil Scientists have had a place in this work, 'they need to have a greater place in the future.

4. Finally, and I know as well as you that I've only skimmed about in the few minutes I have, the future of the soil survey in South Carolina is tied up with the availability of manpower to accomplish the task.

Not long ago three of us presented a panel program to the South Carolina Agricultural Council on the agricultural career opportunities and the need for manpower. A spokesman for Clemson pointed out that in 15 years the candidates for agronomy degree hare had decreased by 41. That's three per year, about. Clemson is the only institution granting degrees in agronomy in South Carolina. Our pool is drying up and it wasn't big in the first place.

What good to draw up blueprints of action, to recognize and state needs, to develop policies, if the manpower to carry out these desirable things is lacking?

The trained people to carry out the job are crucially short. It does us no good to point out that this scarcity prevails in other agricultural fields -- that few students feel the attraction for agricultural professions that we did and thus the academic halls of the ag schools are relatively bare.

There must be a concerted effort to interest good men in ag careers. Without manpower the technology which is bursting forth into the rapid growth I spoke of will be as useless as a jet plane without a pilot.

To summarize, I have named four problems and this could be considered a deviation from my assigned topic. However, I don't think so for they are bound together to affect the future.

Also, I have not exhaustively canvassed either our problems, or our opportunities, but have tried to select those I felt most important to our future.

I am going to repeat them and stop. They are:

1. In the future there will be more and varied use of soil surveys than at present, with a higher percent of non-agricultural demands.

2 . In the future we must make the soil survey an even easier tool to use, for the layman. Great progress has been made - more must be.

3. In the future we need an increased knowledge of soil by the bulk of the population. Not simply an awareness, nor only an appreciation. though these are better than nothing. A knowledge of sorts is needed.

4. And the last of my points is that in the future we need to get more of our youths into agricultural professions, and in soils work specifically.

If we can accomplish these four things the future of soil surveys in South Carolina is bright.

Thank you.

SOIL - SITB RELATIONSHIPS 1/

SLIDE # 1 - Man and his environment are affectionately joined together. We must understand environment to uee it prudently and not destroy it, or possibly ourselves. With the rapid advances in technologies end abilities, man's relationships with environment become more significant. Soil is a part of our environment: a tree is a pert. There are many other components.

SLIDE # 2 - Soil supports plants: it hoe characteristica which reeult from the effects of climate end living matter (including trees) acting upon parent material.

Site represent8 a combination of biotic, climetic, end soil conditions. The ecological factors are considered with reference to capacity to produce trees or other vegetation.

Obviously, trees are products of soils end soils are products of trees, to some degree. Both result from numerous actions and interact ions.

SLIDE # 3 For example - Man menipulates both soils and trees, sometimes to improve - sometimes to degrade. Man is an integral pert of the universe. Much progress has been made in soil-site relet ionships. Rut it is difficult to distinguish between soil and site in evaluating potentials for woodcrop production?

SLIDE # 4 Some investigators have developed highly refined criteria to evaluate soil suitability end productivity (3), (6), (7), (12), (13), (23), (34).

SLIDE # 5 Criteria include depth of horizons, consistence, texture, depth to pan. depth to mottling, organic matter content, moisture equivalent, eurfece drainage end e number of other soil characteristics. Such are well suited to research. ...

1/ Talk by George E. Smith, Jr., Woodland Conservationist, SCS, Columbia, S. C. at Southern Soil Survey Planning Workshop-Clemson University, 9 July 68.

SLIDE # 6 . . . . . . or very intensively managed small forest areas. But mapping surface soil depth and subsoil texture with the Precision required by the "best" criteria is very time consuming and expensive. And in many instances such criteria must be sdjwted due to climatic or topographic influences (11), (30).

SLIDE # 7 Ecological and total-site investigations should be expanded. It is the combinations of characteristics as influenced by time, climate, plant and animal influences, and manipulations that determine site, both qualitative and quantitative.

SLIDE # 8 The Soil Survey is a basic tool to facilitate conservation. Woodland suitability determinations and interpretations have been strongly influenced by the wide variety of criteria developed through research and field studies. Soil surveys and interpretations have not been adequate in some instances however.

Let us review the interpretations being made currently for mapping units:

SLIDE # 9 (a) Potential Productivity -- expressed as site index. Standard deviation is included if computed and tk range in site indexes is indicated.

The actual site index of this site for slash pine is zero due to excess water; but the potential site index at 50 years is above 90.

SLIDE # 10 Water management and tree planting of this Carolina-bay, permitted use of the productivity potentials of this site. Present timber value exceeds $300/acre. Broadfoot (9) demonstrated benefits of water management in woodlands. Flooding, with control of water levels, from January to July increased annual diameter growth as much as 50 percent. Wildlife values (particularly ducks) were improved simultaneously. Klawitter (20),(21) suggests water management and control in wetland forests is a reality though all the relationships sre not understood. Moehring and Ralston (26) relate diameter growth to available soil moisture and rate of soil moisture loss.

SLIDE # 11 — Here are weed trees as far as you can see. Turkey-oak is suited to the Sandhills but productivity is very low and turkey oak is not a profitable woodcrop.

SLIDE # 12 — This is the same area 5 years later. The turkey oaks have been controlled (by using heavy equipment to clear: then growing a crop of watermelons) and slash pine has been planted. Whet is the productivity of these soil8 for slash Pine? Will productivity justify the costs at current interest rates? Cost-return estimates indicate some soils will not produce woodcrops economically.

SLIDE # 13 — Fotential productivity must be defined for each species preferred for particular woodcrops. As an example longleaf Pine may be preferred for pole8 and piling.

SLIDE # 14 — Cottonwood may be preferred for pulp used to manufacture a special grade of paper.

SLIDE # 15 — Arizona cypress may be preferred for Xmas trees. Insufficient data does not permit a complete evaluation of species suitability and productivity currently. Broadfoot (8) summarized soil suitability for bardwoods for 5 soil area8 in the mid-south.

Doolittle (14) and others (27) have prepared site index comparison charts; by using the known site index of an indicator species, site indexes of other species can be estimated, within certain limits of accuracy and within restricted localities. Has such information been utilized fully?

SLIDE # 16 (b) — Erosion hazard - The susceptability of Soils to erosion from site manipulations and management of woodcrops is evaluated as slight, moderate, or severe depending upon characteristic8 such 88 texture of surface, rooting depth, and slope gradient. Site preparation, water management installation8 (culverts, ditches & outlet8 in Piedmont & mts), harvesting, firebreak construction, access road construction and use can contribute to erosion and site deterioration.

SLIDE # 17 Water disposal systems and vegetative treatments (such as planting sericea, etc. in logging roads) may be needed.

SLIDE # 18 Soil movement in the Sandhills can be severe and creates problems to the forester and logger.

SLIDE # 19 Soil blowing is a severe problem in the Coastal Plains. Wind erosion interpretat ions are provided for susceptible soils which include Class I soils and subclass "s" soils.

The effects of erosion vary according to soil and site conditions. Erosion of Cecil sandy loam generally does not decrease productivity for woodcrops as severely as erosion of Cataula sandy loam, a soil with a very dense subsoil. Accumulation of soil (such as benched terrace areas) may result in improved productivity. Alluvail areas frequently have very high productivity. Excellent examples of these conditions will be observed during the field trip to the Clemson Forest.

SLIDE # 20 (c) Equipment restrictions -Access and operation of equipment can be restricted by topography, rock outcrops or stoniness, wetness, etc. Water management may be a prerequisite.

SLIDE # 21 The trend is towards mechanization of operations. Current interpretations may not be adequate for different kinds of machinery.

SLIDE # 22 The tree combine can travel over e wider range of soil conditions than this modern log-truck. Equipment such as this ranges from 40 to 70 thousand dollars - each must operate to justify such expense.

SLIDE # 23 Trafficability is related to texture, plasticity. organic matter content, moisture content. Basset & t&Daniel (2) reported thattrafficability raps can be simplified by grouping individual soils having similar strength properties. To avoid a broken axle, this track received 8 push.

Forest industries and foresters are vitally concerned with trsfficability and compaction and their effects (22). Perhaps more attention should be given to trdfficability interpretations of soil survey.

SLIDE # 24 (d) SEEDLING MORTALITY

Site quality must be evaluated in terms of seed germination & seedling survival.

SLIDE # 25 Inundation for 3 days during spring floods may kill yellow poplar seedings.

SLIDE # 26 Surface soil temperatures may prevent germination, or kill the young seedling. Lack of protective covet and moisture may destroy the crop. Chances for successful germination and early growth of cottonwood are reported to be optimum within a temperature range of 27° - 32° C and at less than 5 atm moisture stress (18)

SLIDE 27 Seedling mortality is an interpretation which is important to natural seeding, direct seeding, tree planting and establishment using cuttings from limbs.

SLIDE 28 65 years ago longleaf pine seed were scraped up from a send road by a small boy & his father. They planted them in hills 8'x10' and later thinned the seedlings to one per hill. This excellent stand resulted from excellent seedling survival.

SLIDE # 29 (e) Species to plant:

The littleleaf disease severely affects shortleaf pine in the Carolina Piedmont. It is associated with a root rot fungus. The effects are also more severe on soils with poor internal drainage and aeration (10). In littleleaf areas, loblolly pine is favored when planting seedlings (though not immune, loblolly pine is affected less severely).

SLIDE # 30 This site supports a well-stocked stand of high quality yellow poplar and upland oaks. On similar sites, yellow poplar would be a preferred species to plant where the objective is to produce veneer and furniture stock.

SLIDE # 31 (f) SPECIAL INTERPRETATIONS

Chemical characteristics of soils influence woodcrop production (4),(5),(16),(29),(32). pH influences soil micro-organisms and the availability of nutrients. Metz and Wells (25) calculated the removal of 1 cord of pine *wood* amounted to 0.25 lb. phosphorus, 1.52 lbs. potassium, 1.69 lbs. calcium, 0.56 lbs. magneaium, and 1.44 lbs. nitrogen.

Nitrogen and sulphur are replenished from rainfall: others come from the soil. The effects of such nutrient losses on soil or site quality are not well known.

SLIDE # 32 Minerals when exposed to air may form toxic or corrosive substances. "Cat-clay" (31) and soils disturbed by surface mining may not be suited to vegetation.

SLIDE # 33 Reclamation of such areas may be too expensive to justify free crops. On-site determinations and laboratory analyses may be required to determine suitability.

SLIDE # 34 Fortunately the mined areas of this sand and gravel operation were found favorable. In fact, some sites were determined to be superior for tree growth than were undisturbed areas. This suggests (as do some benched-terrace sites) soil manipulation may be beneficial to tree growth. Similar site improvement was noted by Ellerbe and Smith in phosphate mine spoil areas in South Carolina (16).

SLIDE # 35 Soil-site relationships encompass many actions and reactions: these have not been discussed thoroughly in this limited time. Much work has been accomplished, but with each accomplishment the need for explorstion appears to increase.

Much progress has been achieved in soil survey end interpretations (26,291. However, these are not always adequate. May I suggest for your consideration a few of the problems which are of mutual interest to soil scientists and foresters:

1 - **During** field studies to evaluate soils for woodcrop production, field plot data and soil descriptions sometimes are not adequately or accurately recorded according to policy statements or instructions. Accordingly it is not possible to use these data for valid interpretations. The State Soil Scientist should vigorously exercise the leadership in these studies assigned by the Administrator of S. C. S.

2 - Since soil surveys are made by numerous soil scientists, there ara variations in concepts of soil chsractaristics and soil identification by individuals, This is expected but does create problems.

SLIDE # 36 This slide illustrates Crevassee soils as correlated and mapped in South Carolina. In this photograph the Crevassee soil is the "ridge" of the ridge-trough topography of the coastal beaches. Note the vegetation consists of palmetto, slash pine, live oak and understory vegetation. The official description of Crevassee describes soils which occur in the Mid-South Delta. Associated species include cottonwood and willow. It is difficult for a forester to reconcile the two sites. The soil characteristics may be similar - the sites are not.

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3. Plant technologists and specialists assist in developing interpretations and information for soil survey handbooks and to validate interpretations of local soil conditions. Ellerbe and Smith (lb), for example, made tree measurements and field studies which provided a basis for determining the need for additional soil series and phases of soil types. In another instance, site index data confirmed the need for and substantiated the correlation of Gills silt loam, a new series and type in South Carolina with very low productivity for pines. Plant technologists or specialists and soil scientists in some states do not coordinate their activities as closely as is common in South Carolina.

Is there merit in coordinating such personnel during preliminary soil correlations? In my opinion, definitely "yes". Other scientists can help the soil scientist avoid "strange vegetative bed-fellows". Extremely wide ranges in site indexes may or may not indicate improper correlations. The forester's increment borer is related to the soil auger - only somewhat shorter.

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4 - Foresters are busy preparing interpretations by major land resource areas across state lines. We, too, are subject to differences in opinions - we share this criticism. Region-wide summaries can introduce ranges in data due to georgraphic and climatic differences. For example, from 1921-1950 within the southeastern states the average length of frost-free season varied between states from 365 to 119 days per year (19). Further exploration or research may be needed for future interpretations.

5. A soil survey is no better than its accuracy. Large wooded areas with limited access are difficult to map. Transects are improvements but can be expensive.

Some informed foresters prefer the expanded use of complexes or associations, adequately described, to a "pure" mapping unit which does not reflect soil conditions accurately.

Can photo-interpretation be improved and utilized more accurately and economically with more limited field work? Infra-red or Infra-color photography have been used for vegetation delineations (1) and accuracy of interpretations has been improved approximately 25%.

Have vegetative indicators been utilized as advantageously as possible? Such are not totally reliable, yet frequently can provide information of value to experienced scientists. This technique needs additional study and energies. Helicopter mapping has been advantageous in South Carolina.

6. The majority of soil-site data has been collected in natural stands. A few studies have been completed in plantations. The trend to artificial establishment demands interpretations for such woodlands. Also, the need for information on broad-leaf species -- soil rellationships becomes more critical daily. Progress in this direction is too slow.

7. Some of the more adverse sites have not been properly evaluated because it is difficult to find trees to measure on such sites. Also, sufficient data for evaluation of topographic influences has not been collected but some research has been conducted (28), (33).

Additional field studies should be scheduled.

SLIDE # 37 The need for soil survey interpretations increases and the kinds of interpretations required for uses of trees are more varied (24). Factories and industries utilize trees for screening, beautification, and to provide scale for buildings and construction.

SLIDE # 38 Trees, shrubs, and other vegetation are being used to break the monotony of the interstate highways.

SLIDE # 39 Trees for streets, parks, recreation areas andlawns provide shade, conspicuous flowers and fruits, color in autumn foliage for recreation, rest, and respite from our labors. Such are useful for scientific study and for wildlife food shelter and cover.

What a magnificent environment when we interpret it properly.

The opportunity to discuss soil-site relationships is appreciated.

LITERATURE CITED

1. AVERY, GENE
   1960. Identifying Southern Forest Types On Aerial Photographs. U. S. Forest Service, Southeastern Forest Experiment Station, Station Paper 112.

2. BASSETT, J. R. & McDANIEL, A. R.
   1967. Trafficability of Four Loess Soils. Soil Science Society of America Proceedings Vol 31. No. 1. Jan-Feb. pp 115-117.

3. BEAUFAIT, WILLIAM R.
   1956. Influence of Soil and Topography on Willow Oak Sites. U. S. Forest Service, Southern Forest Experiment Station, Occasional Paper. 148.

4. BONNER, F. T. AND BROADFOOT, W. M.
   1967. Growth Response of Eastern Cottonwood To Nutrients In Sand Culture. U. S. Forest Service. Southern Forest Exp. Station, Research Mote SO-65,

5. BOX, BENTON F.
   1968. Five Year Results of Intensive Cultural Management of Loblolly Pine in Southeast Louisiana. Louisiana State University Forestry Notes. No. 78, Eaton *Rouge,* La.

6. BROADFOOT, W. M.
   1961 Guide For Evaluating Cherrybank Oak Sites. U. S. Forest Experiment Station, Occasional Paper 190.

7. ________
   1963. Guide For Evaluating Water Oak Sites. U. S. Forest Service Research Paper SO- 1, Southern Forest Experiment Station.

8. BROADFOOT, WALTER M.
1964. Soil Suitability For Hardwoods in The South.
U. S. Forest Service, Southern Forest Experiment Station
Research Note SO-10. 10 pp illus.

9. ____________________

1967. Shallow-Water Impoundment Increases Soil Moisture
and Growth of Hardwoods.
Soil Science Society of America Proceedings, Vol. 31,
No. 4, 562-564 Madison, Wisconsin

10. CAMPBELL, W. A.: COPELAND, OTIS L., JR.: AND HEPTING,
GEORGE H.
1953. Managing Shortleaf line in Littleleaf Disease Areas.
U. S. Forest Service, Southeastern Forest Experiment
Station, Station Paper No. 25.

11. CARMEAN, WILLIARD H.
1967. Soil Survey Refinements for Predicting Black Oak.
Site Quality in Southeastern Ohio. Soil Science Society
of America Proceedings, Vol. 31, No. 6, p 805 - 810.

12. COILE, THEODORE S.
1948. Relation of Soil Characteristics Po Site Index of
Loblolly and Shortleaf Pines in the Lower Piedmont Region
of North Carolina. Duke University, School of Forestry
Bulletin No. 13, Durham, N. C.

13. ____________

1952. Soil Productivety For Southern Pines. Reprint
from The Forest Farmer Vol XI, No 7: 10, 11 & 13 (April)
and VOL XI, No. 8: 11-12 way).

14. DOOLITTLE, WARREN T.
1958. Site Index Comparisons For Several Forest Species
in the Southern Appalachians. Soil Science Society of
America Proceedings. Vol. 22, No. 5, Sept. - Oct.,
pp 455 -458.

15. ELLERBE, C. M. and SMITH, GEORGE E. JR.
1961. Soil Survey Interpretations for Woodland Conservation-
South Carolina.. . Progress Report Vol. 1

16. ___________

1963. Apparent Influence of Phosphate Marl on Site Index
of Loblolly Pine in the Lower Coastal Plain of South
Carolina. Journal of Forestry, Vol. 61, No. 4, 284-286.

17. ______________

1964. Soil Survey Interpretations For Woodland Conserva-
tion - South Carolina- -- Progress Report- Vol. 2.

18. BONNER, F. T.; FARMER, R. E., Jr.
1967. Germination and Initial Growth of Eastern Cottonwood as Inf luneced by Moisture Stress. Reprint from Botanical Gazette. Vol. 128, Ho. 3-4, Sept - Dec.

19. HOCKER, HAROLD W., JR.
1955. Climatological Summaries For Selected Stations In and Hear The Southern Pine Region, 1921-1950. U. S. Forest Service, Southeastern, Forest Experiment Station, Station Paper No. 56

20. KLAWITTER, RALPH A.
1965. Woodland Drainage in the Southeast-Journal of Soil & Water Conservation Vol. 20 (4):181-182.

21. ________________
1967. Water Management in Coastal Plain Woodlands. Southern Lumberman 215 (2680); 175-177.

22. LULL, HOWARD W.
1959. Soil Compaction on Forest and Range Lands. Misc. Pub. No. 768, Forest Service, U. S. D. A. Washington, D. C.

23. McCLURKIN, D. C. AND COVELL, R. R.
1965. Site Index Predictions For Pines in Mississippi. U. S. Forest Service Research Paper SO - 15 Southern Forest Experiment Stat ion

24. McDONALD, J. B.
1963. Soil Resources For An Expanding Population, James Island, Charleston County, South Carolina. U.S.D.A.- Soil Cons. Service in cooperation with S. C. Agr. Exp. Sta., Columbia, S. C.

25. METZ, LOUIS J. AND WELLS, CAROL G.
1965. Weight of Nutrient Quantity of the Aboveground Parts of Some Loblolly Pines. Southeastern Forest Exp. Station, Research Paper SE-17. Forest Service, Asheville, N. C.

26. MOEHRING, D. M. AND RALSTON, C. W.
1967. Diameter Growth of Loblolly Pine Related To Available Soil Moisture and Rate of Soil Moisture Loss. Soil Science Society Proceedings. Vol. 31, No. 4. 560-562

27. OLSON, DAVID F., JR. AND DELLA-BIANCA, LINO
1959. Site index comparison for several tree apeciee in the Virginia-Carolina Piedmonth. Sta. Paper 104, Southeastern Forest Experiment Station, Forest Service.

28. SMALLEY, GLENDON W.
1964. Topography, Soil, And The Height of Planted Yellow Poplar. Reprint from the Journal of the Alabama Academy of Science. Vol. 35, No. 2, April.

29. THOMPSON, GEORGE W. AND McCOMB, A. L.
1962. Growth of Plantation Black Walnut in Relation to pH and Certain Chemical Factors of the Soil. Forest Science Vol. 8 322-333.

30. TURNER, LEWIS M.
1937. Growth of Second Growth Pine On The Coastal Plain Soils of Arkansas. University of Arkansas, Agric. Exp. Station Bulletin No. 342, Fayetteville, Arkansas.

31. U. S. DEPT OF AGRICULTURE. SOIL CONSERVATION SERVICE.
1962. Soils Memorandum SC-4, SOILS TECHNICAL GUIDE NO. I, 5 May 1962, U.S.D.A. - Soil Conservation Service, Columbia, S. C. -Unpublished In-Service document.

32. WOODWELL, GEORGE M.
1958. Factors Controlling Growth of Pond Pine Seedlings in Organic Soils of the Carolinas. Ecological Monographs, 28: 219-236, Duke Univ., Durham, N. C.

33. YAWNEY, HARRY W. AND TRIMBLE, G. R., JR.
1968. Oak Soil-Site Relationships in the Ridge and Valley Region of West Virginia and Maryland. U. S. Forest Service Research Paper NE-96.

34. ZAHNER, ROBERT
1957. Field Procedures for Soil-Site Classification of Pine Land in South Arkansas and North Louisiana. U. S. Forest Service, Southern Forest Experiment Station, Occasional Paper 155.

SOILS INFORMATION USED AND NEEDED FOR WOODLAND PRODUCTION: RESEARCH FINDINGS--ORGANIC SOILS [1/]

By
Ralph A. Klawitter, Principal Silviculturist
U. S. Department of Agriculture, Forest Service
Southeastern Forest Experiment Station
Charleston, South Carolina

We have heard that by the year 2000 every woodland acre will have to produce its fair share of timber if cut is not to exceed growth in the South (9). Not only in the South but in other areas too, woodland owners are looking more closely at organic soils to determine how they can bring them into greater production. For example, more than 4 million acres of peatlands and other soils have been drained in northern Europe to improve woodland productivity (24). In these European efforts, selection of the site has been the key to success in drainage because some sites produce an excellent response, whereae others show little at all. We can see, consequently, why it is so important that woodland owners have as much soils information as possible to guide their water management and site improvement efforts. A lack of organic soils information can lead to improper site selection and much wasted effort. Here in the South, published information on woodland management of organic soils is scanty. Nevertheless, by bringing together what is known from our Region with that from other places, we can draw some general conclusiona about the kinds of information on organic soils which should be included in soil surveys in the future. The question we are asking ourselves then is, "What soil survey information does the woodland owner need to aid him in improving the productivity of his organic soils?"

The Extent of the Problem

An estimated 80 million acres of peat and muck soils are found in the United States, with the largest share--60 million acres--located in the north and northeast (22). About one-fourth of the 60 million acres, or 15 million acres, occur in the northern Lakes States, mostly as forest land (2).

In the South, Florida is a leader in peat and muck soils with approximately 11 million acres (22). The Everglades alone contain more than two million acres in the largest known tract in the world. North Carolina offers another example of the importance of organic soils in the South. Muck and peat deposits in this State are estimated to cover about one and one-half million acres, mainly in forest land (17). When one considers the amount of woodland in and around such areas as the Dismal Swamp in Virginia, the Okeefenokee Swsmp in Georgia, and the multitude of other swamps and bays elsewhere, the acreage of organic soils assumes gigantic proportions. Thus, the problem of guiding woodland owners in the selection of their organic soils for improvement is a matter of real and pressing concern to soil scientists.

1/ For presentation at the 1968 Southern Soil Survey Work Planning Conference, Clemson University, Clemson, S.C., July 9-11, 1968.

Coverage in Soil Surveys

A check of some of the more recent soil surveys for coastal plain counties in the southeast indicate6 that definitive information on organic soils is lacking in many cases. For example, organic soils of the Dismal Swamp in Virginia were included in mapping units identified as mucky peat, mucky peat-shallow over loams, and mucky peat-shallow over sands (29). These soils were not surveyed in detail, however, because of their inaccessibility. In two counties in North Carolina, organic soils were identified in two mapping units in the Pamlico series or simply as mucky peat (25,28). Those in South Carolina and Georgia are listed under swamp soils (30.31, 33. 34). Florida soil scientists, on the other hand, recognize 8n impressive list of organic soil types in addition to the general units of peat and swamp (26,27, 32).

It is now evident, however, that soil scientists are no longer satisfied to lump organic soils into large, ill-defined mapping units. Tentative soil series, such 86 the Dorovan and Ponzer, have been approved within the last year, and a number of others are proposed; i. e., Atlantic, Belhaven, Mattamuskeet, Pungo, and Dare. No doubt more will-follow as soil scientists become bettrr 'acquainted with the range or organic soil condition6 in the coastal plain and those soil factors which affect woodland water management and timber, production significantly.

'Some Factor6 Related to Water Movement

Two criteria that can be defined quantitatively have been suggested as guides to the drainability of land:' hydraulic, conductivity of the, saturated zone and the depth to strata which impede the removal of groundwater (8). Drainage to change the hydrology of the site is one of the first requirement6 to improve organic soil6 for pine tree production (22). Excessive wetness favors organic accumulation but hampers the development of the tree root system. Lake State studies show that, the rate of water movement through an organic soil depends upon the kind of peat material that forms the soil (1,3, 4). Water will flow at 8 rate as high as 118 feet per day through undecomposed peat and 86 slow as 0.016 feet per day through decomposed peat. Humification tends to increase density and thus enables the pest material to retain more water against the suction forces produced in drainage. In addition, the potential for water management varies considerably with the peat type. For example, the water content of moss peat is less than herbaceous peat at a given suction pressure (5, 6).

The pattern of 'water movement and the water source also have direct effect6 on the nutritionof peatlands (14, 3C). Rainwater is generally a poor source of plant nutrients. Elevated peat soils which receive water only from the atmosphere are relatively infertile and tend to decompose slowly. Many nutrients become mobile when the soil and water are acid; slow effluent drainage leaches them from the soil gradually. As the nutrients are lost, the site declines in fertility. Moreover, iron and aluminum compounds can accumulate in significant amounts in such soils. At the other extreme are low peat soils which receive a significant amount of water from adjacent upland mineral soils. These soils are enriched by the ions brought in from without and exhibit greater productivity. In large bays, essentially the same effect may be produced locally by continuous influx of water with low concentrations of nutrient6 from the main expanse of the bay OK swamp. In such cases, more productive organic soils may be associated with inclined groundwater tables and peats of higher hydraulic conductivity.

Some Factors Related to Tree Growth

Pine tree survival and growth on organic soils is more complex than rates and volumes of water movement. In dealing with trees, we are faced not only with hydrologic problems but with biochemical and physiological probleme ae well, many of which are only poorly understood (16). Con-eequently, European foresters go into great detail in claeeifying their peatlande for woodland uea (10). One criterion often suggested for classification purpoee is peat depth. Early experience in eastern North Carolina indicated that loblolly pine (Pinus taeda L.) wae restricted entirely to mineral soils. Later, however, stands of ioblolly pine of acceptable productivity were located on peat eoile five to ten feet in depth. European experience shows conflicting results on the influence of peat depth on tree growth after drainage , and research in the Lake States demonstrates weak correlation of eite index with peat depth (11). Peat depth probably is more important when organic soils are relatively shallow and the tree roots ere influenced by the underlying meterial.

In the southeast, for example, ecientiete determined that the texture of the subsoil beneath peat affects pond pine (Pinus serotina Michx.) site index (7). Where subsoils contained more clay, site indices tended to be higher. Improved tree growth ie also likely when the mineral subsoil is mixed with the peat during site preperation (35). Maintenance of the productivity of sandy subsoil6 may, in fact, require such mixing. Finally, as the peat meterial begins to subside after drainage, the nature of the underlying material will play a greater role in *tree* growth (21,23). The shallower the peat, of course, the eooner the influences of the underlying materials will be realized.

European work demonstrates that type of peat, based upon the composition of plant remains, ie a more significant factor in peatland classification than depth, particularly for peat deposits over twenty inches (51cm.) in depth.. Sphagnum moeeee normally yield peats which are lees fertile than sedge OK woody peats (18). Some of the beet peat sites in Minnesota form from decomposed woody materials or contain woody meterial scattered throughout them (11). I have seen pine growth on woody peat in drained cypress bogs in Virginia, South Carolina, and Florida which exceeded that of trees on adjacent uplands. In fact, one has only to visit the northern end of the Dismal Swamp to see yellow-poplar (Liriodendron tulipifera L.), sweetgum (Liquidambar etyraciflua L.), and loblolly pine thriving on woody peat materials at least ten feet deep.

The degree of decomposition of a peat is almost as valuable a characteristic as the typo of peat (10). In afforestation of treeless peatlands, pine development is ordinarily retarded by poor structure and decomposition (12). As decomposition progresses, both potassium and phosphorous are more abundant near the surface than at lower levels. The humic acid content increases, while the content of hydrolyzable substances decreesee (19). As mentions&earlier, decomposition tends to reduce permeability. h e reduction is much less, however, for woody peats which still retain e high level of permeability because of their loose, granular, and blocky. structure (22).

A great deal of European effort has been devoted to the classification of peatlands on the basis of the natural vegetation. The thinking is thet natural vegetation reflects the hydrologic, physical, and chemical factors of the site and can be used to predict suitability for woodland drainage (10). One Finnish report states that peat soils with a cover of mosses; sedges, end herbaceous plants rich in nutrients can be transformed into highly productive woodlands by drainage (13). Drainage of other kinds of peatlands, however, is ineffective without supplemental fertilization.

A recent account of-a woodlanddrainage projeat in central Florida brings out the problem of distinguishing between organic soil sites with different 'natural vegetation, peat types, and degrees of decomposition (15). One peat has ,a cover of red, root (Gyrotheca tinctoria [Walt.] Solisb.). It is on a mucky, highly decomposed soil which allows reedy water movement through it. This characteristic contrastswith the usual rate of water movement through most decomposed organic soils. possibly because of the inclusion of mineral soil. Pine tree growth on this soil is above average; The other peat is described as a "relatively undecomposed" and "practically impermeable" material found in-bracken fern (Pteris aquilina L.) and sphagnum sites. The pine growing potential of this site is less than that of the other.

Kinds of Information Needed

What kind of soil information does-thewoodland owner need to aid him in managing organic soils? He needs to know the' botanical origin and. stratigraphy of the peat, as well as its thickness, degree of decomposition, wood content, acidity, and water Sources end conductivity. The kind of subsoil material,. amount of mineral soil mixed into the peat, and natural vegetation and fertility are all information that will be put to use in selecting peatlands for woodland drainage' and planting. Detailed knowledge of the kind of organic soils and their location will be used not only in timber production, but in wildlife habitat improvement, in forage production, in water management; ant-by theengineer in road end other construction as well (20).

Without detailed 'knowledge of organic soils, improvement of woodland productivity on wetlands in the South 'will. proceed very slowly through trial and error, a costly process at, best. In addition, the researcher's task will be much more difficult because he will have less knowledge of the range of soil conditions he ha8 to work with and where the various kinds of organic soils are located;

LITERATURE CITED

(1) Bay, R. R. 1963. Aquifer characteristics of peate. Extr. from Rep. Lake States For. Exp. Station (18)

(2) ________ 1963. and Ralph A. Klawitter. What's new in wetland hydrology? Proceed.,S.A.F. pp. 175-177.

(3) Roelter., D. H. 1964. Water storage characteristics of several peats in situ. Soil-Sci. Soc. Am. Proceed. Vol. 28(3): 433-435.

(4) ________ 1965. Hydraulic conductivity of peats. Soil Sci. Vol. 100(4):227-231.

(5) ________ 1966. Hydrologic characterietice of organic soils in Lake States watersheds. J. Soil 6 Water Cone. Vol. 21(2):50-53.

(6) ________ 1964. and G. R. Blake. Importance of volumetric expression of water contents of organic soils. Soil Sci. Soc. of Am. Proceod. Vol. 28(2):176-178.

(7) Coile, T. S. 1952. Soil and the growth of forests. Adv. Apron. Vol. 4: 329-398.

(8) Fly, Claude L. 1961. The soil drainability factor in land classification. J. Irr.& Drain. Div., Proceed. ASCE. Vol. 87: 47-62.

(9) Forest Service. 1958 Timber resources for America's future. U.S.D.A. FdFor. Report No. 14. 713 pages.

(10) Heikurainen, Leo. 1964. Improvement of forest growth on poorly drained peat soils. Int. Rev. For. Res. Vol. 1 pp. 39-113.

(11) Heinselman, Miron L. 1963. Forest sites, bog processes, and psatland types in the glacial Lake Agassiz Region, Minnesota. Ecol. Man. Vol. 33:327-374.

(12) Huikari, Olavi. 1955. Studies on the effect of drainage and ash fertilieation upon the microbes of some swamps. English Summary. Metsantutkimuslaitokseen, Iulkaisujn, Comm. Inst. For. Penn. No. 422, Helsinki. pp. 17-18.

(13) Huikari, Olavi. 1959. Drainage of swamp lands for forestry purposes in Finland. J. For. Vol. 57(2):128-129.

(14) Ingram, H. A. P. 1967. Problems of hydrology and plant distribution 'in mires. J. Ecol. Vol. 55(3):711-724.

(15) Jarvis, W. T. and W. L. Beers. 1955. Reclamation of a wasteland in central Gulf coastal Florida. J. For. Vol. 63(1): 3-7.

(16) Klawitter, Ralph A. Woodland drainage in the southeast. J.
1965. Soil & Water Cons. Vol. 20(4):181-182.

(17) Lee, William D. The soils of North Carolina. Tech. Bull. No.
1955 115. North Carolina Agric. Exp. Sta. 187 pages.

(18) Lishtvan, I. I., A. M. Mamtsis, and N. V. Churayev. Study of
1954. the cation content of the adsorption complex of lowland peats. gov. Soil Sci. Vol. 7:705-711.

(19) Mkonov. M. W. and S. I. Perlin. Changes in organic matter of
1963. peat in relation to its degree of decomposition and type. Sov. Soil Sci. No. 3:261-264.

(20) Robinson, C. C. and T. W. Green. Foresters use soil surveys.
1962. so. Lbrm. Reprint. December 15.

(21) Skrynnikova, I. N. Claeaification of virgin bog and reclaimed
1964. peat soils of the USSR. Soc. Soil Sci. Vol. 5: 455-465.

(22) Stephens, John C. Drainage of peat and muck lands. Yearbk. of
1955. Agric. pp. 539-553.

(23) ________ Subsidence of organic nails in the Florida Everglades.
1956. Soil Sci. Soc. Am. Proceed. Vol. 20(1):77-80.

(24) Stoeckeler, Joeeph Ii. A review of forest swamp drainage methods
1963.. in northern Europe. J. of For. Vol. 61(2):99-104.

(25) U. S. Department of Agriculture. Soil Survey Pasquotank County,
1957. Worth Carolina. U. 8. D. A. and N. C. Agric. Exp. Sta. Series 1949, No. 3.

(26) ________ Soil Survey (Detailed Reconnaissance) Dade County,
1958. Florida. U. S. D. A. and the Fia. Agric. Exp. Sta. Series 1947, No. 6.

(27) ________ Soil Survey Hillsborough County, Florida. U. S. D. A.
1958. and Pla. Agric. Exp. Sta. Series 1950, No. 3.

(28) ________ Soil Survey Duplin County, North Carolina. U. S. D. A.
1959. and N. C. Agric. Exp. 'Std. Series 1954, Ko. 2.

(29) ________ Soil Survey Norfolk County, Virginia. U. S. D. A.
1959. and Vu. Agric. Exp. Sta. Series 1953, No. 5:

(30) ________ Soil Survey McIntosh County, Gacrgia. U. S. D. A.
1961. and Univ. of Ga., College of Agric., Agric. Exp. Sea. Series 1959, No. 4.

(31) ________ 1964. Soil Survey Treutten County, Georgia. U. S. D. A. and Univ. of Ga., College of Agric., Agric. Exp. Ste. Series 1961, No. 16.

(32) ________ 1965. Soil Survey Suwannee County, Florida. U.S. D. A. and Univ. of Fla. Agric. Exp. Sta. Series 1961, No. 21.

(33) ________ 1965. Soil Survey Wayne County, Georgia. U. S. D. A. and Univ. of Ga.. College of Agric., Agric. Exp. Sta. Series 1961. No. 16.

(34) ________ 1966. Soil Survey Bamberg County, South Carolina. U. S. D. A. and S. C. Agric. Exp. Sta. Series 1962, No. 10.

(35) Vomperskii, S. E. 1959. Benefits of forest drainage with special, reference *to* quality of peety soils. Symposium *on* the Increase of Productivity of Swamped Forests. Vol. 49: 103-105. Academy of Sciences, U. S. S. R. (Translation).

(36) Yefimov, V. N. 1964. Forms of accumulation end migration of substances in bog soils. Sov. Soil Sci. pp. 643-649.

Soil6 Information Used and Needed for Woodland Production: Requirements by Industry

Jack T. May[1/]
School of Forest Resources
University of Georgia
Athens, Georgia

The economic Justification for the ownership and management of forests by the wood-using industries lies in the production of timber yields at 6 profit to the industry. Some of the forest management activities that are dependent on or. related to soil or site characteristics are: (1) estimation of site productivity for a tree species or forest type;: including determination of yields for various rotations; (2) selection of species; (3) preparation of site; (4) establishment of regeneration; (5) control of plant competition; (6) harvesting of forest products; (7) land acquisition; (8) protection end (9) taxation. Thus, the identification of the characteristics of forest land becomes an important aspect of industrial management operations,

The forest manager has few direct controls tier the Soil'. His approach to. the concept of soil management must b6 basically, an ecological one (Rudolph, 1958). He must rely, primarily, on indirect methods of manipulating the environment.

Some of the activities listed above and others may be classified as soil management or environment manipulation. These include site preparation, control Of species composition and density, water control, soil stabilization and fertilization. The various practices used by the forest manager may have beneficial or deleterious effect6 on physical, chemical and biological properties of the soil and may affect potential yields.

What kind6 of boil information is needed and/or is used by the forest industries?

Site Index Classification

An urgent need exists for additional information on site quality and predicted yield for nearly all commercial species, for a variety of sites and rotation ages.

The literature on, forest site classification is voluminous. Coil0 (1952) and a host. of other investigators have delineated some of the physiographic and soil factors that affect yield of commercial species. Among the more important are:

A. Physiographic factors: (1) latitude, (2) altitude, (3) degree of slope, (4) length of slope, (5) position on slope, (6) aspect, and (7) differences in angle and direction of stratification of rock formations.

1/ For presentation at the 1968 Southern States Soil Survey Work Planning Conference, Clemson University, Clemson, South Carolina, July 9-11, 1968.

B. Physical factors of soils: (1) depth of the solum, (2) depth to impermeable horizons. (3) depth to mottling. (4) internal drainage (permeability), (5) Porosity. (6) texture of soil horizons, (7) plasticity, etc.

C. Chemical properties of soils: (1) soil reaction, (2) organic, matter, (3) exchange capacity, (4) levels of available nutrients, (5) levels of nutrient reserves, (6) ratio of nutrients, (7) chemical fixation,, (8) biological fixation, (9) toxicity of some chemicals, etc..

D. Biotic characteristics of soils: (1) presence of soil organisms, both macro- and micro- fauna and flora,, and (2) the extent to which some micro-organisms are parasitic to trees.

Empirical equations for estimating site quality from various functions of soil and physiographic variablea were developed by multiple regression analysis of-paired. observations of tree and soil data. The procedures. required for applying these types of soil evaluation techniques to management problems require the compilation, analysis and interpretation of data from intensive sample surveys.

Site classification based on identification and delineation on soil maps of natural soil bodies by families, series, types and phases has been discussed by Byrd, Sands and May (1963), McClurkin and Covell (1965) and others.

This system has been rejected and/or criticized by many land managers' because of some very definite weaknesses: namely, (1) mapping of soil units in some areas has not always been accurate, (2) wide differences in site index values are raported for a single species and a single mapping unit (3) data collection has not always been based on representative samples, and (4) the work has not always been coordinated.

The accuracy of soil mapping is the responsibility of the State Soil Scientists, and strict controls should be in effect at all times.

Determination of relieable site index data for soil mapping units within specified physiographic and climatic zones should be handled as cooperative venture between the Soil Conservation Service, State Forestry Organizations, U. S. Forest Service, forest land owners and forestry schools.

Soil Moisture and Water Control

Dr. Klawitter hasdiscussed the water problems associated with organic soils. The problems may be more complex for mineral soils, whether in the Coastal Plain, Piedmont or Mountain Provinces. A basic need is a classification of soil mapping units, series and families by drainage classes such as excessively drained, well drained, poorly drained, etc. Factors that delineate drainage classes should be described. These include textural classes, organic or mineral hardpans, relief, permeability, depth to water table, stream patterns. etc.

Drainage will be an operational necessity **for many** mineral soils. **Some unanswered questions** are:, **How much? What size** canals? How far apart? At what **levels should** water be maintained **in** canals during dry' periods?

Potential Responae of Soils to **Fertilization**

There is a **voluminous literature** on forest fertilization studies, in, **Europe** and the United States. **Conflicting** results have **discouraged operational** use of fertilizer and to **some** extent research. Among questions still to be answered are: Why do **some** species respond to fertilization on one site and not **to** the **same fertilization on** another site? Why will one type of **fertilizer** stimulate growth **of one** species but not **the growth** 'of another species? What soil characteristics can be used **as indicators** of potential response of trees to fertilfeation? Can soil reaction, base exchange, organic matter, levels of available and reserve nutrients and **minerology** be reliable indicators of fertiliser response? Can the same response be expected from one **fertilizer** applied to similar soil series on ten different sites?

The. forest **industry** needs to know: What 'are the fertilieer requirements' of a species on a **given site? This type of information is beyond** the scope of the soil survey; but **what information can** the survey provide that will be useful in making fertilieer **recommendations?**

Trafficability - Compaction

Extensive use of heavy equipment for **harvesting** and **site preparation** has created **some, problems and raised** some **questions., Among questions** to be answered are:

1. Which soils **will** support **heavy, wheel-and** tractor equipment in wet seasons? dry seasons?

2. What will be the effects of the use of this equipment on wet sites? dry sites?

3. Will **marden** choppers and tree crushers have a compaction effect on soils?

4. What effects **will** tractor logging and skidding have on soils of steep slopes?

5. Can compaction **damage** or erosion on various soils be estimated in terms of site reduction?

6. Are there any cultural practices, biological or mechanical, that would materially and economically help to correct compaction **damage** in reasonably short periods of time?

7. Can the Soil Survey provide information on soil characteristics that will help provide an answer to these questions?

Indicator Plants

Herbaceous plants are sometimes used as indicators of soil moisture, soil fertility and site index. Could plants that are indigenous to specific soil families on sites be listed in the survey7

Conclusions

Much of the usable information on forest soils has been published within the past ten years. Forest land managers are not soil scientists and they are not acquainted with much of the data included in soil surveys,

A recurrent need is for short courses that will assist the land manager in interpreting available information.

References

Rudolph, V. J. 1958. Soil Management by the forest manager. In "Proceedings First American Forest Soils Conference." Michigan State University. East Lansing.

Coile, T. S. 1952. Soils and the growth of forests. Advance in Agronomy 4: 329-398.

Byrd, H. J., N. E. Sands and J. T, Nay 1963. Forest management based on soil surveys in Georgia. In "Forest-Soil Relationships in North America." Oregon State University Press, Corvallis.

McClurkin, D. C. and R. R. Covell. 1965. Site index predictions for pines in Mississippi, U. S. Forest Service Research Paper 50-15. New Orleans.

REPORT OF DISCUSSIONS, COMMITTEES I THROUGH IX,
1968 SOUTHERN REGIONAL SOIL SURVEY WORK PLANNING CONFERENCE
Clemson University. Clemson, South Carolina
July 9-11, 1968

Discussion for Committee I - Criteria for families, series and phases.

Buol - Suggest that 25 copies of the report be forwarded to the Chairman (Dr. Brown) of the S6C group for comments and help from that group in use and interpretation of mineralogy data and additional kinds of data needed.

Discussion for Committee II - Classes and phases of stoniness and rockiness.

James - In early stages of progressive surveys progress reviews should critically examine the use of special symbols to see if these symbols can be eliminated from maps by use of phases.

No discussion for Committee II - Classes and phases of stoniness and rockiness.

Discussion for Committee III - Application of the New Classification System.

DeMent - Question the use of the word "old" after a series name, i.e., Troup (old Lakeland).

Kellogg - There is merit in relating soils at the higher categorical levels for example, the Great Soil Group. One might use "formerly."

No discussion for Committee IV - Interpretation of groups and categories higher than series.

Discussion for Committee V - Soil moisture and temperature.

DeMent - Some temperature data does not show aspect. Aspect data can be important.

Obenshain -Morphological information generally is reflected by mottling.

Kellogg - On young soils mottles may not have had time to develop. On the other hand, gley horizons may still exist on old landscapes where drainage patterns have shifted by deeper channels, etc.

Grossman -Depth to water table in soils must be correlated with antecedant weather data. What is the length of time weather data is needed to get normal water table conditions.

(OVER)

Discussion for Committee V - Soil moisture and temperature (contd)

Bailey - "Mesic, thermic" areas are being investigated in Kentucky. Some 16 stations have temperatures being measured at 4" and 20" depths.

Kellogg - Interpretations of extreme conditions are important. More information is needed on capillary movement of water for well-graded and poorly graded materials.

Discussion for Committee VI - General soil maps.

Kellogg - Three quadrangle sheets of map size 1:1,000,000 (16 miles to the inch) are being studied for the kinds of interpretations that can be made.

No discussion for Committee VII - Urban interpretations.

Discussion for Committee VIII - Soil survey forest committee.

James - Narrow delineation8 along streams and drainageways are commonly exaggerated during map compilation.

No discussion for Committee IX - Priority of problems that need soil laboratory study and realistic estimates of work required for each of these studies.

UNITED STATES DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

Southern Regional Technical Work Planning Conference
of the Cooperative Soil Survey

Clemson, South Carolina
July 9-11, 1968

Report of the Committee on Criteria for Families, Series and Phases.

The charges to the committee were:

1. Summarize the criteria used in distinguishing soil series and phases within families. Study a few families in 2 or 3 representative Typic subgroups in each order. The families should include series from more than one state and more than one region. The Principal Soil Correlator should be requested to select the families. About 5 or 6 families in this region with about 10 soil series each will be sufficient for this study. Record data on form developed by Northeastern Committee.

2. Prepare a guideline statement for use in official soil series descriptions that will indicate the sources of data or of the estimates pertinent to the classification of the soil series.

3. Establish criteria for the ranges in characteristics of soil series.

4. Explore possible ways to improve limits for mineralogy classes. Refer to items 4 and 5, page 125 of 1967 National Proceedings and respond to recommendation 8, page 129.

Subcommittees on mineralogy, series criteria, and guideline statements for sources of data in series description did preliminary work on the charges to the committee. The reports of the subcommittee served as a basis for discussion.

The committee supports Dr. Grossman's suggestion of the National Technical Work Planning Conference of 1967. This committee recommends further study and action to extend the mineralogy of the clay fraction to at least include fine loamy and fine silty families. Classification based on minerals such as quartz has little advantage over plain textural classification, since such minerals are more or less inert when compared to clay minerals. From the standpoint of plant growth there is little advantage in distinguishing between feldspar and quartz in particles of silt size, or larger. It seems, therefore, that the determinant particle size, as well as mineral contents for textures other than clayey, should be carefully examined.

Dr. Grossman's proposal for modification of the control section used for mineralogy classes was not considered.

On page 127, item 7, of the 1967 Proceedings of National Technical Work Planning Conference, a recommendation was made that a chloritic mineralogy class may be needed. The committee was unable to formulate a recommendation at this time, although the recommendation was briefly studied. Soils that usually contain significant amounts of chloritic minerals have coarse-loamy, or fine-loamy textures. The usual soil chlorites are expansible layer silicates, montmorillonite or vermiculite, whose interlayer spaces have been filled or partially filled by hydroxyl alumina, and their physical behavior after chloritization resembles kaolinite or mica. Soils containing much chlorite would probably best be classed as having mixed mineralogy.

At the present time information available on soil chlorites is insufficient to clearly define the nature of these' minerals. Apparently the composition of chlorite interlayers is quite variable, with only small *islands of* aluminous material in interlayer spaces of montmorillonites and vermiculites in some cases, to complete hydroxy aluminum interlayers in others. Action on a chloritic mineral class should be deferred until soil chlorites are better defined, although the investigation of this mineral class should be continued.

The committee recommends that the definition of the fine carbonatic mineralogy class be revised to read: "Contains more than one-third (by weight) of carbonates in the less than 0.002 mm fraction as determined by a calcium carbonate equivalent greater than 33%." This revision would provide uniformity of the method of determining the carbonate content.

The definition of the oxidic mineralogy class should be extended to cover resistant minerals other than quartz. For example, is it permissible that inert or resistant minerals such as rutile, zircon, and other extremely resistant or inert minerals be considered on the same level as quartz, and included with the quartz analysis? Some soils contain appreciable amounts of the latter minerals, along with iron-manganese concretions. Considerable confusion has resulted as to what the mineral class should be in certain soils because of uncertainty regarding non-neatherable minerals other than quartz.

In the ashy mineralogy class it was not clear to the committee as to the exact meaning of the phrase: "dominantly smaller than 2 mm." A minimum limit (percentage) for less than 2 mm-size material should be specified. Unless the word dominant is used with reference to control, it should be deleted from the definition of this class and replaced by a word such as abundance.

In the cindery mineralogy class, as in the ashy class, the subcommittee suggests that the word dominantly be changed for a more suitable word and that quantitative limits be clearly defined.

The committee suggests that the siliceous mineralogy class be further studied and perhaps modified to include tridymite and cristobolite as well as opal, chalcedony, and quartz. The Lauderdale soils in Mississippi are high in both tridymite and cristobolite.

In determining siliceous classes some question always arises as to whether or not non-weatherable minerals should be considered as part of the 30% siliceous components of the soil. These minerals do not have a hardness of 7, or greater; as presently specified. In fact, there are very few minerals with a hardness of 7 or greater. Ilmenite has a hardness of 6; hematite has a hardness of 5.5-6.5; magnetite has a hardness of 5.5-6.5; rutile has a hardness of 5.5-6.5; pyrolusite has a hardness of 2-2.5; goethite has a hardness of 5-5.5; and limonite has the same hardness as goethite.

It appears that the 50% limit (weight of montmorillonite and nontronite) is too high for the montmorillonite class. A value in the range of 30% may be more reasonable. Where montmorillonite is common it may be desirable to arrive at the mineral classification on the basis of a minimum C.E.C. to percent clay ratio, Surface area measurements, plastic limits, or shrink-swell behavior. The same reasoning applied to the montmorillonite class should be applied to the vermiculite mineralogy class. That is, a minimum value below 50% by weight should be considered.

The committee recommends restudy of the percentage K_2O presently used to determine the abundance of illite in the illitic mineralogy class, According to best information, half by weight of illite should be equivalent to 4% K_2O rather than 3% K_2O. Illite clays with reduced K_2O content are mixtures, or interstratified mixtures, of illite and vermiculite or montmorillonite. Some question presently exists on the use of the term illite in the Soil Science Society of America. This has not as yet been resolved, and the final definition may have considerable influence on the definition of the illite mineral class. Illite should be considered as the 10 Å mineral component of the soil clays with an average K_2O complement of 10%. The 3% K_2O used to represent 50% illite suggests that this mineral contains only 6% K_2O when pure.

If the behavior of halloysito is carefully evaluated in terms of the properties it imparts to a soil, the 50% limit of the halloysitic class should probably be reduced considerably, as suggested for montmorillonite and vermiculite. Also, it may be desirable to restudy the limit placed on the amount of allophane that is permissible in halloysitic or kaolinitic mineral classes. As much as 25% allophane normally obscures the behavior of all other minerals present in a mineral mixture.

This committee recommends that a new committee of qualified mineralogists be added to the Southern Regional Work Planning Conference to which questions concerning mineralogy could be referred for study and recommendations.

The committee recommends a subdivision entitled "Source of Data" be added to each new official series description (blue copy) immediately after the subdivision "Series Proposed". The first sentence will contain a statement that characterization data is, or is not, available to support the classification of the series.

Reference will be made to the most pertinent laboratory investigations, when available, such as "The classification of this series is based in part on characterization data reported in Soil Survey Investigation Report No. 13; or in Soil Science Society of America Proceedings (Volume and Page) or unpublished data of the Lincoln Soil Survey Laboratory for pedon LSL X31-37, etc." Unpublished data will be listed by sufficient laboratory and pedon numbers so that it can be located by those most concerned.

Reference will also be made to the most pertinent studies, other than laboratory work, when appropriate. A summary statement of the results will be given. These studies could include such as soil moisture budgets, soil temperature studies, water table studies and the like.

Review drafts, blueline masters, and yellow copies should contain as a minimum the same requirements as for an official series description. Additional information, data, or references may be listed under remarks heading.

It was the feeling of the committee that the state originating the series description would select the one most pertinent reference for listing under "Source of Data". Other data or reference as appropriate would be listed under the "Remarks" section on review drafts and on yellow copies but would be dropped on blue copies.

It was also thought by the committee that the reporting stations for climatic data be identified along with climatic data under the heading "Setting".

The committee summarized criteria used to distinguish soil series in the following families:

- Chromudic Pellustorts, fine, mixed, isohyperthermic (4 series)
- Typic Argiudolls, fine silty, nixed, thermic (4 series)
- Typic llapludults, clayey, kaolinitic, thermic (10 series)
- Typic Palcudults, clayey, kaolinitic, thermic (3 series)
- Typic llapludults, clayey, mixed, thermic (10 series)

The distinguishing characteristics were recorded on forms suggested by the Northeastern Committee and were forwarded to the National Technical Work Planning Conference.

In the five foregoing families, 30 criteria were used as a basis for distinguishing series within the families. One criteria, soil color, was used in all families. Consistence, horizon sequence, and solum thickness were each used in two families. The other 26 criteria were used only within single families. A summary of the criteria used is attached to this report.

The committee discussed at length the establishment of criteria for ranges in characteristics of soil series in light of the foregoing summary. Some members felt that series criteria could be stated in only general terms. Other members felt that within some classes specific limits could be placed on ranges of color, thickness of Bt horizons, or thickness of solum, for example, but pointed out the problem of reaching agreement on what the limits should be.

An analysis of separation values developed for some families showed promise in evaluating the distinguishing criteria used. It is pointed out that the usefulness of separation values depended on the order of the criteria and the numerical weight assigned. Further testing of separation values may be worthwhile.

The committee makes no recommendation in regard to ranges of series criteria at this time.

The committee recommends it be continued to deal with criteria for series and phases.

Discuss-ion after Presentation of Report

Buol: I suggest that this committee request the S-60 Southern Region clay mineral committee consider the use of mineralogy in the classification system at their annual meeting and make recommendations.

Ritchie: Are we recommending that the membership of this conference be enlarged in order to form a body of qualified mineralogists.

Slusher: Qualified people are already members of this conference.

COMMITTEE MEMBERS PRESENT

D. F. Slusher - Chairman
W. H. Fuchs - Vice Chairman
R. C. Glenn
R. J. McCracken
H. F. Perkins
J. D. Nichols
J. T. May
H. H. Bailey
W. H. Koos
R. J. Barnhesil
V. S. Jenkins
H. B. Vanderford
C. A. Steers
C. L. Bramlett
T. C. Peele
R. C. Carter
G. H. Kunze
Juan Juarez, Jr.
F. H. Beinroth
S. A. Lytle
F. Steele

VISITORS

E. J. Pederson
Mel James
V. W. Carlisle
H. F. Miller
G. S. McKee
R. B. Grossman
R. Covell
H. Springer

CRITERIA FOR DISTINGUISHING SOIL SERIES WITHIN

SELECTED FAMILIES IN THE SOUTH REGION

7/1

Family	Chromudic Pellusterts fine, mixed, iso-hyperthermic	Typic Argiudolls fine silty, mixed Thermic	Typic Hapludults clayey, kaolinitic Thermic.	Humic Paleudults Clayey, Kaolinitic Thermic	Typic Paleudults Clayey, Kaolinitic, Thermic	Typic Hapludults Clayey, mixed, Thermic	Typic Hapludalfs fine silty, mixed, thermic	Total Times Used	No. Times Order 1	No. Times Order 2
No. of Series	4	4	10		9	10				
Criteria										
A. Horizon										
Texture				2/	2		2/	1		1
Color	1 1/							1		2
Mottles (high chroma)	1							1	1	
Carbonates	1							1	1	
Salinity	1							1	1	
Bt Horizon										
Reaction		1							1	
Thickness			1					1	1	
Color	1	1	1		1	1		5	5	
Consistence					1	1		2	2	
Texture						1		1	1	
Sand/silt ratio					1			1	1	
Salinity	1							1	1	
Mottles		2						1		1
Low Chroma					1			1	1	
High Chroma					1,2			1	1	1
Other										
Horizon sequence and kind		2			2			2		2
Depth to rock		1						1	1	
Paralithic conta						1		1	1	
Solum thickness			1			1		2	2	
Silt content			1					1	1	
Exch. Al^{+++} and Total acidity			1					1	1	
Concretions		2								1
Permeability					2			1		1
Rock										
Parent rock fragments in solum					1,2			1	1	1
Stoneline in solum					1			1	1	
Chert fragment >2%					1			1	1	
Pebbles, cobbles & fragments					1,2			1	1	1
Mineralogy										
Mica in B2t					1			1	1	
Mica content			1					1	1	
Gypsum in subsoil	1							1	1	

1/ Numbers refer to 1st order or 2nd order criteria
2/ No report

SOUTHERN REGIONAL TECHNICAL
WORK-PLANNING CONFERENCE
Clemson, South Carolina
July 9, 10 & 11, 1968

REPORT OF COMMITTEE II
CLASSES AND PHASES OF STONINESS AND ROCKINESS

I. Charges of the committee

A. Test criteria for stoniness classes and phases on different size and shape of stones.

B. Study problems of rockiness with special attention to size of rock, spacing between rock and percent of surface covered by rooks.

C. Make recommendations for classes and nomenclatures for the classes of rockiness.

D. Suggest ways and means for broader phases in addition to the narrow phase names proposed.

II. Committee actions

A. The Chairman, T. W. Green, requested recommendations in a memo to members on January 16, 1968.

B. Based on responses from committee members, R. E. Daniell, Vice Chairman, summarized their suggestions. In this, several proposals were offered including a difference in phase names based on intensity of use. This was the basis for committee discussions.

C. The committee explored the possibility of intensive versus extensive use in classing stoniness and rockiness. For example, woodland or pasture land are extensive uses--crop-land intensive. The committee stated that this was not needed for the Southern Region.

D. The committee agreed that percent surface coverage was satisfactory and preferred in this region rather than spacing between stones and rooks. The distance between stones is so variable that percent coverage is more reliably estimated by field soil scientists.

E. The following classes and suggested phase names for stoniness are recommended by this committee:

Class	Surface Covered (Percent)	Suggested Phase Name
0	<2	None
1	2-10	Slightly stony
2	10-50	stony
3	50-90	Very stony
4	90+	Rubble land

F. The following classes and suggested phase names for rockiness are recommended:

Class	Surface Covered (Percent)	Suggested Phase Name
0	<2	None
1	2-10	Rocky
2	10-25	Very rocky
3	25-53	Series - Rock outcrop complex
4	50-90	Rook outcrop - series complex
5	90+	Rook outcrop

An alternative for the Rock outcrop - series combination is Rock land if the soil is too variable for a series name.

III. The reports of "Classes of Stoniness and Rockiness" Committees of 1966 and 1968 were compared. They are similar. It was recommended that the committee be discontinued.

IV. Recommendations from conference

Discussion by members of the conference during the committee report resulted in the following:

The above report is amended to include "Spot symbols such as "s tone, " "gravel" or "rock outcrop" should not be used in delineations where the mapping unit name includes like phase names. For example, rock outcrop symbols should not be used in delineated areas having rock outcrop (or rock land) in the name. Such use of spot symbols is redundant and increases the cost of map compilation. If during the process of corre-iation, map units are combined which will result in a rocky phase with "rock outcrop" symbols, there should be a note made to the cartographer that the "rock outcrop" symbols will not be shown in the delineations of this unit."

Committee Members Present:

R. E. Daniell, Vice Chairman
P. E. Avers
H. C. Dean
F. T. Ritchie
J. A. Cotton
C. B. Breinig
T. C. Mathews

Committee Members Absent:

T. W. Green, Chairman
M. E. Horn
Earl Nance

SOUTHERN REGIONAL TECHNICAL WORK-PLANNING CONFERENCE
OF THE COOPERATIVE SOIL SURVEY

Clemson, South Carolina

July 8 - 12, 1968

Report of Committee III - Application of the New Classification System

The specific charge to Committee III was "Test Soils Memorandum 66, issued October 9, 1967." The first item for consideration and discussion by the Committee was Alternative 1 on Page 12 of Memo 66. The Committee recommends that sentence 5 in Alternative 1, which presently reads "Each of the inclusions of soils of closely similar series may constitute as much as 25 percent of the mapping unit but their aggregate proportion must not exceed 50 percent," be changed to read, "Each of the inclusions of soils of closely similar series may constitute as much as 49 percent of the mapping unit but none may be more extensive than the taxonomic unit giving the name to the mapping unit."

Committee consideration was given to item (b) on Page 10. The Committee believes the statement "Families are closely similar if they are alike on one or more counts" is too broad. The Committee recommends that this statement be rewritten so that the term "closely similar families" will be more meaningful. Under the present definition too many families would be considered closely similar.

The criteria now used for defining Typic, Aeric, and Aquic subgroups in the Orders Ultisols, Alfisols, Inceptisols, and Entisols was of concern to all Committee members. No specific changes in these criteria were recommended by the Committee but it was suggested that consideration be given to placing more emphasis on water table data and soil saturation in defining wetness in soils. If definitions for wetness in soils were less restrictive, in terms of low chroma mottling, the Committee believes more meaningful taxonomic units would be recognized.

The Committee discussed the nomenclature currently proposed for classification of Histosols. The discussion centered around suborder names and no recommendations for changes were made. However, the Committee noted the absence in Histosols of suborder names reflecting geographic bias.

Horizon designations of soil series in the Histosols order were discussed. It was pointed out that the use of horizon designation symbols of S, H and F on Histosols and that of 01 and 02 on the organic layer of mineral sails was confusing. The Committee recommends that consideration be given to the use of the same horizon designation symbols on the organic layer of mineral soils as is proposed for use on Histosols.

The Committee recognized the problems encountered in the numerous changes of names of taxonomic "nits, especially at a Great Group and Soil Series level. It is suggested that whenever feasible a communication link with old classification categories be maintained. It is recommended that this Committee remain active and continue work on application of The New Classification System.

Members of Committee Present.

S. W. Buol, Chairman (NCSU)	R. E. Caldwell
J. A. DeMent	E. A. Perry
R. G. Leighty	B. T. Birdwell
0. R. Carter	J. W. Kingsbury
J. M. Soileau	L. H. Rivers
Keith Young	J. B. Watts
H. T. Otsuki	L. E. Aull
	R. R. Cove11

Other Participants in Committee Session.

C. E. Kellogg	S. S. Obenshain
C. J. Koch	M. E. Springer
Joe Elder	G. J. Buntley
E. Winters	R. B. Daniels

Committee IV Interpretations of groups and categories higher than the series

Chairman: Olin C. Lewis, SCS, Florida
Vice Chairman: Curtis L. Godfrey, Texas A&M University

This is a new and relatively small Committee, charged with responsibility for working out guidelines for making interpretations of soils at categories above the series level.

I am greatly indebted to the Committee members and visitors. It was our pleasure to meet and consider possible courses of action.

Our work has been restricted essentially to methodology. The primary objective has been to determine a simple procedure for making meaningful interpretive groupings of soil series. We discussed results of the Regional study on procedure for determining land capability, initiated by Dr. Bartelli in 1965. Some of the information from that study has been applied directly in the work of this Committee.

It seems apparent to us that the art and science of survey interpretation has not received the attention it deserves, while we pressed for perfection in the soil classification system - that we need to go ahead now and stress progress in standardization of procedures and criteria for the widest possible range of interpretations.

The time has come when we should develop State and Regional literature on the occurrence and distribution of soils, and their interpretation *for use* and development. We should be able to pull meaningful groupings of soils out of the classification system, provide basic interpretations by scientific standards, and then show on small-scale maps where these conditions prevail. Our studios so far indicate that such an objective is justifiable, and that we should move in that direction.

We have attempted to outline simple procedures for identifying compatible interpretive groupings of soil series. This has been done at each of the upper categorical levels in the classification system. The idea was to pull together all soil series in the Region having one or a combination of properties important to a specific interpretation.

In order to assure reliable criteria for all interpretive groupings, we listed the criteria used to differentiate each category in the classification system. It comes as no surprise that there is a great deal of overlap and similarity in the properties used at all levels in the system, and that the differences in their use among the categories are largely in number and emphasis. And it is further evident that such properties are weakly definitive at the top of the system and strongly definitive at the bottom. Thirteen properties are broadly recognized at the Order level; 10 properties with a wider choice of alternatives at the Suborder level; and 10 properties with an even wider choice of alternatives at the Great Group level. At the Subgroup and Family levels, the list of properties is not only wide but they also become restrictive and definitive. This affords sound criteria for the purposes of interpretation.

This Committee proposes to group taxonomic units for interpretive purposes, and to list and maintain the definitive properties as basic criteria. In this way, the reasons for making interpretive decisions will be apparent and subject to review and discussion.

It has been demonstrated that the mechanics of making interpretations above the Series level are relatively simple. This Committee proposes use of appropriate charts and narrative, and possibly use of punch cards for sorting out soils with important common properties. Initially at least, groupings should be made within Orders, working from the Series level upward.

On basis of our work so far, adequate guidelines are available for making interpretations at any level in the classification system. The Committee therefore makes the following recommendations:

1. That this Conference move purposefully toward development of a wide variety of standard interpretations for all important soils in the Region, using uniform procedures and specific

criteria.

2. That work on the 1965 Regional Committee on land capability interpretations at the Family level be completed and incorporated into this project.

3. That the Committee be continued another term.

Towards this end, we offer our s&vices. Specifically, the Vice Chairman and I volunteer to help continue the project in whatever capacity you may determine.

Olin C. Lewis
Chairman

Curtis L. Godfrev (Tex.)
Lester L. Loftin (La.)
E. N. Miller (S. C.)
Morris E. Shaffer (Ga.)
L. H. Burgess (Ala.)
W. M. Parker (Miss.)
H. L. Dean (RTSC-Ft. Worth)

SOUTHERN REGIONAL TECHNICAL
WORK-PLANNING CONFERENCE
OF THE COOPERATIVE SOIL SURVEY
Clemson, South Carolina
July 9-11, 1968

Report of the Soil Moisture and Temperature Committee
committee v

The 1967 National Committee recommended that "the principal activity over the next two years should be the formulation of descriptive statements of the water table regime in terms of kind of water table, depth of occurrence, duration, and season of the year, which would replace drainage classes of the Soil Survey Manual and be used in the new classification system in place of morphological features in framing definitions." The committee spent most of its time working on this recommendation. Data in tables 1, 2 and figure 1, together with data and suggested class limits furnished by Carter Steers from Alabama were used in an attempt to formulate water table depth and duration classes that might be used to replace drainage classes. Any depth-duration class we can establish with our present information overlaps classification units; i.e., it does not separate, for example, Aquults and Udults.

It was suggested that present data be tested statistically to determine (A) whether the overlap between classification units is real or only apparent, and (B) how long must water table and rainfall data be collected to give good prediction values under varying rainfall. The data on hand may be sufficient for the tests. The present committee chairman will investigate these possibilities with the assistance of statisticians at North Carolina State University. It is recommended that individual states collect additional water table data to help refine present definitions.

There was considerable discussion on the meaning of "perched water table? It is recommended that "water table" be used to indicate continuous saturation below the measured level; "perched water table" should be clearly indicated and separated.

North Carolina data (tables 1 and 2) indicate that in Aquults water tables are in or within 6 inches of the Al for periods exceeding 1/2 month per year. Udults have water tables in or within 6 inches of the Al for periods of less than 1/2 month per year. We propose that saturation of the Al horizon be tested further to see if it can be used in the definition of suborders - Aquults and Udults, Aqualfs end Udalfs, etc..

There was some discussion of soil temperature classes and it was recognized that the lines separating temperature zones need, further refinement. We recommend that collection of soil temperature be continued and soil temperature lines be reconsidered at the next meeting. Observations of temperatures of steeply sloping soils will include aspect.

This committee was not prepared to deal with the question of soil moisture definitions in arid and semi-arid regions. We recognize the problem but believe it can best be handled by the states involved, working with the western region.

The committee suggests that it be continued, and that additional water table and soil temperature data be collected.

Committee Members	visitors
* R. B. Daniels, Chairman	C. A. Ellerbe
* F. Steele, Vice Chairman	J. A. Cottdn
R. C. Glenn	
T. J. Longwell	
J. D. Nichols	
G. S. McKee	
* D. F. Slusher	
* C. A. Steers	
* G. L. Bramlett	
T. C. Peele	
* V. W. Carlisle	
* R. E. Caldwell	
R. E. Phillips	
* J. A. DeMent	
C. T. Haan	
H. Landers	
* O. R. Carter	
R. I. Barnhisel	

* Attended committee meetings at the Clemson Conference.

Table l.--Months that Water Table is Above Stated Depth Range in North Carolina Data

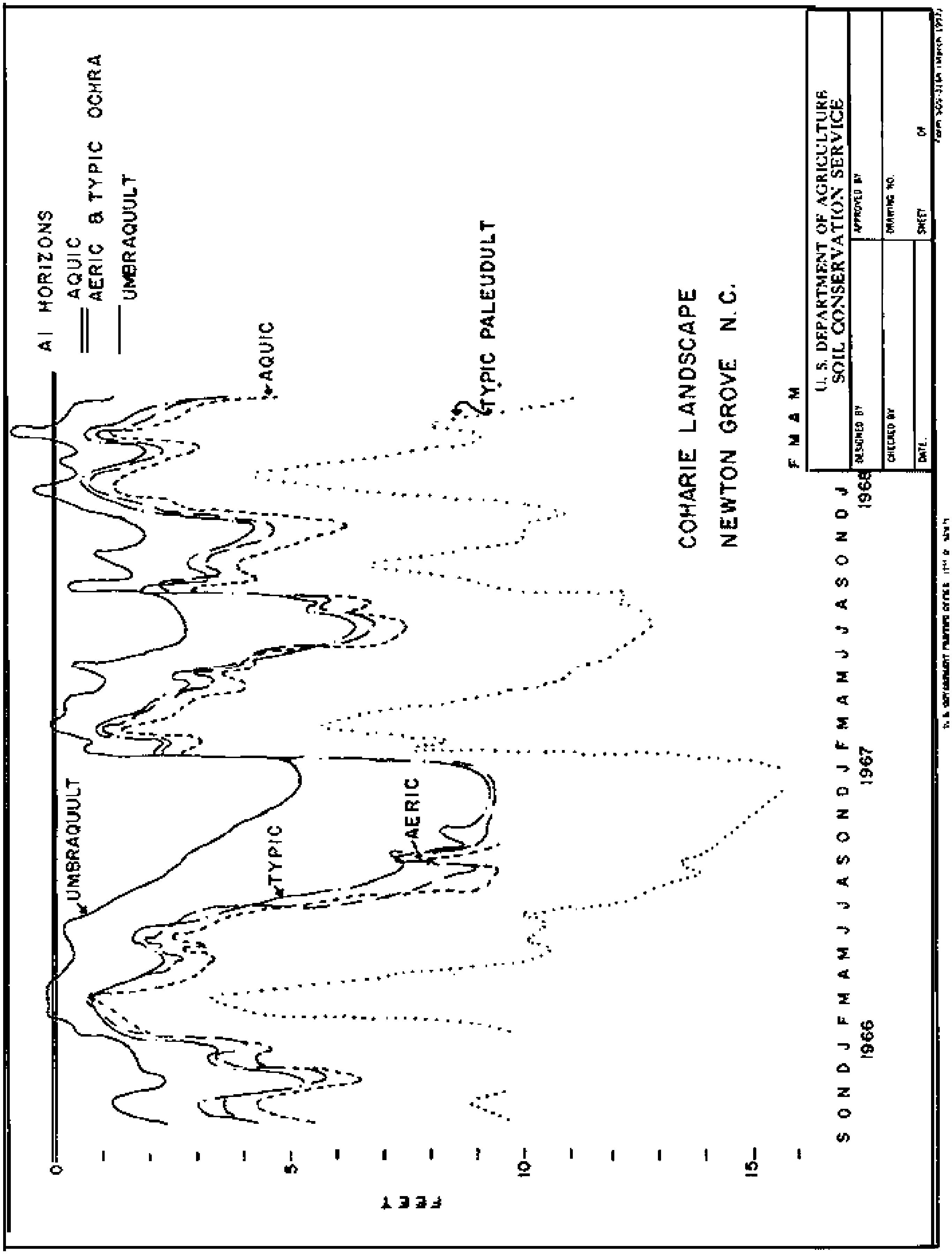
Depth (Inches)	Umbraquults 1966	Umbraquults 1967	Umbraquults 1968	Typic Ochraquults 1966	Typic Ochraquults 1967	Typic Ochraquults 1968	Aeric Ochraquults 1966	Aeric Ochraquults 1967	Aeric Ochraquults 1968
15	65 to 8½	6½	4+	1½ to 35	1 to 74	25 to 5+	1 to 2	0 to 4	½ to 3
30	7½ to 11½	9¼	5+	3½ to 7½	2 to 9	4 to 5+	1 3/4 to 4½	1½ to 7 3/4	3 to 4 3/4
60	11 to 12	L2	5+	6 to 11½	8½ to 12	5+	5½ to LO	7½ to 95	5+
120				12	12	5+	12	12	5+

Udults

Depth (Inches)	Aquic Paleudults 1966	Aquic Paleudults 1967	Aquic Paleudults 1968	Typic Paleudults 1966	Typic Paleudults 1967	Typic Paleudults 1968
15	0 to 1	0 to L	0 to 3	0 to ½	0 to ¼	0
30	1½ to 2½	1¼ to 5¼	2 to 45	0 to 3	0 to 2½	0 to 3
60	5 to 9	6 to 11	45 to 5t	1¼ to 5½	0 to 5 3/4	½ to 5+
120		8½ to 12	5+	3 to 12	54 to 12	3½ to 5+
				9 to 12	6 to 12	5+

Table 2.--Months that Water Saturation In or Within 6" of A1 Horizon Range in North Carolina Data.

Year	Umbraquult	Typic Ochraquult	Aeric Ochraquult	Aquic Paleudult	Typic Paleudult
1966	8 to 9	1½ to 4½	½ to 1½	0 to ½	None
1967	7 3/4	1 to 6½	0 to 3	None	None
1968	5+	1½ to 4½	0 to 1 3/4	0 to ½	None


A1 HORIZONS
AQUIC
AERIC & TYPIC OCHRA
UMBRAQUULT
AQUIC
TYPIC PALEUDULT
COHARIE LANDSCAPE
NEWTON GROVE N.C.
UMBRAQUULT
TYPIC
AERIC
FEET
0
5
10
15
S O N D J F M A M J J A S O N D J F M A M J J A S O N D J F M A M
1966
1967
1968
U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
DESIGNED BY
APPROVED BY
CHECKED BY
DRAWING NO.
DATE
SHEET
OF

SOUTHERN REGIONAL TECHNICAL WORK-PLANNING CONFERENCE
Clemson, South Carolina

July 9, 10 and 11, 1968

Report of Committee VI
General Soil Maps

The Charge:

1. Consider soil interpretations at the higher categories of the current soil classification scheme. Explore the interpretations for farm and nonfarm uses that could be made from maps at the higher categories.

2. Examine the existing maps, both state and regional, that could be adapted or modified for the above purposes.

3. Select a county where a detailed soil and soil association map is available and is a part of a state or regional map and:
   a. Describe the mapping units of a county soil association map in the nomenclature of the current classification system and prepare a legend.
   b. Examine this new legend and determine for each of the mapping units, the most useful categorical level, suborder or great group, for making both farm and non-farm interpretations.
   c Determine what additional words, e.g., from the nomenclature used at the family or phase levels, would have to be added to the suborder or great group names in order to provide the information that in the committee's opinion, would be required for making the interpretations.

   d Prepare map using legend.

   e. Consider what supporting tabular or text information would be required.

The charges and an assignment of charges to selected discussion leaders were made and sent out to all committee members on March 19, 1968. Each member of the committee was requested to develop in writing, his recommendations on each of the charges, sending a copy to the discussion leader and the chairman. Each discussion leader complied with the request and several members sent in their comments.

The chairman selected the General Soil Map of the Rolling Plains Area - Texas, at a scale of 1:250,000 and sent it out to each committee member for use in committee work. The General Soil Map from Fisher County, Texas, soil survey, scale 1:253,440, was selected and sent to the committee to represent a segment of the regional map to be used in the discussion of the charges.

The committee met at Clemson, South Carolina, and each discussion leader discussed his charge with comments from the committee members and visitors. Fourteen members and visitors were present.

Charge 1 -- The committee reviewed the soil interpretations possible at the higher categories of the soil classification system. It is possible to make a limited number of the interpretations at the order level. An increasing number of interpretations can be made at each category from the suborder to the family level.

Recommendation: The categorical level at which interpretations could be made will be dependent on the universe involved; county, multi-county; state or region; the scale of the map; and the needs of the expected users. The committee suggested that each state test the categorical level that would best serve the purpose for different size areas.

Charge 2 -- The General Soil Maps of the Rolling Plains - Texas, and Fisher County were examined and used in the discussion by the committee members.

Charges 3a and 3d -- The committee examined the map legend along with the General Soil Map of the Rolling Plains Resource Area and the Fisher County General Soil Map. A legend was prepared and accepted by the committee. See attachments 1 and 2.

Charge 3b -- In response to Charge 3b, the committee agreed, of the two alternatives of suborder or great group presented in the charge, the great group is better for this map. More specific interpretations can be developed on the family level for the map at the scale of 1:250,000.

Charge 3c -- The purpose of the additional words is to characterize the mapping unit in a general way for users who are not familiar with the classification system as well as for users who are familiar with it. The additional words should describe soil characteristics and landscape features that differentiate one mapping unit from another and are useful in making interpretations of the soil.

Some of the more common soil characteristics used in making interpretations are wetness - or watertable, flood hazard, slope, depth to hard rock, and productivity. These characteristics could be used where applicable along with descriptive landscape terms.

Charge 3e -- The committee reviewed the supporting descriptive legend prepared for the map of the Rolling Plains Area of Texas. In addition, examples of tabular interpretative material to support the legend were presented and discussed.

Recommendation: The legend for the general soil map should be prepared in enough detail, either in a descriptive legend or abbreviated form, to give the information on the soils to the users. Considering the needs of the users, interpretative information should be presented for the components of the associations. This can probably be best presented in tabular form. Attached are examples of the description of an association and a table with interpretations. See attachments 3 and 4.

General Recommendations:

1. The committee considered the problem of base maps for general soil maps. Some maps for completed soil surveys have been furnished to the Cartographic Unit on poor base maps with odd scales. It is suggested that the Cartographic Unit be consulted as to the best available base maps prior to the development of the general soil map. In addition, a memorandum may be needed to indicate scale of base maps suitable for general soil maps.

2. The committee recommends that more development and testing of general soil maps be done for larger areas on smaller scale maps to determine what categorical levels will best serve the needs.

3. It was recommended that this committee be continued.

The committee report was accepted.

Committee Members:

H. L. Dean, Chairman	Texas
H. F. Perkins	Georgia
W. B. Parker	Mississippi
R. C. Deen	Kentucky
Keith Young	Texas
E. A. Perry	Alabama
J. B. Dixon	Alabama
M. E. Shaffer	Georgia
R. G. Leighty	Florida
John Soileau	Alabama
Juan Juarez, Jr.	Puerto Rico
S. A. Lytle	Louisiana
J. B. Watts	North Carolina
J. W. Vandine	Virginia
C. A. McGrew	Arkansas
F. T. Ritchey	Georgia

Visitors:

Dr. Charles E. Kellogg	Washington, D. C.
Mel James	Spartanburg, S. C.
Joe Kingsbury	Washington, D. C.

Attachment 1

LEGEND

GENERAL SOIL MAP OF ROLLING PLAINS - TEXAS
(Based on Fisher County portion only)

NEARLY LEVEL TO SLOPING, DOMINANTLY LOAMY SOILS (Argiustolls, Haplustalfs, Paleustalfs and Ustochrepts)

CW	Carey-Woodward association:	Soils that are loamy throughout.
MO	Miles-Wichita-Olton association:	Soils with loamy to clayey subsoils.
MC	Miles-Cobb association:	Cobb soils are moderately deep over sandstone.

MOSTLY DEEP, GENTLY SLOPING TO SLOPING SOILS WITH CLAYEY SUBSOILS (Paleustolls, Argiustolls, Calciustolls and Llstochrepts)

TV	Tillman-Vernon association:	Tillman soils have a cracking clay subsoil. Vernon soils are moderately deep.
AR	Abilene-Rowena association:	Rowena soils have a cracking clay subsoil.

LOAMY SOILS OF RIDGES AND STRONGLY SLOPING TO STEEP AREAS (Ustochrepts, Calciustolls and Calciorthids)

WQ	Woodward-Quinlan association:	Woodward soils are moderately deep and Quinlan soils are shallow, both over silty redbeds.
MP	Mansker-Berda-Potter association:	Potter and Mansker soils are shallow and high in lime; Berda soils are deep and high in lime.

SOILS OF BOTTOM LANDS, SUBJECT TO FLOODING (Ustifluvents)

CM	Colorado-Mangum association:	Colorado soils are loamy; the clayey Mangum soils crack when dry.

GENTLY UNDULATING, DEEP, SANDY SOILS (Paleustalfs; Ustipsamments)

BT	Brownfield-Tivoli association:	Brownfield soils have a loamy subsoil within depths of 40 inches. Tivoli soils are sandy throughout.

7-68 4-R-26743

GENERAL SOIL MAP

FISHER COUNTY, TEXAS

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
TEMPLE, TEXAS

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Base from General Highway Map ... 1967 – Reproduction permission granted U. S. Department of Agriculture, Soil Conservation Service, Fort Worth, Texas

AR Abilene - Rowena Association:

The soils of this association are deep, nearly level, clay loams and clays. The soils are slowly permeable and well drained. A few areas are gently sloping with slow surface runoff.

The Abilene soils have a thick surface layer of friable, neutral, very dark grayish brown clay loam. The subsoil is firm, dark grayish brown clay that is calcareous below 20 inches. Abilene soils comprise about 35 percent of this association.

The Rowena soils have a surface layer of thick, very dark grayish brown, calcareous heavy clay loam. Soft caliche occurs below depths of about 34 inches. Rowena soils comprise about 35 percent of this association.

Other soils within this association are Roscoe, Miles, Olton, and Acuff. Roscoe soils occur in depressions and are deep, dark colored, poorly drained clays. Miles soils are neutral, brown fine sandy loams with thick, friable, reddish sandy clay loam subsoils. Olton soils are neutral, brown loams with firm, alkaline, reddish clay loam or clay subsoils. Acuff soils have a neutral, dark brown sandy clay loam surface layer and friable, alkaline, reddish brown sandy clay loam subsoils.

The soils of this association are used mostly as cropland with cotton, small grain and sorghums as the main crops. The soils in this association have a high inherent fertility, moderately high available water capacity, and have a moderate potential for crop production. During years of below average rainfall these soils are droughty.

The soils of this association have moderate to high shrink-swell potential. They have severe limitations for highway subbases and home foundations. The slow permeability causes severe limitations for septic tank filter fields, but have only slight limitations for sewage lagoons.

foundations. The slow permeability causes severe limitations for septic tank

Attachment 4

TABLE - Interpretations of Engineering Properties for Rolling Plains Area Texas

Soil assn	components	%	Selected soil characteristics: Depth to bedrock	Selected soil characteristics: Shrink-swell potential	Soil limitations for selected non-farm uses: septic tank filter fields	Soil limitations for selected non-farm uses: Foundations for 1 or 2 story buildings	Soil limitations for selected non-farm uses: Highway location	Soil limitations for selected non-farm uses: Intensive play areas	Soil features affecting farm use: Irrigation	Soil features affecting farm use: Terraces
			Feet							
TV	Vertic Argiustolls	60	5	High	Severe	Severe	Severe	Moderate	Very slow in-filtration & permeability	High shrink-swell
	Typic Ustochrepts	20	3 to shaly clays	Moderate	Severe	Moderate	Moderate	Moderate to severe	Slope	None
AR	Pachic Arigustolls	35	5	Moderate	Severe	Moderate	Moderate	Moderate	None	None
	Vertic Calciustolls	35	5	High	Severe	Severe	Severe	Moderate	None	High shrink-swell
WQ	Typic Ustochrepts		3	LOW	Severe	Slight	Moderate to severe	Severe	Slopes-low water holding capacity	Strongly sloping to steep; shallow
MC	Typic Haplustalfs		5 4	LOW LOW	Slight Severe	Slight Slight	Slight Slight	Slight Slight	Moderate water holding capacity	None None

SOUTHERN REGIONAL TECHNICAL WORK-PLANNING CONFERENCE
of the Cooperative Soil Survey
Clemson University, Clemson, South Carolina
July 9-11, 1968
Report of Committee VII - Urban Interpretations

Charge:

1. Assemble comments and experiences in using the handbook for interpreting engineering uses of soils which was recently issued ("Guide for Interpreting Engineering Uses of Soils", For interim use.)

2. Facilitate the collecting of experiences and research in the broad field of "Correcting soil limitations in non-farm uses." For example, what changes are made in designs of concrete slab foundations when the soil limitations vary from slight to severe, or what physical soil manipulations are being made to overcome soil limitations.

To try and devise a way to best arrive at a procedure to allow all 23 committee members to have an opportunity to express their experiences, ideas and opinions, your Chairman, F. T. Ritchie, Jr., and Vice-Chairman, Dr. H. B. Vanderford, prepared a questionnaire. It was sent to each committee member. We received responses from 21 of the 23 members. This we consider excellent.

Below is the summary we made of the comments furnished by committee members.

1. Experiences and uses of "Guide for Interpreting Engineering Uses of Soils' was quite variable. Several stated they had not seen the guide. Others had made no use of the guide up to the present. Still others stated the guide was very useful, did a fine job in explaining the various engineering uses of soils and listing many important factors affecting their use, very helpful in rating the suitability of the soils for several potential uses, useful in placement of soils in AASHO and Unified system of classification, does a fine job of placing in one package much of the material needed to Interpret the engineering uses of soils.

2. The majority of replies stated that copies of the guide were in such short supply, even for interim use, that adequate use, review, and appraisal had not generally been satisfactory. There ware a few exceptions to this in which they stated the document was thought to be plentiful. Several states reproduced the guide in its entirety, or parts for distribution to the field.

3. An effort was made to collect known knowledge and experiences where adjustments had been made in "Correcting soil limitation6 in non-farm uses." A few instances were cited. For example, where due to a high shrink-swell of soil, certain buildings and houses are being placed on a concrete slab instead of conventional type

pillars; another statement that FHA is now requiring soil tests for high shrink-swell soils; some changes made In septic tank requirements before approval; certain locations require homes to be placed on piling along coastal area, particularly if organic soils are present; several buildings and roads relocated, also some change in concrete design; some cities, counties and planning commissions are becoming more restrictive on the various uses of soils. However, in none of the replies received was there any specific example cited where changes in structure and design requirements were actually due to or changed as a result of soils information furnished by SCS.

It is the belief of your chairman that such changes are taking place daily and the committee members failed to cite specific examples and furnish documentary evidence.

In general, members discussed limitations, qualities and changes that should take place due to the soil conditions, rather than citing examples and properly documenting statements.

4. In requesting additional experiences, ideas, suggestions and exhibits, the comments again were quite variable. Several emphasized the need for presenting material in a more useful, effective and attractive manner to the potential users. The need for a better educational and publicity program was stressed and, if you please, a better selling job. Preparation of better and more informative interpretative engineering materials. For example, one soil series interpreted on one sheet. More additional laboratory data and Benchmark soils information are urgently needed.

There are several comments or items that need to be brought to the attention of all parties concerned. They have been listed below.

1. It was the concensus that all Interpretative criteria should be combined in one handbook. Examples, interpretative criteria for developing guides, such as: residential development, recreational use, noncommercial use, etc. This way the interpretative criteria would be more useful and accessible. It could be of a looseleaf nature, divided into sections and amended by sections or sheets as the need may arise. Even a State might like the authority to place slip sheets or additional instructions In these criteria handbooks. Criteria for interpretation5 should be removed from numbered memoranda, advisory notices and other locations.

2. When material or documents are distributed for review and comments, sufficient copies should be made available to allow for proper review, use and appraisal. The concensus is that this was not generally true of the "Guide For Interpreting Engineering Uses of Soils."

3. It was thought that we should develop uniform criteria for evaluating (in terms of suitability or limitations) the uses for

most of those listed in table 7, columns 4-14. If this were done, then we would have uniform interpretations in soil survey publications.

General:

1. There seems to be considerable overlapping in some of the committee assignments for this conference as they apply to interpretations. This particularly seems to be possible in committee VII and committee VI.

2. The charges to committee VII were quite limited in scope and presented a problem to your chairman and vice-chairman as to how far this committee work should be expanded.

Recommendation:

1. It is the recommendation of committee VII that consideration be given to combining all committees dealing with interpretation. This body should prepare for this region interpretative materials in one handbook. This may be accomplished best by having one large committee with several vice-chairmen that will be responsible for preparation of specific segments or chapters of the interpretative handbook. Each vice-chairman will have a working committee. During the biennial period of meetings, vice-chairmen may need to have several working conferences to assure that there will not be overlapping of materials from one section or chapter to the other.

2. The committee (VII) should be discontinued and handled according to recommendation in one above.

F. T. Ritchie, Jr., Chairman*
H. B. Vanderford, Vice-Chairman*
Committee members:

R. J. McCracken	W. R. Elder
J. W. Clay	L. H. Burgess+
H. T. Otsuki*	M. E. Shaffer
R. E. Daniell*	V. W. Carlisle*
H. C. Dean*	G. W. Kunze
J. A. Elder*	F. H. Binroth*
Fenton Gray	C. B. Breinig*
L. H. Rivera*	C. L. Hunt
T. J. Longwell	D. P. Powell
R. C. Glenn	B. T. Birdwell*
Lester Loftin*	

*Committee members indicated thusly were present for committee meeting.

Visitors at committee meeting:
E. N. Miller
C. J. Koch
S. S. Obenshaln
L. E. Aull
O. C. Lewis

(This report accepted by the Southern Regional Technical Work Planning Conference on July 11, 1968.)

REPORT OF COMMITTEE VIII - SOIL SURVEY FOREST COMMITTEE, J. FRANK MILLER, CHAIRMAN

Committee VIII reports the following actions taken on charges given it Previously:

Charge I: Ask each state to hold at least one meeting with foresters... to etermine the extent that their needs are being met, interpret present methods and explore or offer new approaches. Are deta in a form they want and will use? What data, in what form do they want?

Action: Meetings of the nature specified have been held during the year in four states with two states <South Carolina and Georgia) anticipating meetings in the near future. Two additional states have held this type of meeting within the past two years.

The concensus of this committee in that meetings of this type • re essential to inform foresters and others of the utility of soil surveys.

The results of these state meetings are attached to this report.

Three recommendations of Committee VIII resulting from a discussion of these reports, follow.

It is recommended that:

(1) Bach State Soil Scientist review the need for revision of slope classifications for woodland uses and that interpretations be designed for the various types of equipment used in harvesting and site preparation. When soil scientists are developing or revising legends which will be used for woodlands, forester8 should be consulted (See Charge II)

(2) Where soil complexea and associations, are included in a soil survey, complete description.9 of the individual soil taxonomic unite be included.

(3) Prior to mapping extensive areas of land, where the present and foreseeable primary land use is woodland, the ownership managers be consulted as to their needs. The Soil Survey should be designed to accurately meet these needs.

Charge II: Review currant criteria used in interpretation of soils data into woodland suitability groups end explore the possibility of future woodland interpretation6 that may define which taxonomic units can be classified into groups for different management units.

Action: In consideration of Charge II the committee encountered several problems which were considered to be within the realm of research responsibility. Accadingly, and in line with the recommendations made under Charge III, a regional etudy of the quantification of hardwood

Competition and pine seedling mortality was referred to, and accepted by, the Southern Forest Environment Research Council. An extract oftb minutes of the SFERC is attached as information.

Extract SFERC, report:

"Silker moved that en appropriate committee undertake problem8 a and b presented by Committee VIII of the Southern Region Soil Survey Work Planning Conference and that problem b be given priority. Kaufman second.

Miller amended: the Biotic Studies Committee be deaignated as the appropriate committee, Linnartz second.

Amendment approved and motion adopted,

Prank Miller, Chairmen of Committee VIII, Soil Survey for Forestry Use, Southern Region Technical Work Planning Conference (a group of SCS and research workers et state experiment stations -- meet in 1968 and at 2-year intervals) asked the committee to consider and report to the SFERC that Committee vIII recommends action on two problem areas:

a, Definition of the artificial regeneration rating for Coastal Plain sites, i. e., planting and direct-seeding.

Bonninghausen offered to take this interest to the state management chiefs in their August, 1968, meeting. It was suggested the state forestry staff people could push sampling work, soliciting supplementary information from the USFS and industrial forestry groups. A atendardized survival reporting form could be developed and tied to SC8 mapping units. Formal responsa of the state management chiefs and agreement on report form and standardized sampling and analysis procedure is desired before notion is committed. Committee believes attention should be given first to shortleaf and loblolly pine."

As a result of committee discussion of Charge II, it is recommended, without dissent, (1) that Form SCS 232 (Soil Description) be filled out in it8 entirety; i. e., a complete description of vegetation, and with Particular reference to the four predominant hardwood species. It is suggested thst soil scientists be requested to consult with other appropriate specialists where required.

Charge III. Coordinate future soil6 work including mappinp and interpretatrona with all groups (Southern Forest Soils Council and Southern Forest Environment Research Council). Continua to work on development end form of presentation of soils data to satisfy all users. Special efforts should be made to find what all user8 would like and show them what we have and how we feel it can be used.

With respect to Charge III a meeting of Committee VIII, representatives from the Executive Committee of SFERC and the Steering Committee of the Southern Forest Soils Council was held on April 9, 1968. As a result, the following recommendation is made:

(1) 'That Committee VIII continue to urge the various states to hold the meetings stated in Charge I, and to accumulate the infonmtion on needs of foreaters and other users of soil surveys. This information should be passed on to the Southern Forest Environment Research Council for study and possible action on some points, then transmitted to the Southern Regional Technical Work Planning Conference with the recommendat ions of the SPERC.

<u>Additional Recommendations of Committee VIII.</u>

Committee VIII recommends:

(1) That the committee be continued and instructed to explore new ways of increasing the utility of Soil Surveys for resource management.

(2) That in addition to other charges, Charge I of the 1966 minutes be continued in order to continue end improve communications between resource managers and soil scientists. The committee feels very strongly that potential users of soil surveys must be educated if utility is to be increased.

<u>GENERAL INFORMATION</u> re Committee meeting:

Presiding: W. Frank Miller, Chairman
Acting Secretary: George E. Smith, Jr.
Participant 8:

W. Prank Miller, Miss. State Univ., State College, Miss.
J. M. Case, Regional Forester, S. C. S. Port Worth, Texas
Peter Avers, Soil Scientist, U. S. Forest Service, Morehead, Ky,
Jack T. May, School of Forest Research, Univ of Ga. Athens, Ga.
T. C. Mathews, Asst. Soil Surveyor, Univ. of Florida, Gainesville, Pla.
E. Winters, Tenn. Agr. Rxp. Sta., Knoxville, Tenn.
R. A. Covell, S. C. S., Jackson, Miss.
George E. Smith, Jr., Woodland Cons. S. C. 8. Columbia, S. C.

Respectfully submitted by

George E. Smith Jr.

GEORGE E. SMITH, Jr., Acting
Secretary, 11 July 1968

RATIONAL COOPERATIVE SOIL SURVEY SOUTHERN REGIONAL
WORK PUNNING CONFERENCE
Clemson, South Carolina
July 9-11, 1968

REPORT OF COMMITTEE IX - Priority of Problems That Need Laboratory Study and Realistic Estimates of Work Required for Each of These Studies.

This Committee was added to the Work Planning Conference by request of the Executive Committee after assignment for other committees was completed. It wss designated as Committee IX.

Charge:

1. Collect list of projects in progress or contemplated in the future in each state.

2. Coordinate proposed research projects in soil genesis and classification proposed by each state.

3. Recommend regional or sub-regional projects.

The Chairman requested the following information from each state as specified in charge 1.

la. The number of benchmark soils needing analysis over a ten-year period.

lb. The kind of investigational projects directed toward improvement in the soil classification system or knowledge of soil genesis needed over a ten-year period,

lc. Projects to answer specific problems of soil genesis or interpretation in number of samples and analysis par year. These have been called reference or "grab" samples.

Response to charge la - States indicated a general inactivity on benchmark soils in the past several years. After some discussion on the original concept of benchmark soils and their uses, it was suggested that the states should reevaluate their selection of benchmark soils. The Committee feels it would be helpful if the National Conference provided revised standards and/or guidelines for benchmark soils. The Committee recommends that selection and use of benchmark soils be continued and receive sufficient attention to remain active.

Response to charge lb - Most states listed 5 to 10 investigational projects needed over the next 10 or so years for improvement in the soil classification system or knowledge of soil genesis. Copies of responses are available to the National Committee if requested by the Chairman. Copies were furnished to each State Soil Scientist of all projects proposed for SCS laboratories.

Response to charge 1c - The members of the planning conference indicated a need for nearly 700 determinations per year from SCS laboratories with a range of zero to 150 per state per year. The wide variation in number is due to past volume of laboratory data and degree of assistance from experiment stations. Tabulation by states has been provided to laboratory representatives. A discussion of reference or "grab" samples revealed these varied from relatively simple single determinations (e.g. texture) to those almost equal to investigational projects. Following the discussion on the usefulness of this type data, the Committee voted to recommend that adequate pedon descriptions be prepared at the time of sampling for all reference samples. One experiment station indicated a preference to sampling the entire pedon, when his laboratory was to do the work, rather than making determinations for one or only a few horizons. There was an expression of concern by the Committee of the large number of individual determination samples recently submitted for analysis, however, as the classification system stabilizes, the number will probably decrease to a more moderate level.

Response to charges 2 and 3 - After considerable discussion of charges 2 dnd 3, the Committee feels that direct coordination of projects is beyond the practical scope of this Committee. The Committee recommends that the future function of this Committee include a tabulation of immediate past, present and immediate future projects related to soil classification and genesis in each state. This information will be provided to all interested agencies. The report submitted by Alabama is considered desirable for present and proposed projects. A copy is attached to this report (Exhibit 1). At this time. the Committee feels that little can be done related to recommending projects, however, after charge 2 is developed as outlined above, the Committee will be in a position to make sound recommendations.

Additional Committee Considerations

1. In addition to the changes, the Committee recommended that if the procedures used in analyses agreed with SCS Soil Survey Investigations Report MO. 1, the code number for the procedure would be reported for the data. In the event of minor deviations, footnoted explanations would be used. In the event of use or development of a new procedure, a distinctive code would be developed in conjunction with SCS laboratories.

2. An offer was made by the Soil Survey Laboratories to furnish a limited number of Interlab Comparison Samples to cooperating agencies if requested.

3. Considerable concern was expressed for the need of knowledge of projects and coordination between agencies involved in research affecting soil morphology and characterization. This involves the Agricultural Research Service, United States Forest Service and others carrying out research projects related to soils. The Committee was uncertain as to the administrative channels to effect this coordination and hopes that proper guidance will be provided by the National Conference. The Committee felt that those people with common interest in soils should attend each others' workshops.

The Committee recommends

1. The Committee be continued.

2. The name be Research Coordinating Committee.

3. Future charges of the Committee include the above recommendations.

The report was accepted as presented.

Members of Committee

J. D. Nichols, Chairman
H. H. Bailey, Vice-Chairman
Westal Fuchs, Recorder
*B. L. Allen
*L. J. Bartelli
Glenn L. Bramlett
S. W. Buol
V. W. Carlisle
G. R. Craddock
*R. B. Daniels
*Joe Dixon
*Fenton Gray
R. B. Grossman
*C. J. Koch
*W. M. Parker
E. J. Pederson
*Ted Silker
*M. E. Springer
Carter Steers
R. D. Wells
Keith Young

Other Participants

Louis E. Aull
George J. Buntley
H. S. Byrd
Walter Keenan
David Slusher
J. B. Watts

*Unable to attend Committee meeting.

Attachment (Exhibit 1)

EXHIBIT 1

Laboratory Needs Submitted by the State Soil Scientist of Alabama to Committee IX of the National Cooperative Soil Survey Southern Regional

. The kind of investigational projects directed toward improvement in the Soil Classification System or knowledge of soil genesis needed over a ten-year period. Submitted to Committee IX of the SRT Work Planning Conference.

2. Investigational projects for improvement in the classification system or knowledge of soil genesis needed in Alabama are as follows:

2.1 - A reconnaissance type investigation to study the mineralogy of soil series over various geological regions and landscape positions.

2.11 - A study comparing sand mineralogy for series from the upland Coastal Plains versus the series of the Alabama River terraces. Proposed series to be studied are the Aycock, Cahaba, Kalmia, Norfolk, Orangeburg, Ruston and Wickham. (14 samples)

2.12 - A study comparing clay mineralogy for series from the upland Coastal Plains versus the series of the Alabama River terraces. Proposed series to be studied are the Angie, Craven, Greenville, Leaf, Magnolia, McQueen, and Shubuta. (14 samples)

2.13 - A study comparing sand mineralogy for series from the upland Piedmont region versus series of the Tallapoosa River floodplains. Proposed series to be studied are as follows: Altavista, Augusta, Grover, Masada, Congaree, Chewacla, Mantachie, Wehadkee, and Wickham. (24 samples)

2.14 - A study of clay mineralogy for series from the Piedmont region. Proposed series to be studied are: Hulett, Madison, Tatum, Wedowee and Armuchee (?). (10 samples)

2.15 - Mineralogy is needed to check the classification of the following series: Decatur, Waynesboro, Hanceville, Anniston, Dewey, and Fullerton. (12 samples)

2.2 - A geomorphology study comparing soil series morphology of the Alabama Blackland Prairie landscapes and similar classified series of other resource areas. Proposed series for characterization study are: Boswell, Capshaw, Colbert, Eutaw, Hollywood, Houston, Iredell, Kipling, Mecklenburg, Oktibbeha, Talbott, Vaiden, Watsonia, and Wilcox. (140 samples)

2.3 - Water table study needs expanding to include Geneva and Mobile Counties. Characterization data will be needed to accompany these studies. Work will deal mostly with soils of the fragic and plinthic subgroups. (150 samples)

2.4 - A study of silt content in the control section of selected similar soil series needs to be made across the state from east to west. Selected counties are: Mobile, Dallas, Geneva, and Henry.

2.5 - A base saturation study of selected series from various landscapes and geologic81 areas in the state. (35 samples)

2.6 - A characterization study of soils with 8 regolith of transported materials from limestone, sandstone, shale, and chert 88 well as those of mixed origin., 'This study is needed primarily on the floodplain series for such soil8 previously mappedas: Huntington, Lindside, Newark, Melvin, Ennis, Lobelville, Lee, Pope, Philo, Stendal and Atkins. Also on fragipan soils series such 88 the Cane, Locust, Leadvale, Landisburg,, Csptina, Monongahela, and Tilsit. (90 samples)

4. Alabama has 8 water well study on soils with plinthite in Escambia County and plans have been made to broaden this study into a Soil Geomorphology Study of the Lower Coastal Plain Area in this same county. Dr. R. B. Daniel's drilling rig is scheduled to be in Alabama during November 1968. Expected characterization samples needed will probably be about 75.

SOUTHERN REGIONAL TECHNICAL WORK PLANNING CONFERENCE
OF THE COOPERATIVE SOIL SURVEY
Clemson, South Carolina
July 9-11, 1968

Report of ad hoc committee on
Soil Survey Procedures

Charge: Outline an orderly procedure for making changes in the New Classification System

A. Open meeting on July 9 for general discussion of procedures.

1. The chairman summarized results of 37 questionnaires returned by the members of the conference,

2. Dr. Kellogg suggested that the new comprehensive classification might be published in two volumes.

   There seemed to be a consensus that Volume I might contain a basic explanation of the system, including discussion of diagnostic horizons and information about Orders, Suborders and Great Groups; Volume II might carry information about subgroups, family and series and be issued in loose leaf or other form so that it could be easily revised annually or biennially by either replacement pages or additional pages. Battelli suggested that volume II might include a key from Orders to Subgroups so that an up-to-date outline of higher categories would be available.

   It was suggested that this new publication carry a list of all soil series ever used with an indication of their revision or current inactivity. Battelli and others pointed out that such a procedure would present a great number of technical problems.

   Dr. Winters suggested that state level committees be formed to funnel proposals for change or addition to the regional commit tee.

   Grossman pointed out that time input by members of the regional committee would be large and that some special arrangement for time and funds may be desirable.

   Ritchie suggested that on the regional level a permanent standing committee is needed, with representative from agencies involved in survey, classification, or soil formation work. Bartelli indicated that capability and interest should be prims critetis for membership on such a regional committee. Bailey suggested that personnel serve staggered terms so that there will be continuity.

Buol indicated that participation in this activity should be given status through clearance and approval by administrative personnel, including approval of time commitments and funding of travel to committee meetings. Grossman indicated that soil formation personnel in the states should be oriented closely to needs for research related to the new classification. Buntley suggested that proposals for change originating in the states should be documented and supported by research.

B. Committee meeting after open discussion.

1. Constructive, documented suggestions from any individual can be sent to a proposed regional committee.

2. Any proposals for revisions or additions to the new classification system must be documented with data or written justification to be considered by the regional committee.

3. Echelons or levels of activity.

3.1 State

3.11 A committee is strongly suggested but would not be required.

3.12 An individual, institution or agency may originate proposals at the state level, but it is hoped that they will be discussed with other individuals or agencies or a state committee before transmission to the proposed regional committee.

3.2 Region

3.21 A five-man committee is suggested

3.211 The Regional Soil Survey Work Group (Experiment Station people) will prepare a list of individuals who are able and willing to serve on the regional committee and send it to the Southern Soil Research Committee (SSRC). From this list the SSRC will designate two names for transmission through the office of the Principal Correlator to the SCS Deputy Administrator for Soil Survey. These individuals will report annually to SSRC.

3.212 It is proposed that the Principal Soil Correlator will prepare a list of individuals in SCS who are able and willing to serve. Two from this list shall be appointed to the Regional Committee by the Deputy Administrator for Soil Survey.

3.213 The Principal Correlator will invite the Regional Office of the US Forest Service to designate a qualified individual to serve on the committee.

3.214 The terms of office will be staggered. At the start, one individual appointed by SSRC and one apointed by SCS shall serve two year terms. All other terms are three years.

3.215 The committee may elect a chairman if desired.

3.22 The Principal Correlator shall be an ex officio member of the committee and can receive advice and suggestions from the committee,

4. This five-man committee shall be announced by the Deputy Administrator for Soil Survey upon completion of the appointment process.

5. This committee shall be considered a permanent standing committee of the Southern Soil Survey Work Planning Conference and shall present reports and hold open discussion at every meeting of the W-P Conference.

6. This proposed regional committee may ask the Executive Committee of the Southern Soil Survey Work Planning Conference to appoint special committees or work groups for special needs such as revisions or changes involving soil mineralogy.

7. For each propoeal coming to it this regional committee will recommend either

(a) forwarding the proposal to the appropriate person on the national SCS Soil Survey Staff or to a national (or international) committee.
(b) refer the proposal through the Principal Soil Correlator to a parallel regional committee (or committees) with similar problems.
(c) send the proposal back to the state for further testing or additional documentation and justification.
(d) rejection.

Committee members

L. .I. Bartelli
F. H. Beinroth
R. J. McCracken, recorder
Henry Otsuki
David Slusher
M. E. Springer, chairman
Eric Winters, advisor

Registration 1968 SRTW-PC

NAME	ORGANIZATION
Allen, L. R.	Clemson Univ.
Aull, Louis E.	N. C. State Univ.
Avers, Peter E.	USFS-Ky.
Bailey, H. H.	Univ. of Ky.
Bartelli, Lindo J.	SCS-Texas
Beinroth, Friedrich H.	Puerto Rico Exper. Sta.
Birdwell, Bobby T.	SCS-Tenn.
Bremlett, Glenn L.	SCS-Ga.
Breinig, Clarence B.	SCS-Tenn.
Buntley, George J.	Univ. of Tenn.
Buol, S. W.	N. C. State Univ.
Burgess. Leland H.	SCS-Ala.
Byrd, Huger S.	SCS-S. c.
Caldwell, Robert E.	Univ. of Fla.
Carlisle, Victor W.	Univ. of Fla.
Carter, Oliver R.	SCS-Ark.
Carter, R. C.	SCS-Texas
Chalk, A. T.	SCS-State Conservationist-S. C.
Cotton, James A.	SCS-Ala.
Covell, R. R.	SCS-Miss.
Craddock, G. R.	Clemson Univ.
Daniell, Robert E.	SCS-Ky.
Daniels, Raymond B.	SCS-N. C.
Dean, Harold L.	SCS-Texas
Dean, Hartzell	SCS-Ark.
DeMent, James A.	SCS-Texas
Elder, Joe	SCS-Tenn.
Ellerbe, Clarence M.	scs-s. c.
Fuchs, Westal W.	SCS-Texas
Godfrey, Curtis	Texas A & M
Grossman, R. B.	SCS-Nebr.
Hurst, Victor	Clemson Univ.
James, Mel	SCS-Soil Scientist-S. C.
Jenkins, Van S.	SCS-N. C.
Jutras, M. W.	Clemson Univ.
Keenan, Walter E.	Miss. Agr. Exp. Sta.
Kellogg, Charles E.	SCS-Washington, D. C.
Kingsbury, Joe W.	Soil Survey Operations-Wash., D. C.
Klawitter, Ralph A.	USFS-S. c.

(OVER)

Registration 1968 SRTW-PC (contd.)

NAME	ORGANIZATION
Koch, Charles J.	SCS-Va.
Landers, Toby	State Climatologist-S. C.
Leighty, Ralph G.	Pla. Exp. Sta.
Lewis, Olin	SCS-Fla.
Loftin, Lester L.	SCS-La.
Lytle, S. A	L. S. U.
Mathews, T. C.	Univ. of Fla.
May, Jack T.	Univ. of Ga.
McCracken, Ralph J.	N. C. State Univ.
McKee, Gordon S.	SCS-Texas
Miller, E. N.	SCS-S. C.
Miller, W. Frank	Miss. State Univ.
Nichols, Joe S	SCS-Okla.
Obenshain, S. S.	VPI
Otsuki, Henry T.	SCS-Okla.
Parker, W. B	SCS-Miss
Pedersen, Edwood J.	SCS-Md.
Peele, T. C.	Clemson Univ.
Perry, Ernest A.	SCS-Ala.
Prout, Carrow T.	SCS-Wash., D. C.
Ritchie, F. T.	SCS-Ga.
Rivera, Luis H.	SCS-Puerto Rico
Shaffer, Morris E.	SCS-Ga.
Slusher, David F.	SCS-La.
Smith, G. E.	SCS-S. C.
Sofleau, John M.	TVA-Ala.
Springer, M. E.	Univ. of Tenn.
Steele, Forrest	SCS-N. C.
Steers, Carler A.	Auburn, Ala.
Vanderford. H. B.	Miss. Exp. Sta.
Watts, John B.	SCS-N. C.
Wells, R. D.	SCS-S. C.
Winters, Eric	Univ. of Tenn.
Young, Keith K.	SCS-Texas

NATIONAL COOPERATIVE SOIL SURVEY

Southern Regional Conference Proceedings

Lexington, Kentucky
June 7-9, 1966

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Proceedings of

SOUTHERN REGIONAL TECHNICAL WORK-PLANNING CONFERENCE OF THE COOPERATIVE SOIL SURVEY

UNIVERSITY OF KENTUCKY • LEXINGTON . JUNE 7-9 1966

SOUTHERN REGIONAL TECHNICAL WORK-PLANNING
CONFERENCE OF THE COOPERATIVE SOIL SURVEY

June 7, 8, 9, 1966

Agricultural Science Center
University of Kentucky
Lexington, Kentucky

TUESDAY, June 7, 1966

8:00-9:30	Registration. Foyer opposite Agricultural Library

<u>Opening Session</u>

Room N-12
Presiding: H. H. Bailey

9:30-9:50	Welcome - W. A. Seay Dean and Director, Kentucky Agricultural Experiment Station
9:50-10:30	Tobacco and Health Program - G. W. Stokes, Coordinator
10:30-11:00	Conservation Programs in Kentucky - H. A. Taff, State Conservationist, SCS, Kentucky
11:00-11:30	The National Cooperative Soil Survey - G. D. Smith, Soil Conservation Service, Washington
11:30- 1:15	Lunch
<u>Afternoon</u>	Committee Meetings
1:15-1:20	Room N-12 Announcements
	Problems of Soil Survey Publication - H. L. Dean
1:20-5:00	Committee

	Committee	Room
I	Climate	N-8
II	Made soils	N-10
III	New Classification Scheme	N-11
IV	Stoniness and Rockiness	N-206
V	Organic Soils	N-120

WEDNESDAY, June 8, 1966

Morning	Committee meetings		
8:15-11:30	Committee		Room
	VI	Soil Survey for Forestry Uses	N-8
	VII	Reports and Maps	N-10
	VIII	Engineering Applications	N-11
	IX	Fragipans	N-12
11:30- 1:15	Lunch		
Afternoon	Work Group Meetings		
1:15-1:20	Room N-12 Announcements		
1:20-5:00	Soil Conservation Service Work Group		Room N-10
	Southern Regional Soil Survey Work Group		Room N-120
Evening	Symposium on New Classification Scheme as related to:		
	1) College teaching - B. L. Allen, D. D. Nehr, M. E. Springer		
	2) Training a new soil surveyor - A. J. Baur, G. D. Smith		
	Moderator: R. E. Daniel1		

THURSDAY, June 9, 1966

Morning	Committee Reports	Room N-12
8:00-9:50	Committees I, II, III, IV, v	
9:50-10:10	Break	
10:10-11:30	Committees VI, VII, VIII, IX	
11:30- 1:15	Lunch	
Afternoon		
1:15- 2:30	Business, meeting Room N-12 Presiding: J. H. Winsor	
2:30- 5:00	Field tour-University Farm	
	Soil: Maury silt loam, and adjacent weather station	

Southern Regional Technical Work-Planning Conference
of the Cooperative Soil Survey
University of Kentucky, Lexington
June 7-9, 1966

Minutes of the Business Meeting, June 9, 1966

J. H. Winsor, Presiding

The chairman made the first order of business the report of the committee reviewing the "Policies, Purpose, and Procedures" of the conference. Following a brief review of the proposed changes to the draft, as circulated, the conference moved and adopted the revised "Purposes, Policies, and Procedures." A copy of the document is to be made a part of these minutes.

Following adoption of the "Purposes, Policies, and Procedures," the chairman briefly reviewed the constitution of the voting membership.

H. H. Bailey read a request from the Southern Forest Environment Research Council requesting a one vote membership in the Conference. Conference granted the request without dissent.

The chairman reviewed the membership of the Conference and pointcdout that Virginia and Kentucky are still members of the Southern Regional Conference even though they are in a different region for soil classification purposes. Dr. L. J Bartelli indicated that it is SCS policy for the states to remain in the "region" as corresponds to that of the Experiment Station Directors, thus Virginia and Kentucky would remain in the Southern Region.

Dr. H. H. Bailey read Letters of invitation to the conference from Puerto Rico for 1968 and South Carolina for 1968 or 1970. Following discussion the conference moved and accepted the invitation from Puerto Rico to hold the conference there in 1968, and further, moved and accepted the invitation from South Carolina for 1970.

Dr. Bartelli stated that within the next three months the SCS would check the conference decision of meeting in Puerto Rico with their administrator to determine the possibility of the SCS group going to Puerto Rico. If the administrator ruled against SCS travel to Puerto Rico the conference agreed to go to South Carolina in 1968 in order to keep the conference alive.

Conference suggested July 8-12, 1968 as a suitable time to visit Puerto Rico in order to avoid the tourist season. The third week of June 1968 was suggested as a suitable date if the conference must move its site to South Carolina.

In line with the adopted "policies" the 1968 Conference Chairman will be from the Soil Conservation Service and Vice-Chairman from the Experiment Station.

Mr. Winsor expressed thanks to all speakers at the conference (read names).

The chairman briefly reviewed the instructions to committee chairman as to completion and submission of their committee reports.

As a special item of business Dave Slusher reviewed the proposal submitted to National Conference by the North Central Conference as related to changes in our current procedures for making changes in the soil classification system. These proposed changes were read. (See par A5, pages 3, 4, and 5 of Report of the Committee on Soil Correlation Procedures of the National Conference, Chicago Illinois, January 25-29, 1965).

Winsor asked for discussion.

Representative from Texas asked if this organization would be outside of this workshop group. Winsor stated that we can do one of these things: 1. Approve, 2. Modify, 3. Disapprove.

Several of workshop expressed views that this proposed organization would be outside of this workshop and couldn't see good reasons for the proposed organization.

The group also discussed who would be on the committees to workshops and National group and how they are chosen or selected.

Question raised as to what present arrangements are on the present classification. Dr. Smith discussed this briefly. Through principal soil correlators, Dr. Smith and Dr. Simonson. Sometimes they do not reach agreement, then decision is made by Dr. Kellogg. Once the system has been printed it is thought that some other system might well be used.

Representative from Georgia made motion that the proposal made by the North Central group be rejected in its total form. Seconded and adopted.

Bartelli stated that we should think of things and ways of using Regional and National Work Planning Workshops in future revisions of the classifications system. Need to tap the wealth of these groups.

Dr. Winters stated that it might be desirable to state along with the rejection that the workshops are desirable groups for handling revisions.

Bartelli moved that the charge of organization of proper mechanism for changes of classification be included in duties of some permanent committee on classification in the Southern Regional Workshop with reference to steering committee for selection of the committee. Seconded and adopted.

Dr. Baur pointed out that such a committee would be necessary in other regions and at National level - need to meet more often than two years. Bartelli pointed out that procedures are such now that special meetings of committees can be called. Dr. Smith also discussed this in some detail.

Dr. H. B. Vanderford expressed appreciation to the chairman, University of Kentucky, College of Agriculture, and others for a successful conference.

There being no further business the conference was declared adjourned with the note of an optional field trip to the Kentucky Agricultural Experiment Station Farm to view a Maury soil site, and the Agronomy Department weather instrumentation.

SOUTHERN REGIONAL SOIL SURVEY TECHNICAL WORK-PLANNING CONFERENCE

PURPOSE, POLICIES AND PROCEDURES

1966

I. Purpose of Conference.

The purpose of the Southern Regional Soil Survey Technical Work-Planning Conference is to hring together Southern States representatives of the National Cooperative Soil Survey for discussion of technical and scientific developments. Through the actions of committees and conference discussions, experience is summarized and clarified for the benefit of all; new areas are explored; procedures are proposed; and ideas are exchanged and disseminated. The Conference also functions as a clearing house for recommendations and proposals received from individual members and State conferences for transmittal to the National Cooperative Soil Survey Technical Work-Planning Conference.

II. Membership,

A. Voting Memhership.

Voting members of the Conference are the following:

The state soil scientist, or his representative, of each of the 13 States (Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, Virginia) and Puerto Rico.

The experiment station or university soil survey leader, or his representative, of each of the 13 States and Puerto Rico.

The principal soil correlator of the Southern States, or his representative.

One representative of the Soil Survey Laboratory serving the region.

One representative of the Cartographic Unit, SCS, serving the region.

One representative of the Forest Service regional office.

One representative of the Southern Forest Environment Research Council.

(Other organizations designated by the Conference).

B. Non-Voting Membership.

Special invitations may he given to a number of other individuals to participate in specific conferences. Any soil scientist or other technical specialist of any State or Federal agency or private enterprise whose participation would be helpful for particular objectives or projects of the Conference may be invited to attend. These extra participants do not vote on issues of Conference policy and procedure.

111. Officers.

A. Chairman and Vice-Chairman.

A chairman and vice-chairman of the Conference are elected to serve for two-year terms. Elections are held during the biennial business meeting. Election of officers follows the selection of a place for the next meeting, because officers must be from the State where that meeting is to he held. Officers rotate among agencies. That is, the chairman-elect must be of a different agency than the past chairman. Similarly, the vice-chairman must be of a different agency than the chairman.

Responsibilities of the chairman include the following (specific tasks may be delegated to the vice-chairman):

1. Planning and management of the biennial Conference.
2. Function as a member of the Steering Committee.
3. Issue announcements and invitations to the Conference.
4. Write the program and have copies prepared and distributed to the membership. Provide a recording secretary to take and prepare minutes of the business meetings of the Conference for inclusion in the proceedings of the Conference.
5. Make necessary arrangements for: food and lodging accommodations for Conference members; special food functions; meeting rooms (including committee rooms); and local transport on official functions.
6. Obtain official clearance for the Conference from SCS and Experiment station officials, and other organizations as required.
7. Assemble and distribute the Proceedings of the Conference.
8. Provide for appropriate publicity for the Conference.
9. Preside at the business meeting of the Conference.
10. Maintain Conference mailing list, clear membership with appropriate administration, and turn it over to incoming chairman.

Responsibilities of the vice-chairman include the following:

1. Function as a member of the Steering Committee.
2. Act for the chairman in the chairman's absence or disability.
3. Perform duties as assigned by the chairman.

B. Steering Committee.

A steering committee assists in the planning and management of the biennial meetings, including the formulation of committee memberships and selection of committee chairmen and vice-chairmen, organizing the program of the Conference, and selecting presiding chairmen for the various sessions. The Steering Committee consists of the following members, or their designated representatives:

The Conference chairman (Chairman)
The Conference vice-chairman
Principal Soil Correlator, Southern Region
The Conference past chairman and/or vice-chairman

1. Regular Meetings.

   At least one meeting is held at each regional work-planning conference. Additional meetings may be scheduled at other times or places if the need arises.

2. Communications.

   Most of the Committee's communications will be in writing. Copies of all correspondence between members of the Steering Committee shall be sent to each member of the Committee.

3. Participants.

   The Steering Committee makes recommendations to the Conference for extra and special participants in specific regional conferences.

4. Committee Charges.

   The Steering Committee is responsible for the formulation and transmittal to Committee chairmen of charges to committees.

5. Conference Policies.

   The Steering Committee is responsible for the formulation and statements of Conference policy. Final approval of such statements is by vote of the Conference.

6. Liaison.

   The Steering Committee is responsible for maintaining liaison between the regional conference and (a) the Southern Regional Soil Survey Work Group, (b) the Southern experiment station directors, (c) the Southern state conservationists, (d) the national and state offices of the Soil Conservation Service, (e) regional and national offices of the Forest Service, (f) Southern Forest Environment Research Council, and (g) other cooperating and participating agencies.

C. Advisors.

Advisors to the Conference are the SCS State Conservationist and the Experiment Station Director from the state where the Conference is held. In addition other advisors may be selected by the Steering Committee or the Conference.

D. Committee Chairmen and Vice-Chairmen.

Each Conference committee has a chairman and vice-chairman which are selected by the Steering Committee.

IV. Meetings.

A. Time of Meetings.

The Conference convenes every two years, in even-numbered years. Time of year to be determined by the Conference.

B. Place of Meetings.

The Conference may be held at any suitable location. During the biennial business meeting, invitations from the various states are considered, discussed, and voted upon. A simple majority vote decides the location of the meeting places. Meeting sites should be determined two meetings in advance (eg. 1966 Conference should select place for 1968 and 1970 meetings, and then 1968 Conference select place for 1972, etc.)

C. Separate State and Federal Meetings.

Time is to be provided on the Conference program for separate state and federal meetings if requested by the Conference and scheduled by the Steering Committee.

V. Committees.

A. Most of the technical work of the Conference is accomplished by duly constituted committees.

R. Each committee has a chairman and vice-chairman. A secretary, or recorder, may be selected by the chairman. Committee chairmen and vice-chairmen are selected by the Steering Committee. It is the intent, where possible, for the vice-chairmen to succeed the chairmen at the succeeding conference.

C. The kinds of committees, officers of the committees, and their members, are determined by the Steering Committee. In selecting committee members, the Steering Committee considers expressions of interest filed by the Conference members, but at the same time provides for efficient continuity of work, and considers the technical proficiency of the members of the conference.

D. Each committee shall make a verbal report at the designated time at each biennial Conference. Accepted committee reports shall be written and duplicated hy the Committee Chairman as per instructions from the Steering Committee.

Note: Chairmen of Committees are responsible for submittal of committee reports promptly to the Chairman of the Conference. The Conference Chairman is responsible for distribution of committee reports to Conference members and others.

E. Much of the work of committees will, of necessity, be conducted by correspondence between the times of biennial conferences. committee chairmen are charged with responsibility for initiating and carrying forward this work. They shall provide their committee members with the charges as directed by the Steering Committee, and whatever additional instructions they deem necessary for their committees to function properly. Chairmen should initiate committee work at the earliest possible date.

VI. Representation at the National Technical Work-Planning Conference.

At least one state and one federal voting member will represent this conference at the National Technical Work-Planning Conference. Selections are to he made subject to approval of the appropriate administrators. Representatives will report hack to this conference, as well as to their respective state or federal group.

VII. Amendments.

Any part of this statement of purposes , policy, and procedures may be amended at any time by simple majority vote of the Conference voting membership.

Adopted by Southern Regional Soil Survey Technical Work-Planning Conference at Lexington, Kentucky on 9 June 1966.

1140.

Registration 1966 SRTW-PC

NAME	ORGANIZATION
Allen, B. L.	Texas Tech.
Bailey, H. H.	Univ. of Ky.
Barnhisel, R. I.	Univ. of Ky
Bartelli, Lindo	SCS-Texas
Bender, William	SCS-Texas
Buol, S. W.	N. Carolina State Univ.
Burgess, Leland	SCS-Ala.
Baur, A. J.	SCS-Pa.
Byrne, James	USFS-Va.
Carlisle, Victor W	Univ. of Fla.
Carter, Oliver	SCS-Ark.
Carter, R. c.	SCS-Miss.
Cook, Doyle	Univ. of Ky.
Coover, James	SCS-Texas
Covell, R. R.	SCS-Miss.
Craddock, Garnet	Clemson Univ.
Culver, Jim	SCS-Okla.
Daniell, R. E.	SCS-Ky
Dean, Harold L.	SCS-Texas
Dean, Hartzell	SCS-Ark.
DeMent, James A.	SCS-Texas
Elam, A. B.	Univ. of Ky.
Elder, Joe A.	SCS-Tenn.
Ellerbe, Clarence	SCS-S. Carolina
Godfrey, Curtis	Texas A & M
Gray, Fenton	Okla. State Univ.
Horn, Merlin	Univ. of Ark.
Huffman, E. V	SCS- Ky
Juarez, Juan	Puerto Rico Exper. Sta.
Keenan, Walter E.	Miss. Exper. Sta.
Leighty, Ralph G	Univ. of Fla.
Lewis, Olin T.	SCS- Fla.
Linnartz, Norwin	School of Forestry-L.S.U.
May, Jack T.	Univ. of Ga.
Miller, Frank	Miss. State Univ.
Neher, David D	Texas A & I College
Obenshain, S. S.	VP1
Otsuki, Henry	SCS- Okla.
Perry, Ernest	SCS- Ala.
Pfeiffer, N. B.	SCS- Va.

Ritchie, Frank	SCS-Ga.
Rivera, Luis	SCS- Puerto Rico
Seay, W. A.	Univ. of Ky.
Shaffer, Morris E.	SCS-Ga.
Silker, Ted	Okla. Sta. Univ.
Sims, Raymond	SCS-Ky
Slusher, David	SCS-Louisiana
Smith, Guy D.	SCS-Washington, D.C.
Soilean, John	TVA-Ala.
Springer, M. E.	Univ. of Tenn.
Steele, Forrest	SCS-N. Carolina
Stokes, G. W.	Univ. of Ky.
Taff, Homer A.	SCS-Ky.
Taylor, T. H.	Univ. of Ky.
Tcmplin, E. H.	SCS-Texas
Vanderford, H. B.	Miss. Exper. Sta.
Webster, Lynn	Univ. of Ky.
Weems, Tracey	SCS-Louisiana
Winsor, Joe	SCS-Ky.
Zimmerman, Wm.	SCS-Ky.
Winters, Eric	Univ. of Tenn.

SOUTHERN REGIONAL TECHNICAL WORK-PLANNING
CONFERENCE OF THE COOYERATIVC SOIL SURVEY
Lexington; -Kentucky
June 7-9, 1966

Report of the Committee on Climate in Relation to Soil Classification and Interpretation

Our committee discussed the following topics: guidelines for the application of soil series temperature criteria; activities of other agencies and groups who are making climatic studies of interest to soil survey people; 1965 National Work-Planning conference reports of the climate and soil moisture committees; (the soil moisture report was referred to the Climate Committee because there is no committee on soil moisture at this conference); activities of states in collecting soil moisture and soil temperature data.

Guidelines for application of Soil Series Temperature Criteria

The committee reviewed the proposals in Advisory Soils-2 with respect to allowing taxonomic inclusions in soil series for soils which fall outside the series temperature class limits. The committee agrees that a soil temperature tolerance of 2° F is desirable. There was general agreement that land resource area boundaries should be considered, but that decisions regarding taxonomic inclusions should not be made solely on the basis of land resource area boundaries. The committee reviewed a map on which the following average annual soil temperature lines were drawn: 57°F, 59°F, 61°F, 69.6°F, 71.6°F and 73.6°F. The lines were based on U. S. Weather Bureau data on average annual sir temperatures plus 2°F, supplemented by soil temperature measurements from a few states. The lines were drawn according to the "best fit" to the plotted data, without regard to land resource areas or soil associations.

Recommendations

1. A map showing 59° F and 71.6° F, and the 2° F tolerances from these lines be used as a general guide for decisions as to taxonomic inclusions in soil series. (See attached map.)

2. States collect soil temperature data to use in establishing the average annual soil temperature lines and the 2° F tolerances, Use SCS-TP-144 as a guide in making soil temperature measurements.

Activities of Other Groups

The committee encourages each state which has an S-41 participant to make use of the results of this project in soils interpretation. The S-47 project has been terminated, and the reports are now being written. This project investigated in great detail the micro-climate and crop responses at given locations, The Southern Forest Environmental Research Council la studying climate as a function in forest environment in the coastal plain province. The results of these studies will be useful in making soil interpretations, and each state is encouraged to keep in touch with this group.

In some states the U. S. Weather Bureau has installed soil temperature recording instruments at selected weather stations in cooperation with the National Cooperative Soil Survey. This is encouraged for all states.

National Committee Report on Soil Moisture

The committee had few comments on the 1965 National Committee report on soil moisture, The committee agreed that depth to water table and duration classes are needed and useful in describing soils, but there was general feeling that they not be used as series criteria.

Collection of Soil Moisture and Soil Temperature Data

The 1965 National Committee report on climate points out that uniform methods be used in collecting data, The Principal Soil Correlator can help by reviewing proposed projects. The following states are making or have completed studies.

Soil Temperature

Puerto Rico
Kentucky
Texas
Virginia
Arkansas
Florida
South Carolina
Georgia
Tennessee

Soil Moisture

Virginia
Mississippi

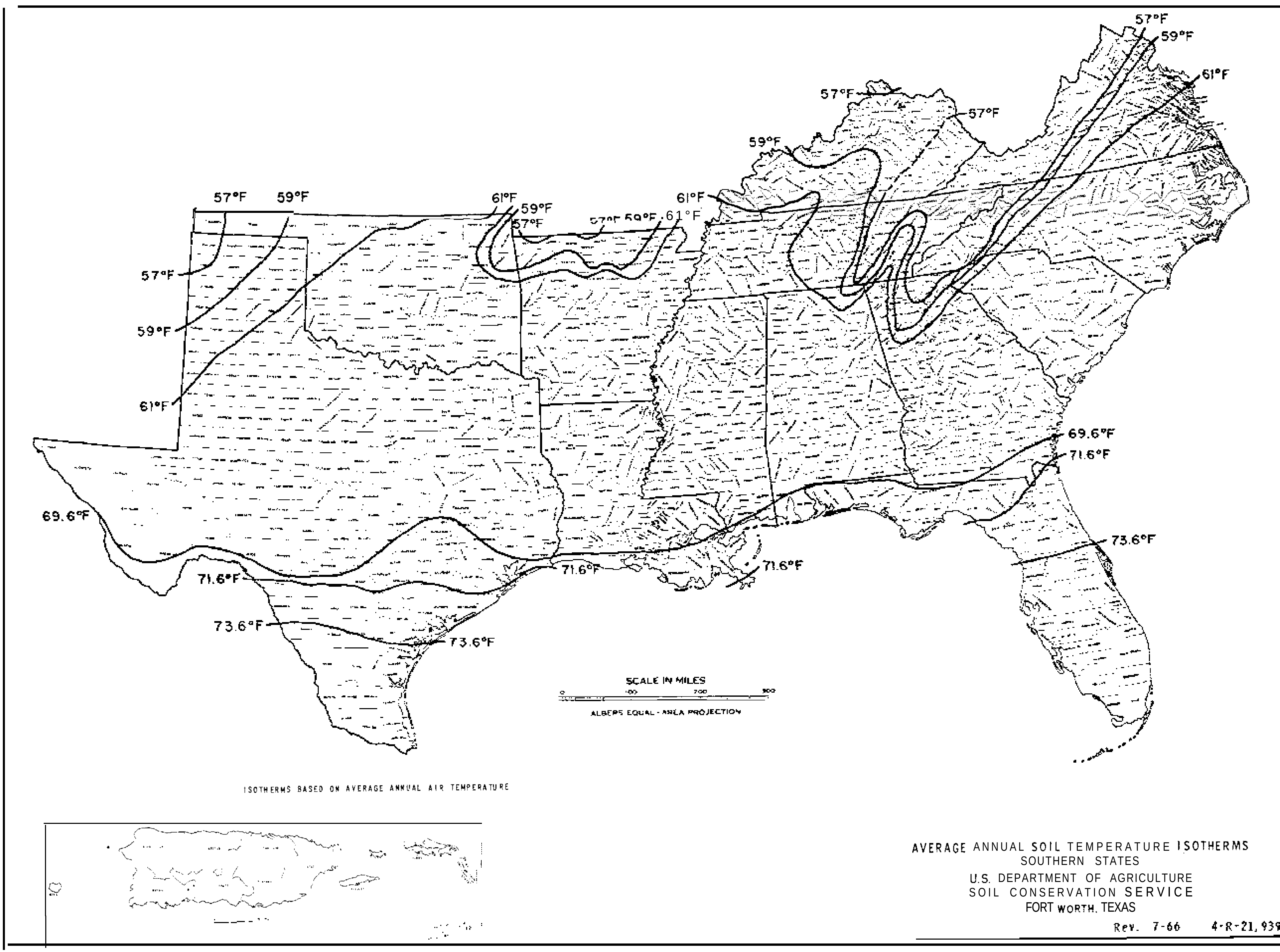
Participants in Committee Deliberations

Committee Members

M. E. Springer, Tennessee-Vice Chairman
C. L. Godfrey, Texas
W. H. Bender, SRTSC, Texas
Tracey Weems, Louisiana
Richard I. Barnhisel, Kentucky
Jim Culver, Oklahoma
Luis H. Rivera, Puerto Rico
J. R. Coover, Texas - Chairman

Consultants

W. Frank Miller
N. E. Linnartz
A. B. Elam, Jr., Kentucky
Ted Silker, Okla.


57°F
59°F
61°F
69.6°F
71.6°F
73.6°F
SCALE IN MILES
ALBERS EQUAL-AREA PROJECTION
ISOTHERMS BASED ON AVERAGE ANNUAL AIR TEMPERATURE
AVERAGE ANNUAL SOIL TEMPERATURE ISOTHERMS
SOUTHERN STATES
U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
FORT WORTH, TEXAS
Rev. 7-66 4-R-21,939

NATIONAL COOPERATIVE SOIL SURVEY SOUTHERN REGIONAL
WORK PLANNING CONFERENCE
Lexington, Kentucky
June 7-9, 1966

REPORT OF COMMITTEE II - Criteria for the Classification and Nomenclature of made soils.

Charge:

1. Review problems in classifying soils which have been altered by urban developments, spoils, deep plowing, lend leveling, and the like.

2. React to recommendation No. 3 of the 1964 Regional Committee.

3. React to National Committee Reports of 1963 and 1965 on "Classification and Nomenclature of Made Soils".

All the recommendations, suggestions and comments from committee members was through correspondence.

Response to a request for two types of detailed descriptions for "Made Soils" were as follows:

South Carolina responded with four semi-detailed composite profile descriptions of made land from river dredginga. They each describe the dominant color and texture by horizons or layers to a depth of 40 or 42 inches and each represented a separate mappable area. (See Attachment 1)

Virginia responded with a legend in which the type of fill or cut, texture, wetness, slope and erosion are used in classifying made land. (See Attachment 2)

Kentucky reaponded with a proposed classification of Strip mine land, using acidity, stoniness and slope groups as principal criteria. (See attachments 3 and 4). Comments from other states were of a general nature.

Response toward improvement of criteria, as proposed by the 1964 Southern Regional "Made land" Committee, was rather sketchy.

Structure, compaction of fill material, character of substrata, kind and amount of "non-soil" materials are additional criteria for consideration. Adjustment of pH ranges and use of color to indicate wetness were pointed out.

Actual experience during the past two years in using the 1964 "Southern Regional proposed criteria to classify made land was not mentioned.

The proper nomenclature of made soils was requested. Most favored were names that had some descriptive meaning such as:

Hydraulic fill, sandy
Candy fill over Rutledge soil
Made lend, industrial wastes or made land, acid, silty, lithic

A committee visitor, R. R. Covell, gave an excellent report on land leveling in Mississippi. Transects were reviewed showing change in series names as well as percentage of unclassified soil areas (made soils with no diagnostic horizons).

There are no final committee recommendations because of the lack of a quorum at this committee meeting. This was due to conflicts in committee assignments as well as members absence from the conference.

There are several individual items that need committee discussion. Also, it would be desirable to have more detailed information on the characteristics of various made soil areas.

Under these circumstances, it seems best to continue this committee with similar charges trusting a sufficient committee attendance for at least a quorum-at the next meeting. Perhaps an additional charge needs to be added. This could be added as charge number 4.

"4. Each state be requested to submit two or more transects across the dominant type of made soil in their state. These would be used as a basis for making more specific recommendations concerning naming and criteria for classifying made land."

Members of Committee

N. P. Pfeiffer
*J. W. Clay
*C. M. Ellerbe
*C. J. Finger
* T. C. Mathews
J. R. Moore
*Cordon McKee
D. D. Neher
E. A. Perry
*R. Leighty
s. L. Larson
C. J. Rich

Visitor - R. R. Covell

W. H. Zimmerman, Chairman

* Contributed comments by mail prior to conference. After the reading of the report, several comments concerning "made soils" were voiced from the group. This further indicated a need to continue this committee. The report was accepted.

ATTACHMENT
(South Carolina)

Most of the Naval Shipyard is made land. The soil materials, mostly clay or sand, came from river dredgings and some from other sources. Natural soils - deep drought gently sloping sandy soils - occur on the Naval Hospital and Officers Quarters Areas.

Borings, 42 inches deep, were made in fill areas where the growth of vegetation is or may be a problem. Color, texture, and thickness of the soil materials were recorded at 6-inch intervals in the soil profile. Any area having fairly similar soil profile characteristics was delineated on a blueprint plat to distinguish it from areas of dissimilar soils. Each area is briefly described. The site of each of the 89 boring6 was located and numbered on fhe plat. Soil descriptions of each boring site are included in this report. Loamy includes coarse and fine loamy. The particular texture of a layer is given in the soil profile description for each boring site. The soil description of an area is a composite of the colors, textures and thicknesses of the boring6 within that area.

Area A

O-12”	grayish brown sand
12-18”	yellow brown sandy loam
18-40"	dark olive gray plastic clay, containing marl

Area B

O-12”	brown sand
12-40"	sand, color may be gray to yellow brown

Area C

0-18"	dark brown sand
18-24"	brown to dark brown sand to sandy loam
24-30"	brown sand
30-42"	brown or gray sand and Clay lumps

Area D

0-6”	brown sandy clay loam to Clay
6-12"	brown clay
12-36"	dark brown to gray plastic clay
36-42"	dark brown to black plastic clay

ATTACHMENT 2
(Virginia)

The following legend is used:

HF - Hydraulic fill (usually saline)
F - Ordinary fill
C - cut

Texture
C - Sands
L - Loamy sands
M - Very fine sandy loam, loam, silt loam
S - Sandy loams
F - Clay loam
H - Clays

Drainage (wetness)
dl - Well drained
d2 - Moderately well drained
d3 - Somewhat poorly drained
d4 - Poorly drained

Slope
Conventional symbols

Erosion
⌿ - Fill (8 inches or more thick)
3 - Cut: to "B"3 horizon or deeper

Examples:

HFSd4A⌿ - Hydraulic fill, sandy loams, poorly drained, nearly level, 8 inches or more thick.
FFd3A⌿ - Ordinary fill, clay loams, somewhat poorly drained, nearly level, 8 inches or more thiok.
CFd2B3 - Cut to clay loams, moderately well drained, gently sloping, eroded (cut).

C-FS-Hd2A1 - cut - fill, sandy loams over moderately well drained plastic clay, nearly level, slight erosion (borrow area, surface soil replaced after borrow removed to ooneiderable depth).

We are showing mines, pits and dumps with numerical symbol only. The word "dump" is printed on county dump areas and sanitary fills.

ATTACHMENT 3
(Kentucky)

Classification of Strip Mine Spoil

There are three main factors which determine mine spoil classification. They are (1) pH level, (2) slope, and (3) degree of stoniness. 1/ They are described in the following chart.

Strip Mine Spoil Classification

ACIDITY GROUPS	Predominant pH*
1. Alkaline	Over pH 7.0
2. Medium Acid	Between pH 5.5 and 7.0
3. Strongly Acid	Between pH 4.0 and 5.5
4. Toxic	Under pH 4

*Generally well over half of area delineated.

STONINESS GROUPS

1. Non-stony - no stones or not enough to make the growing of hay or pasture impractical.
2. stony - sufficient stones to make use of farm machinery impracticable.
3. Extremely stony - too stony for hand planting of trees; 90-100 percent stone cover.

SLOPE GROUPS

1. Gently sloping - O-12 percent
2. Moderately sloping - 12-25 percent
3. Steep - 25-70 peroent
4. Very steep - over 70 percent

OTHER FACTORS (Use only when significant to treatment)

Examples: S - for sand
7 YR. - seven year old spoil
Veg. - Vegetated
Symbol for spoil - Numbers above In order as 112, 323, 423, 312S, etc.

1/ Stone is described as anything other than soil in addition to limestone and sandstone such as slate, shale and coal ‘fragments.

Other criteria, such as texture, may be used.

ATTACHMENT 4

Three Transects from Kentucky Showing Some Important Characteristics
Of Strip Mine Areas

Site	Textural Class	Coarse fragments (percent)	Reaction (pH)	Slope (percent)
T1-S1	Fragmental	80	7.0	2 to 6
Tl-S2	Loamy skeletal	50	4.5-7.0	10
T1-S3	Loamy skeletal	67	6.0	2 to 6
T1-S4	Loamy skeletal	70	<4.5	2 to 6
T1-S5	Clayey skeletal	85	<4.5	100
T2-S1	Fragmental	80	5.0-7.0	2 to 6
T2-S2	Loamy	45	6.0-7.0	100
T2-S3	Loamy skeletal	75	c4.5	100
T2-S4	Loamy skeletal	60	7.5	6
T2-S5	Loamy skeletal		c4.5 7.5	100
T3-S1	Fragmental	60	7.5	2
T3-S2	Loamy skeletal	750		2
T3-S3	Loamy skeletal	755	7.0	0 to 2
T3-S4	Loamy skeletal	60	7.5	0 to 2
T3-S5	Loamy skeletal		7.5	0 to 2

UNITED STATES DEPARTMENT OF AGRICULTURE
Soil Conservation Service

Southern Regional Technical Work Planning
Conference of the Cooperative Soil Survey
Lexington, Kentucky
June 7-9, 1966

Report of the Committee on Application of the New Classification System

The committee met on June 7 to discuss the following subjects:

1. The draft statement of guidelines prepared at the request of the National Committee - "Application of the New Soil Classification System to Series Descriptions and to the Naming of Mapping Units".
2. Criteria for distinguishing series within families.
3. Soil family criteria - (a) skeletal classes, and (b) soil depth classes.
4. Procedures for making changes in the classification system.

1. The draft statement on 'Application of the New Soil Classification to Series Descriptions and to Naming of Mapping Units" was discussed at length. Committee discussion and recommendations are as follow:

   A. The definitions of series concepts and the recording of such concepts in standard series descriptions were reviewed briefly. Although the feelings were not unanimous, the committee favored the recommendation of the National Committee and the draft statement that "The concepts of a series and the standard description of that series are to be developed so that the allowable spans in characteristics fall within the spans of the definitive characteristics of the family in which the series is classified.'

   B. The concept of the control section as defined was considered by the committee as being somewhat arbitrary. For example Bt horizons begin at depths below 80 inches in some soils considered as fitting Grossarenic subgroups of Paleudults. Varying the thickness of the control section a few inches, one way or the other, was not considered a satisfactory solution and the committee felt that provisions for taxonomic inclusions or mapping unit inclusions could be satisfactorily applied. The present definitions of the control section were considered acceptable.

C. Taxonomic inclusions - In a poll of the committee members by correspondence, all indicated they understood the meaning of taxonomic inclusions. However, comments received and committee discussions indicated divergent views in what constituted a taxonomic inclusion and how they were to be used. On the one hand, the mapping unit might be named as a phase of series when it is dominated by a taxonomic inclusion. On the other hand, a mapping unit may be named as a phase of a series when a major part of it falls within the range of the series and the remainder is considered as a taxonomic inclusion.

Recommendation: That the concept and use of the taxonomic inclusion as defined be applied in nomenclature of mapping units and the definition be revised for greater clarity.

Recognition of the fact that a mapping unit consists predominantly of taxonomic inclusions was considered important in publication of descriptions of correlated soils. An explanation by footnote was discussed as one alternative and addition of a term such as "deviant" to the mapping unit name was another.

Recommendation: That taxonomic inclusions be explained by footnote without recognition in the name by some special term such as deviant (similar to the use of variant).

D. Mapping unit inclusions as defined in the draft statement are named series whereas unnamed but closely similar series are taxonomic inclusions. No provision is made for inclusions of minor areas of strongly contrasting but unnamed soils.

Recommendation: That mapping unit inclusions be redefined to provide for inclusion of minor areas of strongly contrasting soils worthy of mention.

E. Nomenclature of mapping units - The committee felt that proposed conventions for nomenclature of mapping units were generally satisfactory. The proposed increase in allowable proportions of inclusions is preferable alternative to long and complex names of mapping units. One exception to the proposed conventions deals with nomenclature of map units for monotype series. Although only a few soils occur as monotype series in the southern region, the committee was opposed to nomenclature of mapping units as, for example, Houston series. One reason given is that the name Houston series would be applied to (1) the concept as defined in the standard series description, (2) the soils as described at the series level in soil survey reports, and (3) the soils as described in the mapping unit. The following alternatives were considered with the number favoring each:

8 members favor retention of the soil type as part of the name of the mapping unit of monotype series (ie, Houston clay)

3 favor no modifier whatever (ie, Houston)

1 favors some other term (ie, Houston _____)

A second exception to the proposed conventions for nomenclature of map units deals with soil associations. As now proposed mapping units of low intensity detailed surveys, as well as general soil maps of counties or states, may be named as soil associations. The committee felt that mapping units on such a variety of map scales would differ significantly in composition, degree of homogeneity of pattern, and use of 'soil associations', at all levels of generalizations would be confusing and misleading.

Recommendation: That mapping units named as soil associations be restricted to county or state general soil maps. The National Committee is asked to propose new nomenclature for use with low intensity detailed surveys.

2. Procedures for making changes in the classification system. The report of the North Central Regional Committee on procedures for changes in the classification system were discussed briefly. The committee recognized the need for and favored establishment of a systematic procedure whereby proposals for revision and modification of the system could be deliberated and acted upon. No recommendation was made by the committee pending further consideration in the work group discussions.

3. Criteria for Series, Types and Phases. The committee reviewed some of the distinguishing characteristics used to separate series within families and discussed their significance. In the placements of soils the southern region (October 1, 1964) 180, families contain one series, 55 families contain two series, and 61 families contain three or more. Considerable discussion centered on the significance of varying proportions of sand as differentiating criteria in coarse silty and fine silty families. The following limits were presented as an example of present usage of sand fraction as series criteria in a fine silty family of Typic Hapludalfs:

Series A	Series B	Series C
Less than 10% total sand throughout (usually loess parent material).	More than 20%' sand throughout (probably alluvial parent material).	Less than 20% sand in the upper solum and more than 20% sand below (thin loess or loesslike material over Coastal Plain or Terrace materials).

At the request of the National Committee, the following is a partial list of criteria used to differentiate series within families in the southern states:

Proportions of particle size classes
Color
Coarse fragments
Depth of plinthite
Lithologic discontinuities
Reaction
Depth to carbonates
Minera logy
Compactness or brittleness
Depth to mottles

AS a result of recent observations, some committee members felt mottles having /3 chroma may be indicative of wetness and in some instances would be preferable criteria to /2 chroma mottles as now used.

Recommendation: That the National Committee summarize available data on soil water table in relation to chroma of mottles and reexamine the definition of classes where mottlings with chroma of 2 or less is used.

4. Soil Family Criteria

A. The National Committee has recommended for testing a sliding scale of coarse fragments in skeletal classes as follows:

sandy skeletal:	20% coarse fragments
loamy skeletal:	40% coarse fragments
clayey skeletal:	60% coarse fragments

The argument for the sliding scale is that the moisture-holding capacities and other physical characteristics of soils would be more nearly equilibrated. On the basis of limited data, the lower limit of 40 percent coarse fragments in loamy skeletal and clayey skeletal classes is more nearly in line with past separations that have been considered satisfactory. Only one sandy skeletal soil is recognized in the southern region and no opinion on the proposal for sandy skeletal classes was expressed.

Recommendation: That the lower limit of coarse fragments in loamy skeletal and clayey skeletal classes be 40 percent.

B. Soil depth (thickness) classes. The National Committee requested the depth (thickness) classes of Ultisols and Oxisols be reexamined. After discussion of alternative proposals, the committee concluded that soil depth classes used at the family level be set at less than 20 inches, 20 to 40 inches, and more than 40 inches and applied in families of Entisols, Inceptisols, Aridisols, Spodosols, Alfisols, and Ultisols when soil depth is not already a part of the subgroup definition. No proposals for nomenclature are made.

5. The committee recommends that it be continued to study problems of application of the classification system.

Committee Members Present:

David F. Slusher, Chairman
G. R. Craddock, Recorder
S. W. Buol
L. H. Burgess
O. R. Carter
R. C. Carter
J. A. Elder
O. C. Lewis
S. S. Obenshain
H. T. Otsuki
N. B. Pfeiffer
H. B. Vanderford

Other Participants:

Guy D. Smith
L. J. Bartelli
Harold Dean
Walter Keenan
John Soileau
Morris Shaffer
B. L. Allen
Jack T. May
Merlin Horn

NATIONAL COOPERATIVE SOIL SURVEY SOUTHERN REGIONAL
WORK PLANNING CONFERENCE
Lexington, Kentucky
June 7-9, 1966

Report of Committee on Classes end Phases of
Stoniness and Rockiness

This new committee was added to the roster of the Southern Regional Conference committees to act on proposal8 contained in the 1965 report by the National Committee on stoniness and rockiness.

Initial regional action on classes and phases of stoniness was taken by the Northeastern States. A committee was formed Sollowing their conference in January 1964 with the charge of studying and testing oriteria for slesses and phases and making recommendations to the Rational Committee prior to the latter's meeting held in January 1965. Although the Northeast confined their study and subsequent report to stoniness, the National Committee's report oovered stoniness and rockiness.

Our committee was charged with:

1. Develop and test guides for classes and phases Of stoniness and rookiness.

2. Reaot to the National Committee's report of 1965 on olasses and phases of stoniness and rookiness.

The comments and suggestions received from members of the committee prior to our meeting were presented for consideration and discussion by the group.

R. E. Daniell, SCS, and 3. G. Byrne, FS, reported on field testing of classes done in Kentucky.. Portions of these report8 are attached to this report (Appendixes I and II).

Daniell's report dealt with measuring the amount of surface exposed rook outorop on mapped areas of mapping units with very rocky or Rock land in the name and also on areas of mapping units without rooky in the name but known to have rock outcrops in the delineated area. The line-interoept transect method was followed. Volume of rock outcrop per transect on the three units with very rocky in the name ranged from 5.5 peraent to 25 peraent and total percent of rook per unit was

8.3, 17.2 and 19.3, respectively. On the two units with Bock land in the name there was a range from 23 percent to 75 percent per transect and totals of 43.5 percent and 35.3 percent, respectively. The three units without rocky in the name had totals of 6, 1.1 and 1.4. The data indicates quantitative underestimations on the part of the mapper in a few cases but does generally support the adequacy of the classes and phases of rockiness as defined in the Survey Manual.

The field study reported by Soil Scientist Byrne was on 36 plots in the McCreary-Whitley Counties portion of the Daniel Boone National Forest. The tests related to stoniness on 20 of the plots and rockiness on 16 plots. They tested several possible schemes including the one proposed by the National Committee. Particular attention was pointed at the comparison of estimated percentages of ooverage with the measured quantities. The accuracy of estimations for seven different schemes of class limits ranged from accurate on 48 percent of the plots to 71percent. There was a tendency to overestimate peroent surface covered by rock outcrops and underestimate percent oovered by stones and boulders.

The group voted in favor of adopting the same class limits for stoniness and rockiness.

A proposal to include all fragments larger than 2mm and base the kind of modification of the unit name on dominant size was rejected by the committee. Although the majority was receptive to the suggestion that consideration of the adequacy of the Manual's guidance on recognizing kinds and quantities of coarse fragments (10 inches and less) on and in the surface horizon be added to this committee's future work.

Also rejected was a suggestion that stones within the soil profile be included as a part of class criteria.

Two main objeotions to the National Committee's scheme were:

1. There are too many breakdowns of olasses 0 through 1.3 to map adequately.

2, The use of like phase designations for stony olasses 2.1 and 2.2 and the designation "rubbly" without a series name for stony class 3.1.

Of several schemes presented the committee voted in favor of the following,

Class	Class limits percent surface covered 1/	Phase designation stoniness phase	rockiness phase
0	<2	No modifier	No modifier
1	2 to 10	Stony	Rooky
2	10 to 25	very stony	Very rocky
3	25 to 50	Extremely stony	Extremely rocky
4	50 to 90	Stony land-series	Rock outcrop-series
5	90+	Rubble	Rock outcrop

1/ Percent surface covered is based on combined total of stones and rock outcrops where the two occur togother. Determine phase designation according to which is dominant.

Two members of the group were strongly opinionated that classes 2 and 3 should be combined, One member was opposed to using a land type (stony land) as part of complex name.

It was generally agreed that spacing between the stones and between the rock outcrops should be defined for each class.

The conference adopted a suggestion from the floor that the National Committee on stoniness and rockiness provide for optional use of no modifier to the soil name up to 2 percent surface covered or a more detailed breakdown below 2 percent as needed in different section of the country.

It was recommended that the committee be continued.

The report was accepted by the conference.

COMMITTEE MEMBERS

T. W. Green, Chairman, USFS, Ca.
*E. V. Huffman, vice Chairman, Ky.
C. B. Breinig, Tenn.
H. T. Byrd, Ga.
J. R. Coover, Texas
*R. E. Daniell, Ky.
*J. C. Byrne, USFS, Ky.
John Elder, Va.
C. L. Hunt, N. Car.
R. E. Medesitt, Va.
*E. A. Perry, Miss.
*F. T. Ritchie, Ca.
E. C. Sease, Tenn.
*E. H. Templin, Texas

*Present at the committee meeting.

APPENDIX I

Summary of Rock Outcrop Data Collected on Eight Mapping Units in Kentucky
Reported By R. E. Daniell, SCS

Mapping Unit Name	Dominant Percent Slope	Land Use	Length of Transect feet	Percent Rook Outcrop
Corydon end Fredonia very rocky silty clay loam, 6 to 12 percent slopes	10	Pasture	1000	5.5
	10	Pasture	1500	10
	10	Pasture	1300	8.5

315 feet of rook outcrop in 3800 feet = 8.3 peroent

- -

Mapping Unit Name	Dominant Percent Slope	Land Use	Length of Transect feet	Percent Rook Outcrop
Caneyville very rocky silty cloy loam, 12 to 20 percent slopes	13	Woodland	124	25
	18	Woodland	166	14
	19	Woodland	270	15
	19	Woodland	167	13
	19	Woodland	121	25

146 feet of rock outcrop in 648 feet = 17.2 percent

- -

Mapping Unit Name	Dominant Percent Slope	Land Use	Length of Transect feet	Percent Rook Outcrop
Fredonia very rocky silty clay loam, 12 to 20 percent slopes	11	Pasture	154	14
	11	Pasture	279	18
	10	Pasture	280	16
	14	Pasture	204	20
	15	Pasture	165	25

198.5 feet of rook outorop in 1082 feet = 18.3 peroent

- -

Mapping Unit Name	Dominant Percent Slope	Land Use	Length of Transect feet	Percent Rook Outcrop
Cynthiana- Rock land complex	22	Pasture	200	23
	15	Pasture	180	30
		Pasture	240	58
	18	Pasture	120	75
	17	Pasture	190	34
	15	Pasture	110	32
	20			50
	25	Pasture Pasture	100	68

572.3 feet of rook outorop in 1390 feet = 43.5 peroent

- -

APPENDIX I

Mapping Unit Name	Dominant Percent Slope	Land Use	Length of Transect feet	Percent Rock Outcrop
Rock land, limestone	18	Woodland	200	47
	17	Woodland	250	26

159 feet of roak outarop in 450 feet = 35.3 percent

Mapping Unit Name	Dominant Percent Slope	Land Use	Length of Transect feet	Percent Rock Outcrop
Caneyville silty clay loam, 6 to 10 percent slopes	9	Pasture	165	7
	10	Pasture	261	2.5
	11	Pasture	119	6
	12	Woodland	183	8

44 feet of Rook outarop in 728 feet = 6.0 peraent

Mapping Unit Name	Dominant Percent Slope	Land Use	Length of Transect feet	Percent Rock Outcrop
Waynesboro silt loam: 12 to 20 percent elopes, eroded	16	Pasture	1000	1.1

Mapping Unit Name	Dominant Percent Slope	Land Use	Length of Transect feet	Percent Rock Outcrop
Faywood silt loam, 12 to 20 percent	18	Cropland	430	2.5
6 to 12 percent	8	Pasture	480	1.4
6 to 12 percent	8	Pasture	120	1.2

15 feet of rook outcrop in 1030 feet = 1.5 peraent

APPENDIX II

Report by James G. Byrne, Soil Scientist, USFS, on Classes and Phases of Stoniness end Rookiness

Purpose: 1. To develop and test guides for classes and phases of stoniness and rockiness.

2. To react to National Committee on "Classes and Phases of Stoniness and Rockiness" (Comm. 3) suggested limits and phase designations,

Deftion: Stones - Coarse fragments 10 to 24 inches in size.

Boulders - Coarse fragments over 24 inches.

Rock - Bedrock exposure,

Stoniness -Any combination of stones and boulders, but mainly stones,

Rockiness - Any combination of rocks and boulders, but mainly rock. These were combined because in limestone areas the two are closely associated, difficult to separate and limit use and management equally.

Summary:

1. Our biggest disagreement with the scheme suggested by the National Committee is in the first four or five classes. It seems that these classes will be difficult to separate and phase designations begin at too low percent coverage, making a soil with a two percent cover of stones very stony.

2. The separations of 1 to 5, 5 to 15 end 15 to 25 were: (1) easiest for us to estimate accurately, (2) near natural groupings on the landscape, and (3) seemed to have most use and management significance.

3. When selecting phase designations in the field, the soil scientist should estimate management limitations as well as percent surface coverage. This would serve as a cross check and give more meaning to the mapping units.

4. There should be upper and lower limits of percent coverage within each class with a ohofoe of phase designations. This would make a more universal scheme, geographically as well as use and management wise.

5. Me tested seven possible schemes, one of which was the National Committee scheme, as to our ability to estimate percent coverage in their classes. We wero accurate 48 percent of the time using the National Scheme and had a high of 71 peroent aoouraoy for the scheme we recommend.

6. We tended to overestimate the percent coverage on rockiness plots and underestimate on stoniness plots. On rockiness, we often had the unit sapped one phase rockier than the plot showed it to be. Estimating the percent coverage is difficult, so the class limits must be wide enough to consider this limdtation of a soil scientist.

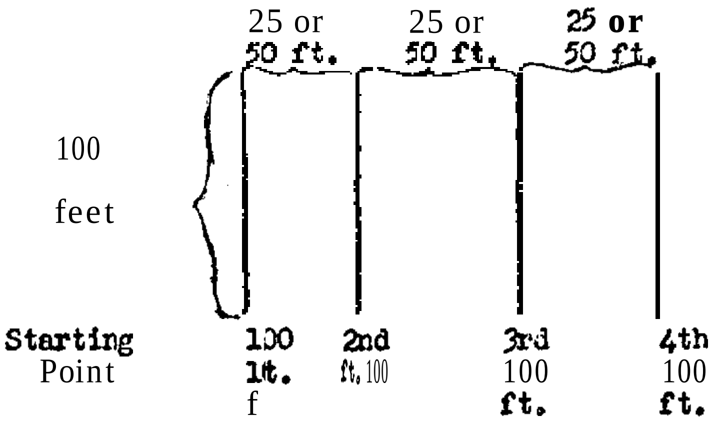
7. The class percentages end the phase designations mean something to map users. So the scheme chosen must be easily and accurately used by the soil scientist less an Improper meaning is conveyed to the map uses.

Methods:

In an interim report by this project, "A Study of Stoniness", presented by Bob Reiske to A. H. Pasohall, Chairman of the Special Committee on Stoniness, NESSWPC, dated December 16, 1964, methods for obtaining quick, accurate information of surface stoniness are discussed in detail. It was determined by Bob Reiske that a line point transect gave' the quickest result6 and also a fairly accurate measurement of surface stones, boulders,- and rocks. Data appearing in this report was obtained by using the line point transect on nearly all of the plots.' Some data from the 1964 study is incorporated in this report.

Field data on 36 plots was gathered. Twenty (20) plots measured stoniness and sixteen (16) plots measured rockiness. An averege of 400 linear feet of line point transect was taken per plot. Four lines of 100 feet eaoh were taken perpendicular to the contour. The starting point was chosen subjectively and each of the four lines were parallel and 25 or 50 feet apart. See diagram on following pege.

APPENDIX II



At each plot the following was recorded:

1. Estimation of the percent surface coverage of stones, boulders and rocks by each of two soil scientists.

2. The degree of limitation for agronomic and forestry practices created by the surface fragments. This was a relative or qualitative rating.

3. Soil profile description.

Data Evaluation:

Several class limits for stoniness and rockiness, including the scheme suggested by the National Committee, were tested as to the ability of a soil scientist to place e plot into the correct class. Two breaks or percentage limits were more accurately estimated than others. One was the 5 percent break. Seventy eight (78) percent of the time the soil scientists could determine whether a plot was between 1 and 5 peroent, They were only accurate 50 percent of the time from 0 to 3 percent and only 17 percent accurate from 0 to 2 peroeat. The other was the 15 percent break. Sixty three (63) percent of the time they could estimate a plot to be between 5 and 15 percent stones, boulders, and rocks. They were only accurate 55 percent of the time between 3 and 10 percent and 16 percent accurate between 5 and 10 peroent. One important exception is that they were accurate 73 percent of the time in the 2 to 10 percent class. This exception supports one of the classes in the scheme recommended by the National Committee. However, taking the National Committee's scheme as a whole, the soil scientists were only 48 percent accurate in placing estimates within the classes. They were accurate 71 percent of the time using the scheme suggested near the back of this report. Five other possible schemes were tested and the soil scientists were 49, 59, 53, 55 and 61 percent accurate is those schemes.

APPENDIX II

In evaluating the data further, there seems to be a "natural" grouping of several plots between 1 and 5 percent stoniness and rockiness and between 5 and 15 percent. There also is a group of plots between 15 and 25 percent. We had few plots over 25 percent coverage and none below one percent coverage. Apparently, the 5, 15, and 25 percent breaks are close to the limits most often occurring on the landscape. In other words, 5, 15 and 25 may be near natural boundaries of the percent stones, boulders, and rocks in our area.

Upon studying the use and management evaluations made on eaoh plot, the limitations were labeled moderate for agronomic uses and slight for forestry uses on those plots that were determined to be less than 5 percent stoniness or rockiness. Between 5 and 15 percent stoniness and rockiness, severe was used for agronomic uses, and slight to moderate for forestry uses. Between 15 and 25 percent, very severe was used for agronomic uses and moderate to severe for forestry uses. These adjectives are defined below.

Slight -Agronomic -very little difficulty (less than 1 percent coverage) in plowing or mowing with rubber wheeled equipment.
- Forestry - very few restrictions as to mobility of a orawler tractor (less than 5 percent).

Moderate - Agronomic - some restrictions in plowing and mowing with rubber wheeled equipment, such as plowing around areas and many stop and go situations (l-5 percent coverage).
- Forestry - crawler tractor would be restricted as to mobility, but could operate with care by going slower to avoid stony or rocky areas (5-15 percent coverage).

Severe - Agronomic - could not plow or mow with rubber wheeled tractor unless stones and rocks were removed (5-15 percent).
- Forestry - couldn't use crawler tractor in area without creating some hazards to machine and operator (15-U).

Very severe -Agronomic - impractical to plow, Use for limited pasture, perhaps (greater than 15 percent).
- Forestry - impractical for crawler tractor to operate (greater than 25 percent).

APPENDIX XI

Hence, the 1 to 5 end 5 to 15 and 15 to 25 percent classes seemed to be:

1. Most accurately estimated in the field by a soil scientist through observation.
2. Natural groupings on the landscape.
3. Logical use and management classes.

UNITED STATES DEPARTMENT OF AGRICULTURE
Soil Conservation Service

SOUTHERN REGIONAL TECHNICAL WORK-PLANNING CONFERENCE OF THE COOPERATIVE SOIL SURVEY
Lexington, Kentucky, June 7-9, 1966

Report of the Committee on Organic Soils

I. Charges of the Committee - To continue work on the development and scheme of classification of organic soils in cooperation with the national committee.

The committee agreed to limit discussion to principals and criteria of the classification scheme. Subgroups needed in the south and the classification of specific series are considered operational instead of committee functions.

II. Discussion and Recommendations

A. Order level

There were no recommendations for changing the definition of Histosols from that given in the 7th Approximation.

B. Suborders

1. The term "Hemist" (Gr. hemi, half) is recommended in place of the term "Lenist" (used in an addendum report given limited circulation by Guy D. Smith, May 1963) or the term "Mixist" (suggested during discussion following the 1965 National Committee Report on Organic Soils). This recommendation also involves changing formative elements throughout the scheme from "Lenic" or "Mixic" to "Hemic".

2. A proposal to abolish the Leptists suborder and to include soils in this class with Thaptic subgroups in either Fibrists, Saprists, or Hemists was rejected for the following reasons (one member takes exception to the rejection):

a. The term Thaptic is being used at the subgroup level for Histosols having a buried mineral soil within the control section. By this definition, those Leptists lacking buried mineral soils (consisting only of various kinds of thin organic layers) would fail to qualify for Thaptic subgroups in either Fibrists, Saprists, or Hemists.

b. Because Leptists, under the present definition, lack diagnostic horizons it would be impossible to classify such soils into an appropriate class because each of the other classes (Fibrists, Saprists, Hemists) are defined on the basis of having diagnostic horizons.

C. Great Groups

1. The 1965 national committee recommended that, in Leptists, the Dysic and Euic classes be moved to the family level and that, at the Great Group Level, the following classes be substituted:

   Saproleptists
   Mixoleptists (Hemileptists)
   Fibroleptists

   This committee recommends retaining Dysic and Euic classes in Leptists for the following reasons:

   a. A danger is recognized in using the same formative element (i.e. Saprist, Hemist, Fibrist) at different categories within the classification scheme. Confusing nomenclature is a possibility should the need arise at the subgroup level for intergrading from one class to another.

   b. In Leptists, moving Dysic and Euic classes to the family level would involve a need for family reaction classes to accommodate this group of soils. Family classes are rather complicated without this additional problem.

D. Subgroups

1. The committee recommends using the same format for defining subgroups in Histosols as is used in defining subgroups within the other orders. At present, each subgroup in Histosols is defined independently' in written text. This creates difficulty in cross-checking specific features when keying out an organic soil. It would be preferable to define a Typic subgroup and make exceptions to the Typic in defining other subgroups within the same class.

2. A proposal to abolish Interic subgroups (subgroups having 2 or more diagnostic horizons) in favor of modifying the subgroup name with the name of the second diagnostic horizon was rejected. Such a proposal would lengthen subgroup names without materially improving the system.

3. The committee rejected a proposal to establish saline subgroups for soils having high salinity. It was recommended that, as in mineral soils, salinity be recognized as a phase

instead of a part of the classification scheme.

4. Consideration was given to recognize a subgroup for organic soils having greater than normal subsidence rates. The committee recommended that this property be considered at the family level. Further study, however, may reveal a need for recognition at a higher category than families.

E. Families

1. Temperature - The committee recommended soil temperature classes in Histosols. It was further recommended that parameters for temperature classes parallel those of mineral soils. Data indicate that, although organic soils may i-e-spond more slowly to air temperature changes than mineral soils, mean annual temperatures of mineral and organic soils are closely related. In application, the data indicate that for Histosols, only the hyperthermic temperature class (71.6° F. mean annual soil temperature as presently defined) is needed in Florida and those states bordering the Gulf of Mexico.

2. Sulfureous families - The committee recommends further study to determine the upper pH limits of sulfureous families. Data from North Carolina indicate that pH 3.5 in 1NKCl as the upper limit may be somewhat high. These soils do not demonstrate limited plant growth but do fall below pH 3.5 in 1NKCl.

3. The committee realizes a need for further study concerning family criteria.

F. Series

Series criteria were not discussed. In the south, there is a need for updating most of the organic soils descriptions prior to classification. The format used by Farnham and Finney 1/ for describing series is recommended. This format adheres to current instructions and also considers features that apply specifically to organic soils.

1/ Farnham, R. S. and Finney, H. R. (1966). Some Ideas on the Classification of Histosols. Mimeograph Paper, Agron. Dept., Univ. of Minn. Some of the recommendations by this committee do not agree with parts of the cited paper. The committee recognizes, however, the merits of this paper particularly in the discussion of morphological features in organic soils and examples of formats given to describe organic soils.

G. Miscellaneous

1. Horizon Designation in Organic Soils - The committee considered several alternatives but recommends the system given by Farnham and Finney 1/ in which:

   H - designates organic horizon of Histosols. The letter O was considered but this is used for organic horizons of mineral soils

   f - designates fibric horizons

   he - designates hemic horizons (cited paper uses mi for mixic horizons)

   s - designates sapric horizons

   Subtypes of fibric horizons (Sphagnum, Hypnales, etc.) are interpreted from botanical composition of fibers as indicated in the description. Horizons are numbered consecutively from the surface with Arabic numerals. Following is an example of 3 sequences of horizons:

   H1 s p - a sapric plowed or disturbed horizon
   H2 he - a hemic horizon
   H3 he - a hemic horizon
   H4 f - a fibric horizon

   Buried mineral horizons should be designated in conventional form Ab, Btb, etc.

2. Thin strata of contrasting materials within a diagnostic horizon - Farnham and Finney 1/ point out that cyclic changes in the peat-generating environment may create thin strata of contrasting organic material within a major horizon of uniform morphology. If a diagnostic horizon must be absolutely homogeneous, it could not contain even the thinnest stratum of contrasting material. The above authors suggest a maximum allowable thickness and contrast in fiber within major horizons as follows:

Degree of Contrast (Difference in percent of fiber between major and minor horizons after rubbing)	Maximum Allowable Thickness (inches) Drained	Undrained
<15	4	6
1.5 - 30	3	4
30 - 45	2	3
>45	1	1.5

1/ **Ibid**

The committee recommends that the above qualification be added to the definition of the diagnostic horizons.

3. Illuvial humic horizons - Florida committee members question if humic horizons occur in organic soils. They have observed greasy, glossy, or shiny material on surfaces of soil particles in decomposed organic materials. Research is continuing on this problem. The committee had no constructive suggestions nor were specific suggestions given for classifying these soils.

4. A need for updated series descriptions - The committee points out a need for updated series descriptions of organic soils. Many of the old descriptions cannot be classified using current criteria. Florida personnel are presently updating many of their organic soils descriptions and indications are that these soils can be placed in the scheme as developed to date. The committee recommends a continuation of this work in all states having organic soils.

5. It is recommended that the Organic Soils Committee be continued with the objective of continuing work on the development and scheme of classification of organic soils. It is noted however that, as of the moment, the national committee on organic soils has been discontinued. In view of this the committee would abide by a decision of the steering committee should they decide to discontinue the organic soils committee for the South Region.

Discussion on Organic Soils Committee Report

1. Bartelli - Regarding temperature classes, there are data showing that organic soils temperatures do not parallel those of mineral soils. For example, in Illinois where organic soils in depressed areas are usually colder than adjacent mineral soils.

Smith - Data show that mean annual temperatures are parallel. Frost pockets do occur in depressed organic areas the same as in mineral soils. Mean annual temperatures, however, are not significantly different.

2. Baur - Would you use the same temperature classes for Histosols as for the other orders?

DeMent - Yes. Organic soils are unique in the sense that they are composed of organic instead of mineral materials. They are, however, a part - Order 10 - of the new classification scheme. Criteria, where possible, should parallel those of the other orders.

3. Baur — Why state that the hyperthermic class can be extended as far as suggested?

DeMent - The intention is to parallel the application used in mineral soils. If there is an established series in a thermic zone that has the morphology of a series within the boundary applied to hyperthermic soils, it could be used within the hyperthermic zone. That is, if within the 2° F. temperature range applied to boundaries of mineral soils.

Committee Members

V.W. Carlisle 1/
James A. DeMent 1/ *
C. M. Ellerbe 1/
Juan Juarez 1/
R. G. Leighty 1/
L. L. Loftin
S. A. Lytle
E. H. Miller
J. R. Moore
James NeSmith
Forrest Steele 1/
B. P. Thomas
Keith Young

Visitors

Guy D. Smith

1/ Those attending Lexington meeting

* Committee chairman

SOUTHERN REGIONAL TECHNICAL WORK-PLANNING CONFERENCE
Lexington, Kentucky

June 7, a, 9, 1966

Report of Committee VI
Soil Surveys for Forestry Uses

The Charge:

1. Review soil survey - a. taxonomic units and b. mapping procedures to determine if soil qualities significant to forest management are being recognized and mapped.

2. Formulate recommendations for mapping procedures in forest lands,

3. Formulate guide lines for differentiating taxonomic units in forest lands.

4. Explore ways of improving, coordinating and standardizing these procedures and programs.

5. Review recommendations that may be developed by the Forest Soils Conferences in the region.

The charges and request for ideas and comments were sent all members of the committee on September 8, 1965, by the chairman. Very few replies were received,

The committee met at Lexington and discussed the replies and each charge. Five committee members and their visitors were present,

Charge 1 -- Most of those present and replies indicated that the new classification system is adequate for delineating taxonomio units. Mapping procedures using the medium intensity soil survey appeared to be adequate for delineating most forest land, There were some who expressed the thought that there was no need to change taxonomic units just for forest uses, also that the same degree of accuracy is needed for forest and other agricultural lands.

There was some discussion of a member's view that series designation appears too inclusive as a map symbol - i.e., it does not help the resource manager interpret the several management classes possible within some of the common soils such as Boswell, Susquehanna, and Oktibbeha (profiles that may vary in A1 and A2 depth from 1 to 14+ inches, and thus vary in regeneration class, associate plant competition level, and productivity level). These factors affect evaluation of input-return and tax assessment base. Use of simple suffix symbols with the series symbol, to delineate certain woodland management classes could assist the resource manager when making his own evaluations, so he can first separate and then aggregate common management classes.

Charge 2 -- Most present seemed to feel that medium and low intensity surveys are adequate. All wanted the best map we can make. In determining the intensity of soil surveys to make, it was realized that economics was an important factor. Could we justify the extra time and money to make a detailed survey on all lands that are dedicated to woods in all the woodland areas. It was also expressed by a member using the new classification system, that some of the taxonomic units at series level can be combined, when grouping sites into common woodland management classes.

Charge 3 -- One expression stated that there should be no difference in differentiating taxonomic units in forest lands over lands used for other purposes. Another, "I believe the best way to standardize procedures is to have the SCS soil scientists and Forest Service soil scientists in complete agreement on mapping procedures for each state." Also, forested lands can and must be mapped accurately before land managers can be expected to use soil, surveys. The mapping must separate segments of the landscape which have significance in planning forest management.

Charge 4 -- Guide lines rather well set out in the new classification system, coordinated by the Regional Technical Service Center staff and state staffs,

Charge 5 -- A brief report was given on the objectives, goals and items of interest discussed at the June 2-3, 1966 Southern Forest Environment Research Council Workshop at Clemson University. The group is organized under auspices of the Southern Agriculture Experiment Station Directors to provide inter-discipline cooperation among climatologists, geologists, soil scientists, foresters, etc. Excerpts from one of the papers follow: "This sampling of opinion took the form of a questionnaire sent to each of the major landholding companies in Tennessee, Alabama, Arkansas, Louisiana, and Mississippi,

"The questionnaire asked for information in the following areas:

1. amount of formal and information (Short course) soils training.
2. personal rating of practical soil-site knowledge and interest in soil.-site information.
3. whether or not land under supervision has been soil-mapped, and by whom.
4. sources from which information is obtained to make decisions on selection of planting sites, rotation length, type of hardwood control measures, road location, equipment limitation, and site index determination.
5. way in which soil and/or site information is either lacking or could be made more useful.

"Returns were obtained from 27 sources representing 18 different companies with a total acreage under supervision of slightly over 9½ million acres.

Table 1. Summary of information received

Number of companies responding	18
Number of individuals responding	27
Acreage represented	9,689,500 acres
% of acreage reporting land at least partially mapped	89%

Distribution of responding companies, by state:

Alabama	Arkansas	Louisiana	Mississippi	Tennessee
4	1	6	4	3

"I would like to state at this point that I was essentially correct in my early assumptions - the management, forester thinks mainly in terms of soil-yield, and for the most part, fails to see the potentially great utility of site classification. To substantiate this statement, I have extracted comments from some of the questionnaires as follows: "...need better yield data for managed stands by sites.", ". ..we need more local yield and growth information.", 'We need a small booklet (like Zahner's) to get side Index..", "...a need for site index determination in the deep loess soils...". Only a few considered the need for more basic research leading to solution of practical problems - ". ..influence of summer rainfall patterns on site,... .", and ". ..the effects of site preparation on yield... .". A few indicated concern on a broader scale and felt that more management practices should be tied to soils information, and concern with the use of all available site information for a complete economic analysis based on site quality.

What level of knowledge, or what caliber of men are making these statements? Forty-one percent of the respondents had at least one soils course beyond the requirements for a Bachelor's degree plus attendance at one or more short courses, meetings, or symposiums dealing with soil-site information.

Table 2. Education, practical knwoledge, and interest of respondents.

College Soils Courses	Symposiums, etc.	No.	%
0 or 1	none	3	11
0 or 1	1 or more	7	26
2 or more	none	6	22
2 or more	1 or more	11	41
		27	100%

Professed Practical Soils Knowledge	Professed Interest	No.	%
Poor	low	-	-
	med.	5	18
	high	3	11
Good	low	1	4
	med.	4	15
	high	13	48
Excellent	low		
	med.		
	high		
		27	100%

"An additional 22% had the same amount of formal education but did not obtain additional training. Their own rating of their practical knowledge of soil-site information and interest in such information is as follows: only 4% rated their knowledge as Excellent, 66% as Good and 30% as Poor. As would be expected, their interest ratings closely paralleled their knowledge - only 37.5% of the ones with Poor knowledge indicated a high interest while 72% of those with Good knowledge marked a high interest,

"In the section dealing with the basis for making decisions, only 36% of respondents with soils maps available on all, or a portion, of their land used the maps, primarily for assistance in selection of planting sites and site index estimation. Of these people, more than half (66%) did not utilize the Interpretations for Woodland Conservation Reports in conjunction with soils maps.

Table 3. Use of sources in making management decisions

Management practice	Soil Maps No.	%	U.S.F.S. Res. Repts. 0.	%	Soil Survey Interp. 0.	%
Selection of planting site	6	27(1)	5	22	2	9
Rotation Length	- -		3	14		
Type of Hdwd Control Measure	1	4	8	36		
Road Location	1	4	-	—		
Equip. Limitation	3	14	-	—		
Site Index Determination	4 8	18 30%(2)	10 14	45 52%	5 6	22 22%

(1) % based on number reporting land at least partially mapped
(2) % based on total number of respondents

Of the 22% of the total respondents who used the soil survey interpretation reports (40% of these used soil maps, also), 17% used them to aid only in selection of planting sites, 66% used them only to assist in determination of site index, and 17% used them for both purposes. Why did 78% of the foresters not utilize the information available? A lack of communication? - perhaps to a certain extent; witness the man who feels that "...most soils information is geared to the farmers.". Education7 - certainly, to a much greater extent than a communication. The general feeling gathered from the comments on the questionnaires is that there is a need to simplify research findings, to present site information to the management forester in a form that should "...not require him to possess the know-how of the technically trained soils man". One statement continues to intrique me - "In summary, I think that we need to know what we have uhen we see it." - a simple statement, almost superfluous, but with tremendous ramifications if we choose to explore them. Remember, this is a man well trained in biological sciencea, a man who apparently does not have the information available which would allow him to synthesize answers from the large amount of soil information and his knowledge and training. Another reason for not utilizing the available soils information, and one that assumed a great deal of importance in the eyes of many of the respondents, is a feeling of uncertainty, even of distrust of the information. One respondent states that, "Soil maps (are) lacking and often inaccurate for woodlands."; another cites the Woodland Reports as a good guide, but goes on to question the accuracy of the information, a third states that "...we are interested in yield by sites but have found existing soils information of no value...". The general impression received is that they want to be able to employ their own knowledge and training to make evaluations from a site classification rather than accept the combined classification - evaluation studies currently being produced."

Southern Forest Soils Council Report by Linnartz: He reported this in an informally organized group of research workers, public, industrial and consultant resource managers that meet bienially to discuss and promote the use of forest soils data. Field tours are used to illustrate how procedures are or may be used.

It seemed to the committee that with the use of the new classification system many of the past criticisms of lack of soil details that effect management of woodlands may be corrected. Many of the states are recalculating soil site indices on basis of new classification system. It was also indicated that presentation of soils data in woodland suitability groups may not be the best. Many forest users would prefer the data and maps by taxonomic units so they can make their own evaluations. The SFERC also concurred with this view. Incidentally, the report of the environmental group is in line with Charge IV of Committee VIA of the 1964 SRWPC at College Station.

Recommendations of the Committee:

1. Each state hold at least one meeting with foresters, consultant foresters and industrial foresters to determine the extent that their needs are being met, Interpret present methods and explore or offer new approaches. Are data in a form they want and will use? What data, in what, form do they prefer?

2. Review current criteria used in interpretation of soils data into woodland suitability groups and explore the possibility of future woodland interpretations that may define which taxonomic units can be classified into groups for different management units.

3. In the future soils work including mapping and interpretations be coordinated with all groups (i.e., Southern Forest Soils Council and Southern Forest Environment Research Council). It was the consensus view that the committee should be continued to work on development and form of presentation of soils data to satisfy all users. Special effort should be made to find what all users would like, and show them what we have and how we feel it can be used.

SOUTHERN REGIONAL TECHNICAL
WORK-PLANNING CONFERENCE
OF THE COOPERATIVE SOIL SURVEY
Lexington, Kentucky
June 7-9, 1966

Report of Committee VII - Soil Survey Reports and Map8

Committees on Soil Survey Reports and Maps were active in the Southern Region in 1960 and 1962. The 1960 committee, under the chairmanship of Dr. C. L. Godfrey, and the 1962 committee, under the chairmanship of Mr. J. C. Powell, dealt with the form, content, and use of soil survey publications. There is no record that a Southern Region Committee on soil survey publications was active in 1964. There does not seem to have been any previous committee work on the charge of the 1966 committee.

The charge of Committee VII is;

1. To develop guidelines for incorporation of the comprehensive classification into soil survey publications, and
2. To respond to National Committee on Technical Soil Monographs a8 deemed appropriate by the chairman.

The committee thought it best 'to deal with the entire, section on formation, classification, and morphology instead of trying to isolate the 'classification subsection. We gave much more attention and time to item number 1 of the charge than we did to item number 2.

The committee discussed by correspondence and in session five *main* topics in presenting the formation and classification of soils in soil survey publications. These are as follows:

1. The objective in presenting the classification system in soil survey publications. The main point here is our intended reading audience.
2. The sequence of topics to be discussed and the kird of text material under each topic.
3. The arrangement of the classification table.
4. The nomenclature of the classification system.
5. The technical profile descriptions.

Diacussione of these five topics are summarized in the main body of the report with each considered in a separate major section. Recommendations of the committee are given as a last item in each section.

1. The objective - the reading audience.

This topic was dealt with by correspondence prior to the meeting and again in session. There was quite a wide difference in opinions. The thinking of most members, however, is that this chapter or section is not especially for general reading, and that it is an educational tool for those who teach and those who are interested in learning about soil formation and classification., Most members thought that we would not likely have a great number of readers for this section, though the number would certainly vary from one survey area to another. Most committee members specified soil scientists, and other professional agricultural students;, Vo-ag students and teachers; engineers, and some farmers, approximately in that order as the main users of this chanter.

The committee recognizes that this is a difficultaudience to write for. It recommends that (1) the chapter be technically sound with enough technical material in it to satisfy soil scientists, (2) the material be written so that others can understand it, and (3) the authors strive for simplicity of language yet maintain technical soundness. If the last item can be successfully done; our reading audience will be enlarged.

2. The sequence of topics.

The committee dealt with the entire section on formation and classification in trying to develop a suggested outline and text material, under each topic,

The committee recommends the attached outlines (marked Exhibit 1) as a suitable sequence of topics in this chapter.

3. The arrangement of the classification table.

The committee members agreed that a classification table was essential in this chapter. Three different kinds of classification tables were sent to the committee members prior to the meeting. Table number 1 arranged the soils by higher categories, orders, suborders, etc. Table number 2 was arranged by series alphabetically; this table also gave the 1938 system of classification. Table number 3 wae similar to table number 2 except that the 1938 system was not given.

About two-thirds of the committee members favored table number 2. They believed that most users would be looking up the classification of a -particular series and the alphabetical arrangement made this much easier., An example of the table recommended by two-thirds of the members is attached (see Exhibit 2). It should be recognized that about one-third of the committee members did not favor a table such as Exhibit 2. They thought that a table arranged alphabetically by soil series was not a classification table; -rather a listing of soil series.

4. Nomenclature.

The committee considered whether a subsection on nomenclature should be inoluded in the classification section. Most of the members believed that we could not afford a detailed dieoussion of nomenclature in soil survey publications and that a brief discussion of it would be inadequate for the person interested in learning the Classification system in some detail. It would be better for such a user to refer to the text of the 7th approximation. The committee recommends that a separate subsection on nomenclature not be given in soil survey publications.

5. Detailed technics1 profile descriptions.

Before the conference, a poll of the committee members was taken to find out in which section they thought the detailed descriptions should be presented. Nfteen members renlied to this question. Nine members favored the detailed descriptions in the Descriptions of Soils section. These nine members stated that the profile descriptions Should be in one plaoe in the publication and that the descriptions should be in the Descriptions of Soils section. Six members said that the detailed descriptions shoulđ be in the technical section in the back part of the publication or even in an appendix. These men further stated that the Descriptions of Soils section is for land users and that those users are not interested in and cannot comprehend detailed technical profile descriptions. One member pointed out that we would reduce the number of users by placing detailed descriptions in the mapping unit descriptions.

The group attending the session in Lexington could reach an agreement on this subject. They did agree that the answer could best be found by consulting the users. We recommend that a committee be continued on soil survey publications, and that this committee give attention to the technical profile dsscrintions with special emphasis on seeking the answer from users of soil surveys.

In regard to Technical Soil Monographs, most of the committee members stated that assignments would have to be made and adequate time allocated if we are to make progress in the preparation of monographs.

Committee Members:

* Joe A. Elder, Chairman	Tennessee
* H. C. Dean, Acting Vice-Chairman	Arkansas
C. A. McGrew, Vice-Chairman	Arkansas
* B. L. Allen	Texas
* L. H. Burgess	Alabama
* R. E. Caldwell	Florida
C. C. Carter	Texas
R. L. Carter	Georgia
J. W. Clay	Virginia
** J. R. Culver	Oklahoma
* R. E. Daniell	Kentucky
* H. L. Dean	Texas
* C. L. Godfrey	Texas
A. R. Hidlebaugh	Texas
C. L. Hunt	North Caroline
** W. E. Keenan	Mississippi
* O. C. Lewis	Florida
J. F. Miller	Texas
** D. H. Nehr	Texas
James Nesmith	Florida
A. L. Newman	Texas
** J. D. Nichols	Oklahoma
D. P. Powell	Florida
R. F. Rieske	Pennsylvania
* L. H. Rivera	Puerto Rico
F. B. Smith	Florida
K. K. Young	Louisiana
J. W. Vandine	Virginia

* Particapated in committee meetings at the Lexington Conference.

** Attended Lexington Conference but had a conflict between committees.

Several of the other members who were unable to attend, submitted their views in writing to the chairman before the conference.

Others attending the committee sessions:

A. 3. Baur	Pennsylvania
E.V. Huffman	Kentucky
R. G. Leighty	Florida
H. T. Otsuki	Oklahoma

Exhibit 1.

SUGGESTED OUTLINE AND TEXT MATERIAL
FORMATION AND CLASSIFICATION CHAPTER

I. Introduction - some brief statements telling the reader what he can expect in the chapter.

11. Formation of soils - Some briefly stated facts telling how soils are formed and introducing the factors in soil formation.

1. Parent material and rock weathering - a thorough discussion of the different kinds of parent materials and kinds of rocks in the survey area giving examples of the local soils which formed in the different materials. It is suggested that this factor be discussed first among the five factors.

2. Relief - the discussion should point out the effects of relief on soil formation followed by a discussion of the relief in the survey area giving examples of the local soils which formed on the various slopes.

3. Climate - a few brief statements about the effects of climate on soil formation. Do not overlook the effect of climate on all of the soils in the area, For example, soils in warm temperate climates that are leached and strongly acid. Reference the climate section instead of repeating a detailed discussion of the local climate under this heading.

4. Living organisms - a few brief statements about the effects of living organisms, especially vegetation, on soil formation, followed by a discussion of the original and present vegetation in the survey area. The influence of man's activity on soils should be pointed out here or as a separate, or 6th factor.

5. Time . a few brief statements on time and its influence on soil characteristics followed by examples of soils on landscanes of different ages.

III. Classification of soils - a few brief statements on why we classify soils followed by a brief explanation (basis of the classes) number of categories, and mmes of the categories.

1. Order - give number of orders followed by differentiae used among the orders, and how the name is derived. Give number and names of orders represented in the survey area followed by a very brief definition of each of those orders.

2. Suborders - a brief statement or two on properties used to differentiate suborders, the meaning of the name along with an example showing the meaning of the syllables in the name.

3. Great group - same sequence as suborder.

4. subgroup - same sequence as suborder.

5. Family - same sequence as suborder*

6. series - same sequence as suborder.

Exhibit 2

Table • Soil series classified according to new and old systems of classification.

	New Classification				1938 System of Classification	
Series	Family	Subgroup	Suborder	Order	Great Soil Group	Order
Baxter	Clayey Kaolinitic Mesic	Typic Paleudults	Udults	Ultisols	Red-yellow Podzolic	Zonal
Huntington	Fine-silty, Mixed, Mesic	Cumulic Hapludolls	Udolls	Mollisols	Alluvial	Azonal
Melvin	Fine-silty, Mixed, Non-acid, Thermic	Fluventic Haplaquepts	Aquepts	Inceptisols	Low-humic Gley	Intra-zonal

FORMATION, CLASSIFICATION, AND MORPHOLOGY OF SOILS

This section has two main parts. The first discusses the major factors of soil formation as they relate to the formation of soils in County. In the second part the system for classifying soils is described and the soils are placed in the system.

FORMATION OF SOILS

The characteristics of a soil at any given point are determined by ths interaction of five factors of soil formation - climate, plants and other living organisms, parent material, relief, and time. Each of these factors affects the formation of every soil, and each modifies the effects of the other, four. The importance of the individual, factors varies from place to place.

Climate and vegetation are the active factors that change parent material and gradually form soil. Relief modifies the effects of climate and vegetation, mainly by its influence on runoff and temperature. The nature of the parent material also affects the kind of soil that is formed. Time is nesded for changing the parent material into soil. Generally, a long period is required for distinct soil horizons to develop.

The interactions among these factors are more complex for some soils than for others. In many places, for example, the environment has changed and the characteristics of a new soil have been superimposed on those of an ancient one.

In the following pages the five major factors of soil formation are discussed in relation to their effects on the soils of ___ county.

Climate

The climate in the county is characterized by mild winters, warm summers, and abundant rainfall. Presumably, it is similar to the climate under which the soils formed. Climatic data for the county are given in the section "General Nature of tha County."

The warm, moist climate promotes rapid soil development. The warm . temperatures permit rabid chemical reactions. Large amounts of water are available to move through the soil and remove dissolved or suspended materials. The remains of plants decompose rapidly, and the organic acids thus produced hasten development of clay materials and removal of carbonates. Leaching and soil development can continue almost the year round because the soil is frozen for only short periods, and then to a depth of no more than 3 or 4 inches,

The climate is fairly uniform throughout the county, though it is slightly cooler and more moist on the Cumberland Plateau than in the other parts. Climate has had a strong influence on most soils in the county, but it alone does not account for local differences among the soils.

Living organisms

Plants, animals, insects, bacteria, and fungi are important in the formation of soils. Among the changes they cause are gains in organic matter and nitrogen in the soil, gains or losses in plant nutrients, and changes in structure and porosity.

Plants generally have a greater effect on soil formation than other living organisms. In ____ County the native plants wore dominantly hardwood trees. Chiefly oaks, hickory, beech, and yellow-poplar were on the well-drained sites. Sycamore, maple, and gum grew in. the wet places. Because of the, climate and the rapid decomposition of organic material from hardwoods, the soils generally are low in organic-matter content.

Parent material

Parent material is the unconsolidated mass from which a soil forms. St determines the limits of chemical and mineralogical composition for the soil, There is a wide variety of parent materials in ____ County - loess, alluvium, and residuum from several kinds of limestones and from sandstone and shale.

Nearly all of the western four-fifths of the country (the Highland Rim part) is underlain by limestone, some of which contains much chert. This limestone furnished the parent, material for the Bodine, Barter, and Christian soils, all of which are on strongly sloping hillsides of the Highland Rim. These soils have cherty and clayey profiles of low base saturation and low fertility.

Alluvium is the parent material for many soils in the county, especially those along the eastern edge of the Highland Rim and those bordering the larger streams. This alluvium probably cams from the Cumberland Mountains. It washed down the mountain slopes and was deposited, 3 to 15 feet deep, on the Highland Rim, The alluvium was a mixture of materials weathered from limestone, sandstone, and shale. In most places it was later reworked by water. The soils that developed in it range from yellowish brown, such as the, Jefferson soils, to dark red and red, such as the Cumberland and Waynesboro soils. All of these soils have a strongly developed clay loam to clay B horizon, low base saturation, and low to medium fertility.

Loess was the parent material of the soils on the smoother parts of the Highland Rim. A mantle of loess, 1 to.3 feet thick, was desposited on the entire Highland Rim during the glacial ages. Since that time the material has been washed off the steeper slopes, but a layer 1 to 3 feet thick remains in the smoother areas. Soils that developed in loess are light colored, silty, and low in fertility and base saturation. In many places a fragipan formed along the area of contact between the loess and the under-lying red clay, which formed from limestone. The Mountview, Dickson, Lawrence, and Gutherie soils formed in loess, and the differences among them are due. to differences in drainage,

The Cumberland Plateau and Mountains are underlain by sandstone that is interbedded with shale in some places. These rock8 furnished the parent material for all the soils In this area - the Hartsells, Linker, and Ramsey soils. These soils have a loamy, light-colored subsoil and are very low in plant nutrients and in base saturation

The soils on bottom land throughout the county formed in alluvium consisting of a mixture of material derived from the parent materials mentioned in this discussion.

Relief

Relief, or the shape of the landscape, affects soil formation through its influence on drainage, erosion,. plant cover, and soil temperature. Slopes in ____ County range from nearly level to very steep.

The Gutherie, Lawrence, and other gray, poorly drained soils formed in nearly level and depressional areas where water stands or drains away slowly. In these places the soils are saturated for long periods and are poorly aerated, thus causing reduction and the formation of gray colors. In rolling areas that have good drainage, the soils generally are well aerated and have colors of red, yellow, or brown. On steep slopes in the Cumberland Mountains and similar areas, relief seems to be the dominant factor in soil formation. In these places the soil is removed by geologic and accelerated erosion nearly as fast as it forms. Consequently, a thick soil profile never develops. Example of shallow soils on steep slopes are the Ramsey soils. The differences between the Ramsey soils and the associated Hartsells soils, which are 3 1/2 to 6 feet deep, are caused by differences in relief.

Time

A long time generally is required for soil formation. The differences in length of time that parent materials have been in place therefore are commonly reflected in the character of the soil.

The soils in____ County range from those that are very young and have little or no profile development to those that are very old and have a well-defined profile.

The Staser, Sequatchie, and Waynesboro soils are an example of a sequence of soils that owe their differences in characteristics to diffences in time. The Staser soil is a young soil that lacks developed horizons because the materials have been in place only a short time. The Sequatchie soil lies a few feet higher than the Staser soil and has been in place long enough for weakly expressed horieons to develop. The B horizon in this soil has a slightly redder color and slightly more clay than the A horizon. Furthermore, the carbonates have leached out of this soil, and it is now strongly acid. The Waynesboro soil is an old, well-developed soil that has strongly contrasting horizons.

CLASSIFICATION OF SOILS

Soils are classified so that we may more easily remember their significant characteristics, assemble knowledge about them, see their relationships to one another and to the whole environment, and develop principles that help us understand their behavior and response to manipulation. First through classification, and then through use of soil maps, we can apply our knowledge of soils to specific fields and other tracts of land.

The system of classification used In this soil survey is that adopted a8 standard for all soil surveys in the United States, effective January 1, 1965 (9). It replaces the 1938 system, with revisions, of Baldwin, Kellogg, Thorp, and Smith (2,7). In table __ the soils of ______ County are classified according to the new and the old systems, The current system of classification defines. classes in tens of observable or measurable properties of soils. The properties ohoeen are primarily those that permit grouping soils that are similar in genesis. Genesis, or mode of soil origin, does not appear in the definitions of the classes; it lies behind ths classes. The classification, designed to accommodate all soils, has six categories, Beginning with the most inclusive, the categories are the order, suborder, great group, subgroup, 'family,' and series. Following are brief descriptions of the, first five categories in the system. The series is defined in the section "How This Soil Survey Was Made."

ORDER

Ten soil orders are recognized. The properties used to differentiate among soil orders are those that tend to give broad climatic groupings of soils. The two exceptions to thie are the Entisols and Histoeole, which occur In many different climates. Each order is named with a word of three or four syllables ending in sol (Ent-i-sol),

As shown in table 8, there are' four soil orders in ___County: Entisols, Inceptisols, Mollisols, and Ultisols. Entisols are recent soils. They are without genetic horizons or have only the beginning *of* such horieone.

Inceptisols are soils that occur most commonly on young but not recent land surfaces. Their, name is derived from the Iatin Inceptions for beginning.

Mollisols are soils that have a dark-colored, thick surface layer and have high base saturation throughout the soil profile.

Ultisols are soils that are strongly weathered or strongly developed. Their name suggests the ultimate in soil development.

SUBORDER

Each order is subdivided into suborders that are based primarily y on those soil characteristics that seem to produce classes with tne greatest genetic similarity. The suborders narrow the broad climatic range permitted in the orders. The soil properties used to separate suborders are mainly those that reflect either the presence or absence of water-logging, or soil differences resulting from the climate or vegetation. The names of suborders have two syllables. The last syllable indicates the order. An example is Aquepts (Aqu, meaning water or wet, and ept, from Inceptisol).

GREAT GROUP

Soil suborders are eeparated into great groups on the basis of uniformity In the kinds and sequence of major soil horizons and features. The horiaone used to make separations are those in which caly, iron, *or* humus have accumulated; those that have pane that interfere with growth of roots or movement of water, or both; and thick, dark-colored surface horizons. The features used are the eelf-mulching properties of clay, soil temperature, major differences in chemical composition (mainly calcium, magnesium, sodium, and potassium), dark-red and dark-brown colors associated with basic rocks, and the like. The names of great groups have three or four syllables are made by adding a prefix to the name of the suborder. An example is Normaquept (Norm, meaning normal, aqu for wetness or water, and ept, from Inceptisol).

SUBGROUP

Great groups are subdivided Into, subgroups, one representing the central (typic) segment of the group and others called intergrades that have properties of the group and also one or more properties of another great group, suborder, or order. Subgroups may also be made in those instances where soil properties intergrade outside of the range of any other great group, suborder, or order. The names of subgroups are derived by placing one or more adjectives before the name of the groat group. An example is Typic Normudult (a typical Normudult).

FAMILY

Families are separated within a subgroup primarily on the basis of properties Important to the growth of plants or on the behavior of soils when used for engineering. Among the properties considered are texture, mineralogy, reaction!, soil temperature, permeability, thickness of horizons, and consistence. A family name consists of a series of adjectives preceding the subgroup name. The ad jectivas are the class names for texture, mineralogy, and 80 on, that are used as family differentiae (see table 8). An example is the fine-silty, mixed, thermic family of Typic Paleudults.

UNITED STATES DEPARTMENT OF AGRICULTURE
Soil Conservation Service

SOUTHERN REGIONAL TECHNICAL WORK-PLANNING CONFERENCE OF TRE COOPERATIVE
SOIL SURVEY
Lexington, Kentucky, June 7-9, 1966

Report of the Committee on Engineering Application and Interpretation of Soil Surveys vith Special Reference to Urban Fringe and Irrigated Areas and Highways

A. Objectives:

1. Continue the 1964 conference work of Committees VIII, VIIIA, and VIIIB. Review and prepare regional guides for the Engineering Application and Interpretation of Soil Surveys with Special Reference to Urban Fringe and Irrigated Areas and Highways.

2. Respond to 1965 national committee report (Committee V).

B. Committee actions:

1. Guidelines for nine different urban fringe land uses were prepared. The guide sheets are attached to this report.

2. Guides for engineering interpretations were not prepared because a national guide for preparing engineering interpretations for soil survey publications and soil handbooks is ready for printing and will be distributed soon.

3. The national committee chainnan, Lindo J. Bartelli, said that the national committee needs assistance in preparing guides for urban fringe interpretations. The attached guides were prepared with this need in mind.

4. These guides are intended to reflect criteria and terminology of the comprehensive soil classification system. They will be the guidelines for making interpretations of phases of soil families in the near future.

   These guides are not intended to replace the guides that were used for making interpretations for major land resource areas. They are for discussion and field testing only, until they are reviewed and reissued by the national committee.

5. It is recommended that this committee be continued.

6. Suggested future objectives:

   a. This committee should exchange information and act as liaison between states.

b. Continue to study and improve guidelines.

c. Develop and expand guidelines to include fields not presently covered.

d. Encourage research on soil properties as they relate to the engineering application and interpretation of soil surveys.

Committee members:

William H. Bender, Chairman
James R. Culver, Recorder
R. C. Deen
S. S. Obenshain
F. T. Hitchie, Jr., Vice Chairman
M. E. Shaffer
J. M. Soileau
M. E. Springer
Forrest Steele
W. H. Zimmerman

Visitors:

G. R. Craddock
C. M. Ellerbe
D. D. Neher

Soil Limitations for Sanitary Land Fill Areas

Definition: These areas are for underground burial of garbage and trash. The chief requirements are well-drained soils on sites that are free of flooding. The soil should be easy to excavate to a depth of 10 feet.

Degree of Soil Limitation

Items Affecting Use	None to Slight	Moderate	Severe
Slope	1 to 4 percent	Less than 1 percent 1/ and 4 to 8 percent	More than 8 percent
Depth to hard rock	Deeper than 120 inches	60 to 120 inches	Less than 60 inches
Seasonally high water table	Below 120 inches more than 9 months	72 to 120 inches more than 9 months	Above 72 inches more than 3 months
Texture of the area to be excavated (affecting sidewall caving and workability to the depth of the excavation).	Loam, silt loam, silty clay loam, sandy loam, clay loam, silt, sandy clay loam	Silty clay, sandy clay, well graded gravel	Sand, loamy sand, clay, organic soils, poorly graded gravel
Stoniness	Classes 0 and 1	class 2	Classes 3, 4, and 5
Rockiness	class 0	Class 1	Classes 2, 3, 4, and 5
Trafficability of soil In place	Loam, sandy loam, ssndy clay loam, sandy clay	Silt loam, clay loam, silty clay loam, silt, silty clay	Sand, loamy sand, clays, organic soils

1/ Assumes inadequate surface drainage on less than 1 percent slopes.

SRTWPC
6/66

Soil Limitations for Shrubs and Trees

This guide applies to the use of the undisturbed soil for shrubs and trees in residential areas, around factories, apartment houses, school buildings, and intensively used parks.

Items Affecting Use	Degree of Soil Limitations		
	None to Slight	Moderate	Severe
Available moisture to 40 inches	More than 5.0 inches	2.5 to 5.0 inches	Less than 2.5 inches
Depth to root restricting layer including bedrock	More than 40 inches	20 to 40 inches	Less than 20 inches
Wetness	None to slightly wet	Moderately wet	Wet and very wet

SRTWPC
6/66

Soil Limitations for Cemetery Sites

Definition: These are areas for underground burials. The chief requirements are a well-drained site free of flooding that is easy to excavate to a depth of five feet 1/ and is productive of plants commonly used in landscaping.

Degree of Soil Limitation

Items Affecting Use	None to Slight	Moderate	Severe
Slope	Less than 12 percent	12 to 25 percent	More than 25 percent
Depth to hard rock 1/	Deeper than 72 inches	48 to 72 inches	Less than 48 inches
Seasonally high water table 1/	Below 60 inches more than 9 months	Below 40 Inches more than 9 months	Above 40 inches more than 3 months
Productivity	Medium to high	Medium to low	Low
Rockiness	class 0	Class 0	Classes 1, 2, 3, 4, and 5
Stoniness	Classes 0 and 1	class 2	Classes 3, 4, and 5
Flooding hazard	None	Once in 5 to 20 years	More often than once in 5 years

1/ Adjust for excavation depths commonly used locally.

SRTWPC
6/66

Soil Limitations for Lawn6

This guide applies to the use of the undisturbed soil for lawns in residential areas, around factories, apartment houses, school buildings, and intensively used parks.

Degree of Soil Limitations

Items Affecting use	None to Slight	Moderate	severe
Available water capacity to 40 inches	More than 5.0 inches	2.5 to 5.0 inches	Less than 2.5 inches
Percent rock fragments 3 to 10 inches in size in surface 10 inches	0 to 1 percent	1 to 5 percent	More than 5 percent
Surface layer texture	Silt loam, loam, sandy loam, sandy clay loam, silt	Loamy sand, silty clay loam, clay loam	Silty clay, clay, sandy clay, loose sand, organic, gravelly
Wetness harard	No wetness and slight wetness	Moderately wet	Wet and very wet
Depth to rock or other root restricting layer	>40 inches	20-40 inches	<20"
Percent slope	0-5 percent	5-15 percent	>15 percent

SRTWPC
6/66

Soil Limitations for Golf Fairways

Definition: The soils are not rated for the rough or for hazards because of the extremely wide variety of soils that are suited for these parts of the golf course. Neither are the soils rated for greens because most of them are man made. The rating reflects the suitability of the soil for the establishment and maintenance of grassed fairways and depends mainly on the ability of the soils to withstand foot and cart traffic without damage to the soil cover.

Degree of Soil Limitation

Items Affecting Use	None to Slight	Moderate	Severe
Slope	Less than 8 percent	8 to 15 percent	More than 15+ percent
Stoniness or rockiness	Class 0	Class 1	Classes 2, 3, 4, and 5
Productivity	High to medium	Medium to low	Low
Wetness hazard	Slightly wet	Moderately wet	Wet and very wet
Flooding hazard and duration	Once in 1 to 5 years for 7 days to 2 weeks	Once or more every year for 2 to 7 days	Once or more every year for 7 days to longer than 6 months
Surface texture	Silt loam, loam, silty clay loam, fine sandy loam, sandy loam, clay. loam, sandy clay. loam, very fine sandy loam, silt	Silty clay, clay, sandy clay	Sand, loose sand, loamy sand, gravelly and organic

SRTWPC
6/66

Guide for Depth to Hard Rock Classes

Definition: The depth of loose material to "rock which requires drilling and blasting for its economical removal." 1/

Classes	Depth to Rock
Very shallow	0-20 inches
Shallow	20-40 Inches
Moderately deep	40-72 inches
Deep	6-20 feet
Very deep	20 feet plus

1/ Glossary of Geology and Related Sciences, second edition, The American Geological Institute, Washington, D. C., 1960.

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6/66

Guide for Determining Flooding Hazard Classes

Definition: Water from river and stream overflow, from runoff or seepage, and water standing or flowing above the soil surface.

Class	Frequency 1/	Duration	
None	No flooding	Very brief	1 to 2 days
Very infrequent	Once in 20 to 50 years	Brief	2 to 7 days
Infrequent	Once in 5 to 20 years	Moderate	7 days to 2 weeks
Frequent	Once in 1 to 5 years	Long	2 weeks to 6 months
Very frequent	Once or more every year	Very long	Longer than 6 months

1/ The time of year that the floods occur should be taken into consideration when rating soils for a particular use. Flooding occurring during the heavy-use period is more serious than in those periods when use is light.

Measurement: Measurements should be accumulated according to Soils Memorandum SCS-40, April 27, 1961.

Estimate: Hydrological surveys from Geological Survey, Corps of Engineers, TVA, and other agencies give frequency and flow information on many streams. This information can be used in making the estimates.

SMWPC
5/66

Guide for Rating Water Table Characteristics

Definition: The upper surface of free water in a soil or underlying material. In some places an upper- or perched-water table is separated from a lower one by a dry zone.

Depth 1/		Duration*	
Very shallow	0 to 10 inches	Continuous	12 months per year
shallow	10 to 20 inches	Very long	6 to 12 months per year
Moderately shallow	20 to 40 inches	Long	2 to 6 months per year
Moderately deep	40 to 80 inches	Brief	1 to 2 months per year
Deep	80 to 240 inches	Very brief	Less than 1 month per year
Very deep	Below 240 inches		

* Duration of seasonally high water table is most severe when it occurs during the heavy-use season. Duration may be more usefully expressed as a percentage of the use period. For example, a soil used for golf fairways might have a permissible-duration tolerance of 20 percent for a 6-months'-use period.

Measurement: Observation of the level at which water stands in an unlined bore hole. Time should be allowed for moisture adjustment following rainfall. Allow about 48 hours for coarse-textured soils and about 72 hours for fine-textured soils to adjust to field capacity. A perched-water level is observed when the deepening of the hole causes the water level in the hole to subside. The observations should be made at the time of the year when the soil is wettest.

Estimate: Without adequate water table observations; estimates can be based on the drainage class and experience in the area.

Approximate correlations based on natural soil drainage are:

Drainage Class		Water Table Depth and Duration
Well	approximates	Below 60 inches more than 9 months per year
Moderately well	approximates	Below 30 inches more than 9 months per year
Somewhat poorly	approximates	Below 15 inches more than 9 months per year
Poorly	approximates	Above 15 inches more than 6 months per year
Very poorly	approximates	Above 15 inches more than 9 months per year

1/ Reference: Proceedings of National Technical Work-Planning Conference of the Cooperative Soil Survey, Chicago, Illinois. January 25-29, 1965.

Guide for Rating Soil. Wetness

Wetness is a soil. quality related to the position and duration of a free-water surface.

Rating in Terms of Soil Wetness	Depth of Free-Water Surface in Soil and its Duration
No wetness	Free-water below 80 inches more than 9 months of the year. Water table normally does not reach the surface during the remaining 3 months of the year.
Slightly wet	Free-water between 40-80 inches more than 9 months of the year. Water table normally does not reach the surface during the reamining 3 months of the year.
Moderately wet	Free-water between 20-40 inches more than 9 months of the year.
Wet	Free-water between 10-20 inches more than 6 months of the year.
very wet 1/	Free-water between the surface and 10 inches more than 6 months of the year or may be above the surface (ponding) 1/

1/ Includes marshes, swamps or any "still-water" area but does not include flood waters along rivers, streams, or water in upland drainage ways.

SRTWPC
6/66

UNITED STATES DEPARTMENT OF AGRICULTURE
Soil Conservation Service
SOUTHERN REGIONAL TECHNICAL WORK PLANNING CONFERENCE
OF THE
COOPERATIVE SOIL SURVEY
Lexington, Kentucky

Report of Committee IX
FRAGIPANS

The Committee on Fragipans had the following charges:

1. Review adequacy of concepts and designations for fragipan soil conditions,. especially for the Southern Region.

2. Develop guidelines for identification and designation of fragipans with emphasis on bi-sequum conditions.

Considerable interest was exhibited prior to the meeting via' correspondence from many committee members and during the deliberation of the committee in Lexington.

The committee is indebted to Dr. M. E. Horn of the Arkansas Agricultural Experiment Station for his interest and assistance in developing and providing the Questionnaire-- "Identification and Evaluation of Fragipans in the Field", a copy of which is attached. This Questionnaire was circulated to all committee members prior to the meetings. It provided an excellent tool for stimulating interest and responses.

The majority opinion of those answering the Questionnaire agreed that:

1. The fragipan horizon is mottled generally with shades of gray, brown, and red.

2. A polygonal color pattern is observable.

3. Some fragipans exhibit bisequal characteristics and others do not.

4. Consistence is most always firm or greater where moist.

5. It displays brittleness when moist.

6. It is compact and appears-to have a significantly greater bulk density than horizons above and below it.

7. Voids are usually present in most fragipans and are largely of the vesicular type.

8. Opinion was about equally divided that oriented clays were readily observed between a definite "yes" and indefinite "yes".

9. Textures listed were generally silt loam, very fine sandy loam, or loam. The (a) line dominated as textures observed in fragipans.

10. The question of structure was also about equally divided between angular blocky and subangular blocky.

11. The majority indicated most fragipans observed were between 12 and 28 inches (a), but could be between 28 and 36 inches or below 36 inches in some profiles.

12. Most agreed a perched water table was apparent.

13. Roots in the fragipan generally were confined to and followed down the gray streaks.

14. Most indicated the fragipans were most common on 0-3% slopes but could range up to 8-12% which was not very common.

The following items were discussed during the committee meeting:

1. The definition of a fragipan as defined in the 7th Approximation was discussed.

   It was the opinion of most members who expressed their views that the definition covered the items looked for in the recognition of fragipans, but possibly might be strengthened if it could be made more definitive especially with respect as to what constitutes the minimum requirements for fragipan recognition.

   No definite or concrete opinions or recommendations were offered as to how this could be accomplished.

2. Some soils with plinthite (more than 10% by volume that is non-indurated) have characteristics that are quite similar to those with fragipans.

   At the present time, due to lack of knowledge and evidence, the committee agreed to exclude soils with plinthite from fragipan consideration. As additional information and knowledge are obtained, consideration should possibly be given to a review. of this decision.

3. The classification of fragipan soils at'the subgroup level was reviewed. Included for discussion purposes were the following subgroups :

Typic Fragiudalfs	Aqueptic Fragiudalfs
Ochreptic,, Fragiudalfs	Typic Fragfaqualfs
Aquic Fragiudalfs	

The definition of Typic Fragiudalfs states:

"has a fragipan that has a brittle matrix in at least 90% of the cross section of the most strongly cemented subhorizon."

Opinion was expressed that this 9% figure *is too* high, and that consideration be given to changing this figure to about 60 or 70 percent, which it is thought would more nearly represent the conditions with which we are dealing.

The committee was in agreement with definitions of the subgroups as presently defined, with the exception of the 9% brittleness, as being adequate for the needs in the Southern Region.

These subgroup definitions are applicable to the whole soils, expressing the total morphology rather than just to the fragipan horizons.

4. Considerable discussion centered around the degree of expression of fragipan horizons. The question was raised--"Could we recognize degrees of fragipan expression in the same subgroup?"--That is, for example, would it be possible to have in the Aqueptic Fragiudalfs a soil series having a strong expression and also one with a moderate expression? It was felt, that at least at the present time, we lack sufficient knowledge and guidelines to do this, but we should not rule out this possibility.

No action was taken by the committee relative to its continuance. The Conference likewise took no action. It is suggested that the 1960 Steering Committee take action on the continuance or discontinuance of this committee.

This concludes the committee report.

Attachment

Committee Members:

*E. A. Perry - Chairman - Ala.
C. B. Breinig - Vice Chairman - Tenn.
*R. I. Barnhisel - Ky.
*O. R. Carter - Ark.
*R. C. Carter - Miss.
*J. R. Coover - Texas
*J. A. DeMent - Texas
J. B. Dixon - Ala.
C. J. Finger - Ark.
*Fenton Gray - Okla.
R. C. Glenn - Miss.
*M. E. Horn - Ark.
*W. E. Keenan - Miss.
C. J. Koch - Va.
R. J. McCracken - N. C.
*N. B. Pfeiffer - Va.
Grant Thomas - Texas
*H. B. Vanderford - Miss.
J. B. Watts - N. C.
*Tracey Weems - La.

Visitors:
L. J. Bartelli - Texas
G. A. Buol - N. C.
G. D. Smith - Wash., D.C.
E. H. Templin - Texas
Eric Winters - Tenn.

*Indicates members present at the conference.

Identification and Evaluation of Fragipans in the Field*

Introduction

The field soil scientist is frequently confronted with the problem of making decisions as to whether the soil he is inspecting or describing has (1) a fragipan or not?, and (2) if one is present, what is its degree of development or expression? In making these decisions chances are that the soil scientist goes through a mental exercise in which he, knowingly or unknowingly, asks himself a series of questions about the morphology and properties of the soil profile that he is observing.

Eventually his mental inquiry leads to a set of answers upon which he bases his decisions to the main questions posed above. If all soil scientists considered the same questions, had similar powers of observation and knowledge of soils, and reasoned similarly with the evidence on hand, presumably they would come up with the same decisions. If this were true, the problem of obtaining uniformity of fragipan identification and designation would largely be resolved. Obviously, this is not the case. However, if we assume that the majority of soil scientists possess similar powers of observation and a knowledge of soil morphology, the outcome of the mental inquiry would then be dependent on (1) the pertinence and scope of the questions asked, and (2) the interpretations of the answers.

It then seems possible that a list of pertinent questions and interpretations could be agreed upon that would lead to more consistent decisions regarding fragipan identification and designation of degree of expression and thus improve the classification of fragipan soils.

Because there seems to be little hope of finding a means of "measuring" fragipan properties in the field with any mechanical or chemical quick-test, it would appear that we must rely on some judgement method such as this in our routine mapping program.

Attached is a suggested checklist of questions with interpretations as I would make them. I am sure that there are weaknesses, however, by pooling our experience in mapping fragipan soils a list of questions and interpretations could well be prepared that would guide all of us in making more consistent evaluations of fragipans. Admittedly, there would still be a great deal of personal bias in answering the questions, but a conscientious attempt to critically and objectively observe and answer questions such as these should improve upon the present situation.

---

* Prepared by Dr. M. E. Horn, University of Arkansas Agri. Exp. Sta.

Check List of Questions for the Field Identification of Fragipans

	Definite Yes	Indefinite Yes	Definite No
1. Is the horizon mottled (a) predominately shades of gray? or with (b) grays, yellowish-brown, and reds?			
2. Is a polygonal color pattern observable?			
3. Does soil exhibit a **bisequal** profile?, i.e., does it have an A'_2, and double clay bulge?	____	____	____
4. Is consistence **firm** or greater when moist?	____	____	____
5. Does it display brittleness (non-plastic deformation) when <u>moist</u> or dry?	____	____	____
6. Is it compact? i.e., on the basis of lack of many voids, closeness of particles, does it appear to have a significantly greater bulk density than horizons above or below?	____	____	____
7. If voids are visibly present are they largely of the vesicular (discontinuous) type?	____	____	____
8. Are oriented clays (clay films on void walls and in the **matric** associated with voids or "former" voids) readily observed?		____	____
9. Is the texture (a) sil, vfsl, l, **lt.sicl,** or lt.cl?	____		____
(b) fal, **hv.sicl,** or **hv.cl**?			____
10. Is the structure (a) massive, angular **blocky,** or prismatic?	____	____	____
(b) subangular blocky:	____	____	____

	Definite Yes	Indefinite Yea	Definite No
11. At what depth below surface does the upper boundary of the questioned fragipan horizon occur?			
(a) between 12 and 28 inches	___		
(b) between 28 and 36 inches	___		
(c) below 36 inches	___		
12. Is a perched water table readily apparent?	___	___	___
13. Are any of the following features applicable? Roots confined to upper profile, roots follow gray streaks only, evidence of windthrowing.	___	___	___
14. What is the slope gradient			
(a) 0% to 3%	___		
(b) 3% to 8%	___		
(c) 8% to 12%	___		

Interpretation of Checklist Results and Drawing Conclusions to the Crucial Questions

A. Is the horizon a fragipan, either minimal, medial, or maximal?

Affirmative if a definite yes is given to all of these questions: 1*, 4, 5, and 8. These seem to be the key properties of fregipans.

*The a or b answers to question 1 have no bearing on recognition of the fragipan but are related to the drainage class.

B. Is the fragipan of strong (maximal) expression?

Affirmative if a definite yes is given to questions 1, 2. 4. 5, 6, 7, 8, 9a, 10a, 11a, 12*, 13*, 14a or 14b.

*In many cases answers to questions 12 and 13 may not be obtainable depending on season, and vegetative cover. If they are answered a definite yes would be required in order to have a maximal fragipen.

Also note that a "yes" to question 3 is not considered a requirement of a fregipan of maximal expression. A bisequal condition (definite or indefinite) is generally associated with maximal fragipans in poorly and certain somewhat-poorly drained soils but is not associated with maximal pans in moderately well drained fregipan soils.

C. Is the fragipan of moderate (medial) expression?

Affirmative if a definite yes is given to questions 1, 4, 5, 6, 8, 9a or 9b, 10a or 10b*, 11a or 11b, and 14a, 14b, or 14c**; and an indefinite yes to questions 2, 3***, 7, and 12 and 13, if answered.

*There is some question as to whether one should permit subangular blocky structure in medial fragipans or not. This kind of structure is usually associated with good permeability; it may be that in some soils, individual peds are "fragipan-like" in themselves, perhaps representing a degraded fragipan zone (or the encroachment of the fragipsn into the overlying B-horizon?). Nevertheless, if the entire layer, or a substantial part of it, does not show the slow permeability and other overall physical features normally associated with a fragipan horizon, it probably should not be included with the fregipan in designating horizons. If isolated fragipan material does exist it is unlikely that it could be accurately described within itself as subangular blocky.

**Fragipans in soils on slopes of 8 to 12% are generally weak. If it is generally true that moderate pans do not occur on these slopes, then a yes to 14c should be omitted.

***Comments regarding bisequal profiles made under (B) above also apply here, except that if bisequal conditions do exist they are apt to be less evident, and thus, an indefinite yes answer is most appropriate.

D. Is the fragipan of weak (minimal) expression?

Affirmative if the horizon qualifies as a fragipan by a definite yes to questions 1, 4, 5, and 8 (See (A) above) and does not qualify as strong or moderate as defined in (B) and (C) above.

An indefinite yes would be given to questions 2 and 7.

Minimal pans are more likely to be formed in fsl, hv.sicl, or hv.cl., if the latter contain high proportions of expanding clays it is unlikely that a fragipan would form at all. With lower clay contents, as in sil, vfsl, 1, lt.sicl, or lt.cl, mineralogy does not seem to make appreciable difference in determining whether fragipan formation takes place or not. Apparently, at the lower clay contents there is either insufficient disruption by swelling and shrinking, or internal drainage is such that moisture contents are high and the expanding clays are in a static swelled condition, a factor that may actually play a vital role in fragipan formation in poorly drained soils.

Minimal pans are also more apt to be deep lying pans whose upper boundaries are below 28", and, more likely, below 36". The fragipans of soils on steeper slopes (8-12%) are also most likely to be minimal and usually begin at greater depth.

NATIONAL COOPERATIVE SOIL SURVEY

Southern Regional Conference Proceedings

Fort Worth, Texas
December 13-I 7, 1965

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OPTIONAL FORM NO. 10
MAY 1962 EDITION
GSA FPMR (41 CFR) 101-11.6

A. J. Baur
Upper Darby, Pa.

UNITED STATES GOVERNMENT

Memorandum

15 APR 1966

TO : State Conservationists, and Director, Caribbean Area, South Region, SCS

DATE: April 13, 1966

FROM : Lindo J. Bartelli, Principal Soil Correlator, SRTSC, SCS, Fort Worth, Texas

SUBJECT: SOILS - Meetings - Committee Report of State Soil Scientists Workshop Fort Worth, Texas - December 13-17

Enclosed is a copy of the proceedings of the Regional Workshop of the State Soil Scientists held in Fort Worth last December 13-17. Included are the various recommendations made by the study committee on the classification and interpretation of the soils common to the Southern States. Many of these recommendations have been adopted, some have been rejected, and others are under study. Some followup work may be required on some of the committee activities. This will be done under separate memoranda.

Lindo J Bartelli

Enclosure:
Committee Report

cc:
C.E. Kellogg
Roy W. Simonson
A. J. Baur
A. R. Aandahl
W.M. Johnson
R. B. Daniels

REGIONAL SOIL SCIENTIST WORKSHOP
Worth Hotel, Fort Worth, Texas
December 13-17, 1965

Monday A.M., December 13 - Chairman: E. A. Perry

9:00-9:15 a.m.. Objectives of workshop ....H. B. Martin

9:15-10:15 a.m. Plinthite - formation and characteristics .... L. T. Alexander

10:15-10:30 a.m. Break

10:30-11:30 a.m. Continuation of plinthic discussion ... L. T. Alexander

Monday P.M., December 13

1:00-5:00 p.m. Committee workshop

Committee I - Classification of Sandy Soils - Chairman: J. A. DeMent

O. C. Lewis	Forrest Steele
H. J. Byrd	Joe Nichols
L. Ii. Rivera	E. C. Sease
H. C. Dean	L. H. Burgess
C. M. Ellerbe	J. R. Coover

Committee II - Classification of Soils with Plinthic Horizon - Chairman: R. C. Carter

E. A. Perry	J. B. Watts
A. L. Newman	R. D. Well6
F. T. Ritchie	H. C. Dean
K. K. Young	

Committee III - Classification of Alents and Alentic Subgroups - Chairman: E. H. Templin

H. T. Otsuki	G. S. McKee
D. F. Slusher	J. A. Elder
R. R. Covell	O. R. Carter
J. R. Moore	W. R. Elder
C. B. Breinig	

Tuesday A.M., December 14 - Chairman: F. T. Ritchie

8:15-9:00 a.m.	Report of Committee I
9:00-9:45 a.m.	Report of Committee II
9:45-10:00 a.m.	Break
10:00-11:30 a.m.	Report of Committee III
11:30-12:00 N	What the laboratory can do for you ... L. T. Alexander

Tuesday P.M., December 14 - Chairman: Hartzell C. Dean

1:15-3:00 p.m.	Modifications in the soil classification system .... L. J. Rartelli
3:00-3:15 p.m.	Break
3:15-4:15 p.m.	Interpretation guide of soils for engineering .... Lester Lawhon
4:15-5:00 p.m.	Review of soil survey manuscripts . . A. R. Hidlebaugh

Wednesday A.M., December 15 - Chairman: R. R. Covell

8:30-8:45 a.m.	Land use capabilities based on soil family phases . . . . W. H. Bender
8:45-10:00 a.m.	Guide for determining basic capabilities . . O. C. Levis
10:00-10:15 a.m.	Break
10:15-11:30 a.m.	Guide for determining the capability class of sloping phases of families ..... J. R. Coover
11:30-12:00 N	Procedure for testing capability classification , ... W. H. Bender

Wednesday P.M., December 15 - Chairman: Forrest Steele

1:15-2:15 p.m.	Review of series descriptions . . . . A. R. Hidlebaugh
2:15-2:45 p.m.	Nomenclature of mapping units ..... L. J. Bartelli
2:45-3:00 p.m.	Break
3:00-4:45 p.m.	Guides for the application of the soil classification system .... L. J. Rartelli

Thursday A.M., December 16 - Chairman: C. M. Ellerbe

8:15-9:00 a.m. Ordinating woodland suitability groups . . . W. Ii. Bender

9:00-10:00 a.m. Field reviews - testing the soil mapping units .... L. J. Bartelli

10:00-10:15 a.m. Break

10:15-12:00 N Progress report on soil-geomorphology study, Wilson County, North Carolina . . R. B. Daniels

Thursday P.M., December 16

1:15-5:00 p.m. Workshop to discuss placement of problem series by MLRA's

Committee A - MLRA-136 - Chairman: Forrest Steele

Committee B - MLRA's 133, 150, 153, 154, and 155 - Chairman: E. A. Perry

Committee C - MLRA's 11.6, 122, 123, and 128 - Chairman: J. A. Elder

Committee D - MLRA's 77, 78, 79, and 80 - Chairman: H. T. Otsuki

Committee E - MLRA's 84, 85, 86, 87, and 135 - Chairman: Gordon McKee

Committee F - MLRA's 117, 118, and 125 - Chainnan: 0. R. Carter

Friday A.M., December 17 - Chairman: C. B. Breinig

8:15-10:00 a.m. Report of Committees A, B, C, D, and E

10:00-10:15 a.m. Break

10:15-10:30 a.m. Status of MLRA interpretations . . . . W. H. Bender

10:30-11:00 a.m. Summary of workshop .... L. J. Bartelli

10-12-65

Report of the Committee on Classification
of Sandy Soils (Committee I)

The discussion of this committee and its recommendations to the workshop are concerned with the classification of soils in (1) Psamments, (2) Arenic subgroups of Ultisols, and (3) Arenic subgroups of Alfisols. Recommendations are given for definitions of various subgroups. Series are listed as examples.

PSAMMENTS

The committee recommends:

1. The following criteria, to be used at the series level:

   (1) For uncoated families - (a) soils having less than 4% fines (silt plus clay) or (b) soils having 4-10% fine6 and 67% or more separates coarser than fine sand.

   (2) For coated families - (a) soils having 4-10% fines and less than 67% separates coarser than fine sand or (b) soils having 10-25% fines.

2. That, due to moisture limitations inherent in uncoated families under both irrigation and natural rainfall, uncoated families be included in all Psamments.

3. That Kershaw and Lakeland series be separated on the basis of Kershaw soils being defined as uncoated, Lakeland soils as coated.

1.X1 Aquipsamments

No changes are recommended. Discussion following presentation of the committee report, however, points out a need for better distinction between Aquipsamments and Psamments as well, as between Typic and Aeric Aquipsamments (see discussion following this report).

1.X2 Quartzipsamments

No changes are recommended.

1.X5 Torripsamments - In the South Region, these occur only in west Texas.

The following subgroups are recommended:

U S DEPARTMENT OF AGRICULTURE, SOIL CONSERVATION SERVICE, FORT WORTH, TEXAS
USDA SCS FORT WORTH TEX 1966

Typic Torripsamments. Torripsamments -

a. having slopes of more than 25 percent, or with organic matter content that decrease6 regularly with depth.

Fluvic Torripsamments - Like the Typic except for a.

1.X6 Udipsamments

The committee recommends the following subgroups:

Typic Udipsamments. Udipsamments -

a. With no mottles having chromas of 2 or less to a depth of 1 meter (40 inches).

b. Having slopes of more than 25 percent or with organic matter that decreases regularly with depth.

c. With no lithic contact within 50 cm. (20 inches) of the surface.

Aquic Udipsamments. Like the Typic except for a.

Fluvic Udipsamments. Like the Typic except for b.

Lithic Udipsamments. Like the Typic except for c.

1.X7 Ustipsamments

Typic Ustipsamments. Ustipsamments -

a. That are usually dry in some pert of the solum for 135-180 days (cumulative) in most years.

b. Having slopes of more than 25 percent or with organic matter that decreases regularly with depth.

c. With no lithic contact within 50 cm. (20 inches) of the surface.

Udic Ustipsamments. Like the Typic except for a and are usually dry in some part of the solum for 90-135 days (cumulative) in most years.

Fluvic Ustipsamments. Like the Typic except for b.

Udifluvic Ustipsamments. Like the Typic except for a and b, and are usually dry in some part of the solum for 90-135 days (cumulative) in most years.

Lithic Ustipsamments. Like the Typic except for c.

Attachment No. 1 shows recommended placement of relevant soils into the above subgroups.

ARENIC ULTISOLB

1. The committee considered a proposed Great Group of Paleudults, defined as:

> Other Udults with (1) epipedons with textures coarser than loamy very fine sands that are thicker than 50 cm. (20 inches); and (2) argillic horizons that are thicker than 1 meter (40 inches) and extend to 1.5 meters (60 inches) or more below the soil surface and have textures finer than loamy fine sands.

The following objections were registered to this proposal:

(1) The proposal infers that, in Ultisols, only those soils having thick, coarse-textured epipedons are associated with old landscapes.

(2) By its very name, the term "Ultisol" infers old soils, thus the "normal" soils of this order should occur on old surfaces. The definition of Normudults should include the old soils.

(3) Thickness of the argillic horizon is considered significant at the Great Group level, thus Normudults should include those soils having argillic horizons with or without thick, coarse-textured epipedons and another Great Group should include soils having thin argillic horizons.

2. In lieu of the above, the committee recommends as follows:

(1) Redefine Normudults to read:

> Other Udults with an argillic horizon that extends to depth greater than 1.5 meters (60 inches) below the soil surface and with an epipedon or an argillic horizon that has moist color values of 4 or more or dry values of 5 or more in some part.

(2) Define Typic Normudults as follows:

As defined in the June 1964 supplement except that item g should read "... if coarser textured than loamy very fine sand."

(3) Redefine Arenic Normudults as follows:

"Like the Typic except for g and having sandy epipedons 50 to 100 cm. (20-40 inches) thick."

(4) The following subgroups are proposed:

Aquic Arenic Normudults. Like the Typic except for a and g and having sandy epipedons 50 to 100 cm. (20-40 inches) thick that are mottled in some part.

Grossarenic Normudults. Like the Typic except for g and having sandy epipedons more than 100 cm. (40 inches) thick.

Aquic Grossarenic Normudults. Like the Typic except for a and g and having sandy epipedons more than 100 cm. (40 inches) thick that are mottled in some part.

(Attachment No. 2 to this report shows placement of soils in Arenic Normudults. Plinthic subgroups are shown on the chart, but definitions are deferred to Committee II.)

(5) Establish the following Great Group:

8.26 Juviudults - Other Udults
This Great Group would include those Ultisols having argillic horizons extending to depths less than 60 inches.

(6) The committee did not consider a proposal for Paleaquults, although it was suggested that principals applying to Normudults and Juviudults would be applicable to Paleaquults.

ARENIC ALFISOLS

The committee recommends acceptance of "Pale" great groups in the order Alfisols. Definitions are deferred to MLRA Committee D, although

Attachment No. 3 to this report shows a classification proposed by this committee.

Committee members:

L. H. Burgess	O. C. Lewis
H. J. Byrd	J. D. Nichols
J. R. Coover (Secretary)	E. C. Sease
Horace C. Dean	F. Steele
C. M. Ellerbee	L. H. Rivera
C. L. Hunt	J. A. DeMent (Chairman)

Visitors:

L. J. Bartelli (part time)
Curtis Godfrey
Morris Schaeffer

Discussion:

Bartelli : One area not considered is that of distinguishing between Typic and Aeric Aquipsamments and between Aquipsamments and Quartzipsamments on the basis of present definitions. The color criteria listed do not adequately differentiate.

DeMent: It would seem that depth and duration of water table needs more emphasis.

Templin: In Psamments, high chroma mottling is an indication of wetness and should be used in the definition.

Byrd: Not always. Some very wet sands have no mottling or other colors indicative of wetness to distinguish them from better drained sands. Water tables, if we could define, are better criteria.

Templin: Another name would be preferable to the proposed "Juviudults." One that indicates thin argillic horizons for these soils, versus thick argillic horizons in the proposed redefinition of Normudults.

Attachment No. 1
Sandy Soils Committee
South Region

PROPOSED CLASSIFICATION FOR PSAMMENTS 1/

Family and composition of control section 2/	Aquipsamments: Typic	Aquipsamments: Aquic	Quartzipsamments: Typic	Quartzipsamments: Aquic	Quartzipsamments: Spodic	Quartzipsamments: Ultic	Torripsamments: Typic 3/	Torripsamments: Fluvic 2/	Udipsamments: Typic 2/	Udipsamments: Aquic 2/	Udipsamments: [illegible] 2/	Udipsamments: Lithic 2/	Ustipsamments: Typic 2/	Ustipsamments: Udic 2/	Ustipsamments: Fluvic 2/	Ustipsamments: [illegible] 2/	Ustipsamments: Lithic 2/
1. Siliceous, [illegible], uncoated ([illegible])			* [illegible] ([illegible]); St. Lucie (?)	* [illegible] ([illegible])	[illegible] ([illegible])	Kershaw											
2. Siliceous, acid, thermic, coated; a. [illegible]	* [illegible] ([illegible])	[illegible]	* [illegible] ([illegible])	* [illegible] ([illegible])		Lakeland											
b. [illegible]						* Alaga ([illegible])						? ([illegible])					
c. [illegible]				[illegible]													
3. Like line 1, but nonacid	[illegible]																
4. a. Like line 2a, but nonacid		[illegible] ([illegible])	* [illegible] ([illegible])	[illegible]			* [illegible] ([illegible])	[illegible] ([illegible])		Mustang	[illegible]			[illegible] [illegible]	[illegible]	[illegible]	
b. Like line 2b but nonacid								[illegible] ([illegible])	[illegible]				[illegible]			[illegible]	
5. Carbonatic, thermic									Palm Beach								

1/ [illegible]
2/ [illegible]
3/ [illegible]
4/ [illegible] (Candler, [illegible], Arredondo, [illegible] [illegible] in [illegible] state)
[illegible]

Proposed Classification for
Normudults Having Arenic Epipedons

Attachment No. 2
Sandy Soils Committee
South Region

Family	Udults							
	Normudults							
	Arenic	Aquic Arenic 1/	Arenic Plinthic 1/ 2/	Arenic Aquic Plinthic 1/ 2/	Arenic Duraplinthic 1/ 2/	Grossarenic 1/	Aquic Grossarenic 1/	Psammentic
Fine, Kaolinitic, Thermic	* Wicksburg ([illegible])							
Fine, Mixed, Thermic	* Dixon ([illegible])							
Loamy, Siliceous, Thermic	* Wagram ([illegible]) * Lucy ([illegible]) * Blanton ([illegible])	* Ocilla ([illegible])	* Fuquay ([illegible]) * Stilson ([illegible])	* Leefield ([illegible])	* Conrad ([illegible])	* Troup ([illegible])	* Albany ([illegible])	
Loamy, Phosphatic Thermic	* Hague ([illegible])					Arredondo	Kanapaha	
Sandy, Siliceous, Thermic								Eustis

1/ Proposed subgroups.
2/ Soils having plinthite are defined by Committee II.
* - tentative series

10

Proposed Classification for Alfisols Having Arenic Epipedons

Attachment No. 3
Sandy Soils Committee
South Region

Family	Ustalfs								
	Paleustalfs								~~Haplustalfs~~
	Arenic 1/	Aquic Arenic 1/	Aquultic Arenic 1/	Arenic Udultic 1/	Grossarenic 1/	Aquultic Grossarenic 1/	~~[illegible]~~ Mollic Arenic 1/	Udultic Grossarenic 1/	~~Arenic~~
Loamy siliceous thermic	Brownfield Nueces Hobscot	Nimrod		Dougherty Stidham	*Sarita ~~(Tex.)~~	*Patilo ~~(Tex.)~~	*Comitas ~~(Tex.)~~	Kenney	~~[illegible]~~
Fine, siliceous, thermic	Lemina		*Demina ~~(Tex.)~~	*Keatchie ~~(Tex.)~~					

1/ 1/ – Proposed Subgroups

* * – Tentative Series

		Plintharenic Ochraquults	Plinthaquic Arenic Normudults	Plinthaqu Grossare Normudult
7.	Loamy, siliceous thermic > 4% fines in the A horizon	*Alapaha	*Leefield Series A	Series A

80

CLASSIFICATION OF SERIES SELECTED FOR GULF COAST FLATW

Lithology of Control Section	Typic Normudults	Paraquic Normudults	1/Aquic Arenic Humic Normudults	Typic Glossaqualfs	Typic Ochraquults	Typic Umbraquults	Plin Non dul
1. Fine loamy, siliceous thermic							Pro No.
1a.) >20 percent silt) C.E.C. 30-50 m.e./100 grs. clay							Pro No. Irv
1b. < 20 percent silt							~~Tift~~ *Gr *Do Carr ~~Tift~~ *Cow
1c. *Silt not diagnostic*							
2. Coarse loamy, siliceous, thermic >20 percent silt C.E.C. 30-50 m.e./100 grs. clay	Profile No. 4	Profile No. 11					
3. Loamy, siliceous >15 percent silt			Profile No. 7				
4. Clayey, mixed, thermic							
4a.) >35 percent clay) >30 percent silt					Profile No. 9 (Leaf)		
4b. < ~~20~~ *30* percent silt Mineralogy - Kaolinitic (?) *4C - Silt not diagnostic* →							*Var Suns
5. Fine silty, mixed, thermic high Sand but <15 percent coarser than vfs C.E.C. >30 m.e./100 grs. clay				Profile No. 13 (Almo)		Profile No. 10 (Hyde)	
6. Coarse silty, mixed, thermic high sand but <15 percent coarser than vfs C.E.C. >30 m.e./100 grs. clay							

*Tentative Series

1/ Provisional Subgroup

U. S. D. A. SOIL CONSERVATION SERVICE, FORT WORTH, TEXAS

COMMITTEE II - Classification of Soils Having Horizons Containing Plinthite

The Committee reviewed the draft report of Classification of Soils in the Gulf Coast Flatwoods of the Southern States, June 1965, and recommended that this report be released with the following suggested modifications:

1. Definitions of subgroups.

2. Changes in Classification Chart 2a, notes to be attached to chart.

   Under Plintharenic Normudults we recommend series not be separated that have chroma 2 mottles in the 10- to 20-inch depth of the Bt from those that are free of chroma 2 mottles in the upper 20 inches of the Bt.

3. Series criteria.

   a. Soils 20 inches or less to horizons having 10 to 50 percent nonindurated plinthite.

   b. Soils 20 to 65 inches to horizons having 10 to 50 percent nonindurated plinthite.

   c. Soils 20 to 65 inches to horizons having 10 to 50 percent nonindurated plinthite, use percent silt as series criterion.

coarse or fine loamy	$<$ 20% or	$>$ 20% silt
clayey	$<$ 30% or	$>$ 30% silt

   d. Soils 20 inches or less to horizons having 10 to 50 percent nonindurated plinthite, percent silt is not a criterion in coarse loamy, fine loamy, or clayey families.

   e. Soils with arenic epipedons ($>$4% fines).
   Soils with arenic epipedons ($<$4% fines).

4. The Committee commends Dr. R. B. Daniels for his guidelines on <u>Criteria for Plinthite</u>. However, we would suggest that the title be altered to something such es <u>Criteria for Nonindurated Plinthite</u>, or to expend the paper to cover indurated plinthite, expecially nodules.

5. The Committee recommended that the grid system, as recommended by Dr. Daniels, be used in the field for determining the percentages of plinthite.

6. The Committee recommended that all soils having horizons containing 10 to 50 percent nonindurated plinthite be included in this report.

R. C. Carter

U. S. DEPARTMENT OF AGRICULTURE, SOIL CONSERVATION SERVICE, FORT WORTH, TEXAS

COMMITTEE II - Classification of Soils with Plinthic Horizon

R. C. Carter, Chairman
E. A. Perry
A. L. Newman
F. T. Ritchie
K. K. Young
J. B. Watts
R. D. Wells
H. C. Dean

Report - Comm. III 9/14/83
Alentic Soils

LWB

* Anna Miss. Alentic Aquic Eutrochrepts Aquic Udalf
Coarse silty, mixed, thermic

Arkabutla Miss. Aeric, Alentic Haplaquepts
fine silty, mixed, acid, thermic

Atkins Ark. Alentic Haplaquepts
Poolstemp. fine loamy, siliceous, acid, thermic

Bibb Miss. Alentic Haplaquepts
Coarse loamy, siliceous, acid, thermic

Bowdre Miss. Alentic Hapluquolls
fine over loamy, mixed, thermic

*Bruin La. Alentic Aquic Eutrochrepts
Coarse silty, mixed, thermic

Bruno Ky. to be suspended or released
for mesic series -

Buncombe N. Car. Alentic Quartzipsamments
sandy, siliceous, thermic

Catalpa Ala. Alentic Aquic Hapludolls
fine, mixed, thermic

Cascilla Miss. Alentic Dystrochrepts
fine silty, mixed, thermic

Chastain Miss. Alentic Haplaquepts
fine, mixed, acid, thermic

Chewacla N. Car. Alentic Aquic Dystrochrepts
fine loamy, mixed, thermic

Collins Miss. Alentic aquic Dystrochrepts
Coarse silty, mixed, thermic

*Combs Ark. Alentic Dystrochrepts
loamy skeletal, siliceous, thermic

Commerce La. Aeric Alentic Haplaquepts
fine silty, mixed, nonacid,
thermic

Congaree S.C. Aeric Dystrochrepts
fine loamy, siliceous, thermic

*Convent La. Aeric Aquentic Haplaquepts
Coarse silty, mixed, nonacid, thermic

Crevasse Miss. Aquentic Udipsamments
sandy, siliceous, thermic

*Dunbar Ga. Typic Udalfs
fine loamy, siliceous, acid, thermic

Egam Tenn. Aquentic Aquic Cumulic Hapludolls
fine, mixed, thermic

Elkins W. Va. Aquentic Humaquepts
fine silty, mixed, acid, mesic

Ennis Tenn. Aquentic Dystrochrepts
fine loamy, siliceous, thermic

Falaya Miss. Aeric Alentic Fluvaquents
Coarse silty, mixed, acid, therm

*Fenwick Miss. Typic Udifluvents
Coarse silty, mixed, nonacid, therm

? *French N.C. Alentic Aquic Dystrochrepts
fine loamy, mixed, thermic

Godwin Tenn. Alentic Aquic Cumulic Hapludolls
fine, mixed, thermic

x Hamblen Tenn. Alentic Aquic Dystrochrepts
(dropped - proposed for reinstatement) fine loamy, siliceous, acid, th

Houlka Miss. Aeric Alentic Fluvaquents
fine, montmorillonitic, therm

Huntington W. Va. Alentic Cumulic Hapludolls
fine silty, mixed, mesic

Jackson	Miss.	Alentic Aquic [illegible] Coarse loamy, siliceous, thermic
Johnston — (Possible Cumulic)	N.C.	Alentic Humaquepts — Coarse loamy, siliceous, acid, thermic
*Rainey	Ala.	Typic Udults. Coarse loamy, siliceous, acid, thermic
Lanton	Tenn.	Alentic Cumulic Haplaquolls fine silty, mixed, thermic
Lee	Tenn.	Alentic Normaquepts fine loamy, siliceous, acid, thermic
Leeper	Miss.	Aeric Alentic Normaquepts fine, Montmorillonitic, nonacid, thermic
Lindside	Ky.	Alentic Aquic Dystrochrepts fine silty, mixed, mesic

Lobelville	Tenn.	Alentic Aquic Dystrochrepts fine loamy, siliceous, thermic
Lynnville	Tenn.	Alentic Aquic Cumulic Hapludolls fine loamy, mixed, thermic
Mantachie	Miss.	Aeric Alentic Haplaquepts Coarse loamy, siliceous, acid, thermic
Marietta	Miss.	Alentic Aquic Eutrochrepts fine loamy, mixed, thermic
Melvin & Mevis	Ky	Alentic Haplaquepts fine loamy, mixed, nonacid, thermic
Mhoon	La.	Alentic Haplaquepts fine silty, mixed, nonacid, thermic
Newark	Ky.	Aeric Alentic Haplaquepts fine silty, mixed, nonacid, thermic
Newellton	La.	Aeric Alentic Haplaquepts fine over loamy, mixed, nonacid, thermic

[illegible] Ala. Alentic [illegible]
Coarse loamy, siliceous, thermic,

[illegible] Ala. do do do do

[illegible] Ark. Alentic Aquic [illegible]
fine silty, mixed, thermic

Philo Ky Alentic Aquic [illegible]
Coarse loamy, siliceous, mesic

Pope Ark. Alentic Dystrochrepts
Coarse loamy siliceous, thermic

Robinsonville Miss. Alentic Eutrochrepts
Coarse loamy, mixed, thermic

[illegible] Tenn. Alentic Haplaquolls
fine, mixed, thermic

Rosebloom Miss. Alentic [illegible]
fine silty, mixed, acid, thermic

× [illegible]	Miss.	Aeric Fluventic Haplaquepts Coarse-silty, mixed, nonacid, thermic
[illegible]	Tenn.	Fluventic Cumulic Hapludolls fine-loamy, mixed, thermic
Stendal	Ind.	Aeric Fluventic Haplaquepts Coarse-loamy, siliceous, nonacid, mesic
Tunica	Miss.	Fluventic Haplaquepts fine over loamy, mixed, nonacid, thermic
Tuscumbia	Miss.	Fluventic Haplaquepts fine, montmorillonitic, nonacid, thermic
Una	Miss.	Fluventic Haplaquepts fine, montmorillonitic, acid, thermic
Urbo	Miss.	Aeric Fluventic Haplaquepts fine, mixed, acid, thermic
Verona	Miss.	Aeric Fluventic Haplaquepts fine-silty, mixed, nonacid, thermic

Vicksburg	Miss.	Typic Udifluvents Coarse-silty, mixed, acid, thermic
Waco	Tenn.	Alentic Cumulic Hapludolls fine loamy, mixed, thermic
Waverly	Miss.	Alentic Normaquepts Coarse silty, mixed, acid, thermic
Weaver	Tenn.	Aeric Alentic Normaquepts fine loamy, mixed, calcareous, thermic
Wehadkee	N.C.	Alentic Normaquepts fine loamy, siliceous, acid, thermic
Whitesburg	Tenn.	Alentic Aquic Eutrochrepts fine loamy, mixed, thermic

Fort Worth, Texas December 14, 1965

WHAT THE LABORATORY CAN DO FOR YOU

by

L. T. Alexander

This morning I have been asked to tell you what the laboratory can do for you. In view of our shrinking laboratory staff and the increased need for laboratory work as a result of the adoption of the new classification system, I am tempted to ask what you can do for the laboratory.

At the present time, we have 28 professional employees in our three laboratories. A few years ago we had considerably more than this. On the basis of the 61 million acres of soil mapped in 1964, this amounts to somewhat less than one half years of professional laboratory time for each million acres of soil mapped. You can see that the butter is spread rather thin. Now I am not citing these figures in order to elicit your sympathy. Rather, I want to impress upon you the necessity for careful planning and study prior to any request for laboratory time.

Laboratory studies should not be undertaken for the purpose of solving problems that can be cleared up by field studies alone. Neither should you request complete characterization of soils when a simple test may give the answer you need. But most important of all, you should not ask for laboratory help on a problem unless you have in mind some specific questions to answer or some hypotheses to test that require laboratory data for solution. We cannot afford to be shooting at ducks in the dark. We must put our time on work that will yield good returns on the average. I realize full well that at times we will fail to answer a question even when we have given careful thought. But we must come out well as a whole.

Now you may inquire as to how we expect you to fit soils into the new classification system without adequate laboratory data. And this is a good question indeed. But at the present time we do not have the resources to characterize one soil out of five that are being mapped. At present, I see no prospects that this situation will improve in the near future. Hence, the necessity for getting the most out of the work that we can do.

There are some things that you can do for yourselves. There is no need for the laboratories to determine your textures. You can do a much better job than we. Your evaluation of the texture of a mapping unit or of a given delineation on the map should be much better than we could possibly give you from one or a few samples. For example, if you walk over a given field and determine texture by feel at a number of locations, you not only come out with the knowledge of the average texture for the field but at the same time you evaluate the range in texture. The two bits of knowledge together give far more useful information than the data obtained from a single sample or for that matter, more useful than a precise determination of particle distribution on a composite sample taken from the field. Only by analyzing a number of samples from this field could the laboratory give any information on the range in texture.

Perhaps you will say that this particular field has a texture near the border of a split in our triangular representation of textures in relation to particle size. But I say to you that there is no more necessity for precision here than if the texture was medium for a given class. A little thought will convince you, I think, that if you texture the field and find that the soil ranges from a heavy silt loam to a light silty clay loam, you have characterized it just as precisely as if you had found that it was a medium silt loam for example. If the soil truly falls astride a division line on the triangle, then the texture may just as well be thrown in one category as the other. All man-made divisions in functions that are continuous are subject to this same problem of what to do when values fall astride dividing lines. If one hangs up on these kinds of things, he runs the risk of becoming a slave to the system, rather than the system being a help to the slave. There are no natural breaks in percentages of clay, of degree of base saturation, or for that matter in such things as soil temperatures. One will always be faced with arbitrary decisions. The extent to which one can rise above the frustrations of such borderline cases determines how useful the soil texture triangle, or for that matter the whole of the new classification system can be to you and to the Soil Survey as a whole.

When one deals with the separation of soils on the basis of arbitrary values such as percentages of clay a little above or a little below 27%, for example, he may not do himself any permanent harm if he whispers to himself the assurance that the separation that he has just made does not mean a thing in the world but was only an exercise in futility that he had to go through with in order to carry out his assigned task. In view of your assignments for the next few days, I may find myself persouna non gratis with your chairman.

If one knows that he will get data on only perhaps one fifth of his soils, he will or should select those to be characterized so that they are related in some systematic manner to soils not analyzed. It is poor strategy to have all of your analyses on closely related soils and to leave a large group of soils without data. From data on one well-chosen soil, one can reason information on a number of soils. Bear in mind that our present plans do not call for precise data on any of our soils. Only reliable information is required. Our efforts should be in areas where we have real gaps of knowledge rather than in trying to get precise information on the borderline cases.

Dr. Cady has stated that we now know enough about soil clay mineralogy to reason out the clay mineral composition of almost any soil in the United States for purposes of the classification.

This reasoning is done from a knowledge of the geological materials, the soil forming factors and the knowledge that we have already accumulated on many soils. Our clay mineralogy studies should be for the purpose of gaining a better understanding of processes, clay mineral syntheses, degradations and trends with degree of development rather than for the specific purpose of determining clay mineral percentages on specific soils. As a matter of fact, I might say that we cannot afford to analyze soils for the sole purpose of gaining information on that one soil. The soils must be so chosen that the data we get can be reasoned to other related soils.

Now the tough part of this is that it requires that considerable reasoning, the posing of questions, and the development of hypotheses prior to the selection of soils for sampling.

We now are to the stage in many states that we can gain much more by studying six profiles of soils composing some kind of a transect or sequence than we can by putting a similar amount of effort into three pairs of matched profiles from three mapping units. And here I should say that in transect studies all of the profiles studied need not, and perhaps frequently should not, constitute midpoints of mapping units. Some of them may well be transitional to other soils. The important thing is that we gain an <u>understanding</u> of the differences between the soils in the transect or sequence. This is the kind of knowledge that enables us to understand and assign values to those soils that we do not get data for.

One of the most common problems we face in getting soil samples is the selection of sites to sample. Frequently the fieldman wants to select a site that really fits the approved description for a given series. Now it may happen that he is working in a borderline area where in general the particular soil is not modal for the series as designated. Here again we must know why the laboratory work is being done. If the purpose is to characterize the series, then one should take the samples in another area where the soil is modal and this county is not the proper location. If the purpose is to characterize the soils as being mapped in that county the selected pedons should be modal for what is being mapped in that county or area and not modal for the series as described. Again if a local problem is being studied the soil should be typical of the problem. Thus we should never be faced with frustration because one cannot find the right sampling spot. Yet in getting matched profiles, we frequently find one that suits the selector fine but he never finds another one that quite fits. This should never be. If the soil to be studied is not easy to find then there is some mistake either in the mapping or the man is carrying one concept and mapping another.

A second problem that we frequently encounter is that the local people have not dug enough pits and really do not know what the lower horizons of the soil are like. This is particularly pertinent with soils that have horizontal patterns of structure and color that can be seen only in horizontal section. A typical case in point is the polygonal patterns found in soils such as Tifton and some of the Zuber that I have seen. No valid picture of the soil can be gotten without examining a horizontal plane surface at the pertinent depth. It cannot be gotten from any numbers of augering nor can it be seen in a road bank. Yet we sometimes find areas where the county or area is half finished and not a single pit of adequate size and depth has been dug and the soil described. In these cases the men simply do not know or understand the soils they are mapping. It is my feeling that the mapping is no better than their understanding of the soils being mapped.

If the men who are mapping are not allowed enough time to dig a hole to find out what the soil is like, then there is something wrong with the staff that has jurisdiction over them. You will recall the consequences when the Egyptians would not allow the Israelites to have straw for making their bricks. On the other hand, if the fieldmen are not interested in seeing what shows in a pit then there is something wrong with them.

My purpose in giving you this talk is not to discourage you from requesting laboratory assistance. Just the opposite. It is our wish that the men in the field will submit to us through you well thought out problems that give them trouble. By committing these problems to writing, they will have to organize and set down their thinking and this will be beneficial in itself.

have been raised on the basis of information that you have from other areas or other soils. It may be that there are similar problems that you have that can be profitably combined to make a single project aimed at answering questions in more than one area. Another possibility is that the questions raised can best be answered by field studies. If so, this should be done by allocating the time necessary to do the work.

Regardless of whether you need more field work or more field work supported by laboratory data, our job is to help you if you need us. We would appreciate the opportunity of working with your fieldmen on problems prior to the submission of a formal request for laboratory assistance. If we do not think that laboratory work is needed in order to answer the questions raised, we will say so and not consider that the time with you was not well spent. In any such study preliminary to submission of a request for laboratory assistance, I am sure that both we and the fieldmen would learn something useful. And we might be able to come up with an answer that would save a great deal of laboratory time and expense.

If, as a result of such joint field studies, we decide that a laboratory study is needed we will be in a better position to prepare a request and to undertake the study with more understanding and background information than if our first contact with the problem is the morning we start to work in the area taking samples.

If you think that you need more technical help, both in solving field problems alone and in those requiring laboratory support, your best strategy, it seems to me, is to confront us with a stack of well-reasoned written requests for such help. Certainly such requests would have to be considered by Drs. Simonson, Smith and by me. If we could not undertake to give the needed technical assistance because too many good requests were ahead of yours we would have to say so in writing. But at the present time, we have no such stack of requests on hand from the states that you represent.

Committee Report - Handling Proposed and New Soil Series Descriptions

The Committee considered statements made by Principal Soil Correlators from other regions on their procedure and recommended the following:

1. Tne procedure now in effect in SRTSC is satisfactory and is working. There appears to be no need for major changes or adjustments.

2. It is suggested six months after the new classification list of series is received, when a survey area comes up for correlation it be a requirement that all series in the area must have en updated series description before the correlation is completed. (Note by Hitchie - It is possible this requirement should be placed into effect to a limited degree at an earlier date.)

3. If the Principal Soil Correlator wants to use the card system in his office as presented by Mr. Johnson, that is his prerogative. We do not believe this should be made a requirement to fill this card out at the State level.

4. It does appear to be advisable to establish some guidelines on requirements before a new series can be submitted as tentative, possibly 2500 acres total; and there should be some requirements before a series is correlated within a State. Also guidelines in map units appear to be desirable.

5. Materials and/or instructions to be followed by Soil Scientists at State level and below should be authenticated and sent out as Advisory Notices in sufficient quantities for a copy for each Soil Scientist in each State and for each cooperator in the survey program.

F. T. Ritchie, Jr., Chairman
J. R. Coover
D. F. Slusher

U. S. DEPARTMENT OF AGRICULTURE, SOIL CONSERVATION SERVICE, FORT WORTH, TEXAS

A SYSTEMATIC PROCEDURE FOR DETERMINING LAND USE CAPABILITY BASED ON SOIL FAMILY PHASES

Introduction:

A Committee composed of W. H. Bander, J. R. Coover, and O. C. Lewis was appointed in mid-1965 to study possible procedures for relating land capability to the soil family or phase of the family, and to develop a technique for uniform application of the land capability classification system. Work sessions were held during the period September, 1965, to February, 1966, tc discuss the broad subject of capability coordination, and to determine a course of action.

Conclusions reached were:

1. Merits of the procedure justify continuing.

2. Family concepts are stable enough to use in developing this procedure.

3. Series composition of families will be adequate by January to use this procedure.

4. A family phase can be classified or placed in a capability class and • ubclaas on the basis of the key soil of the family. All other soils Of the *family,* similarly phased should fall in the same capability class and subclass. If a soil has a different classification, it may not be phased properly or it may be in the wrong family.

5. The present capability classification of soils as represented by

   (a) the 1961 agreements

   (b) MLRA Tables

will be in effect until new placements baaed on family phases become operational. This will probably be within the next 2-5 years. The new procedure will be kept separate until it is perfected.

6. Soils Memorandum-22 - Land Capability Classification will not be revised.

1. It is not planned to revise Soils Memorandum-30 dealing with subclass. We might try to polish this guide a little.

Some form of direction and coordination beyond that achieved up to this time is needed for uniform application of land capability classification principles. The wide variety of soil expression in the South Region encourages differences in decision on capability of soils from place tc place and especially from State to Stats. And yet, increasing use of land capability classification in regional and national programs requires a high degree of uniformity not yet attained.

A basic principle of the new soil classification system is that the family category will permit meaningful interpretation, and that there will be a direct tie-in with interpretive systems. Soil properties directly related to the growth of plants have been introduced at the family level. Texture, mineralogy, reaction, temperature, and other properties become significant. These were selected for their value in differentiating a relatively homogenous set of conditions with respect to soil-air, soil-water, soil-root, and soil-nutrient relationships.

Background:

It is assumed that the same unique set of soil properties that evolve down through the various categories Of the soil classification system tc the family establish a sound basis for interpretations. If the family is sufficiently refined and therefore homogenous, then it follows that the controlling criteria should result in uniform interpretations.

The series category strengthens the close relationship between soil classification and interpretation. Moving from the family category to the series and its differentia further narrows the range of soil properties, and permits study and evaluation of soils as separate "things". This transition from tba higher categories to soil series as individuals or groups of individuals is therefore complete.

Soils that have similar properties are assumed to have essentially the same capability. Thus, different series that are members of tbe same family phase should fall into tbe same land capability class.

At this point, it can be reasoned that the land capability system should be revised end perhaps simplified. This is evident from the fact that it preceded development of the comprehensive soil classification system. Careful study of land capability in light of today's needs, however, led to the committee's early decision to support the principles outlined in SoilsMemorandum SCS-22 and concentrate on procedures for applying the interpretation. A high degree of co-ordination Can be attained through methodology in application, within the normal flexibility of the system. The problem is primarily one of procedure in moving logically from a set of facts about the soil to a decision on capability.

criteria:

Determining land capability rust begin with a well-defined soil, correctly fitted into the soil classification system. This permits use of information from all categories in the system, in addition to that normally shown in the description. It is then possible to evaluate each significant soil characteristic, soil quality, or other soil related feature separately. The degree to which these tend to reduce capability for agricultural use is a reliable indication of the capability class.

Many properties are considered in soil classification, and therein lies the key to better interpretation procedures. By working with specific parts of the whole soil, a decision on land Capability classification can be reached by synthesis or steps instead of a single conclusive jump, and the basis for the decision can be documented for review by all concerned. It is necessary, however, to organize the various kinds Of soil properties and understand their relationships and how they can be evaluated under existing capability classification procedures. While there are some vague exceptions, a clear and useful distinction can be drawn among soil properties as follows:

1. Soil "Characteristics" tbst can be seen or measured. with limited interpretation, these include basic properties such as; particle size distribution or fractions, texture, reaction or pH, color, stoniness or rockiness, soil climate, percolation, compaction or bulk density, soluble salts, mineralogy, roil thickness or "depth", cation exchange Capacity, base saturation, structure, consistence, water table depth and duration, depth to rock, porosity, infiltration, permeability, and fines.

2. Soil "Qualities" thet are acquired through the interaction of soil characteristics under a prescribed set Of cordition.9. These can be illustrated by; tilth, fertility, available nutrient capacity, nutrient-supplying capacity, ercdibility, available water Capacity, productivity, root zone, workability, trafficability, wetness, and response.

3. Soil related features Or over-riding conditions that are soil-based but are not directly a part of the soil itself. These can be illustrated by; flooding, overflow, ponding, seeping, water table, soil loss, gullying, subsidence, salt intrusion, slumping, overwashing, climate, storm damage, windthrow, precipitation effectiveness, landscape, size and shape, and relief.

In principle, "suitability" of a soil for a particular use (for which the soil requirements can be determined) is based on a relatively few significant soil "qualities", and they in turn are based on a few basic soil "characteristics". Superimpose the influence of soil-related features and a semblance of usefulness begins to emerge.

Over-expression of one or a Combination o? the characteristics or qualities results in some measure Of "limitation" or "restrictions" in we. Influence Of soil related features can more appropriately be caned "hazards". Hence the degree of limitation, restriction, or hazard can be used as capability class criteria.

By following this line of reasoning, it is possible to predict behavior of a soil for certain uses, or easier yet to start with the specific use and determine the soil requirements. This applies especially to the so-called "non-agricultural" uses end to purely soil "suitability" decisions for specific crops.

"Suitability" alone is not "capability", despite tendency to equate the two. It is more logical to accept suitability as an intermediate step in the systematic progression from soil properties to land capability. The ability of a soil to support a specific use can be expressed in terms Of suitability, following consideration of its limitations, restrictions, or hazards. But to move into land capability it is necessary to drop emphasis on soils as such, or even their suitability for a certain use, and dwell on practical application.

"Land" in land capability involves people and economics and everyday problems of production, environment, and general social concerns. Soils provide the essential basis for land use, but they may not always represent the controlling element. In some cases their quality may only set a ceiling *for* agricultural potential or add special requirements for treatment or correction. Considerations other than the soil come to the forefront. The final step into "land capability" CM be taken by introducing the elements significant in practical application and only indirectly related to the soil. For example: common crops (general), level of management, management problems and treatment, conservation treatment, influence on production, productive capacity, practicability, feasibility, Input-output ratio, kinds of problems, continuing limitations, degree of limitations, soil deterioration, risks of soil damage, degree of hazards, restrictions in we, etc.

Some of these elements are built into the land capability system itself. Others are handled as background assumptions, i.e. it is assumed that the input-output ratio is favorable on all soils permitted in capability classes I through IV. Still others must be considered in defining the various degrees of influence on capability. For example, the whole problem of wetness can be broken into degrees of influence by relating it to "degree of limitations", "continuing limitations", "risks of damage", "degree of hazards", "restrictions in use", etc.

A moment's reflection indicates that there is a close tie-in between soil characteristics and land capability. While soil characteristics may be the building blocks for roil classification, it follows that soil quality is basic to land use and that additional elements of practical application are basic to land capability. It can be illustrated schematically as: Soil characteristics -- soil quality -- soil-related features -- soil suitability for specific use -- land capability. This has been accomplished by gradual introduction of definitions, conditions, soil-related features, or hazards, and an array of practical use provisions. Soils information fed into the capability system is typically one or two stages removed from the detailed observations and measurements used in soil classification. This permits simplification of detail - a significant first step in progression from "soil" facts to "land" capability.

<u>Procedure for Using Table 1</u>:

1. Select a key series in each family, and use it to establish the basic land capability classification Of the family. Other series in the same family should rate the same. Different phases of tbe series may have different capability, but differences in capability of similar phases of a family indicate a problem in either soil classification or capability classification that needs further study. Discrepancies may arise from inadequate information, stereotyped descriptions, problems la classification, etc. These should be noted.

2. Enter the soil name, family name, and the capability classification directly on a copy of Table I. Indicate with a bold check in the appropriate block the degree of severity of limitation, restriction, or hazard resulting from each soil property. Assume that the soil is in class I unless individual properties pull it toward class VIII.

3. Determine tbe capability of the dominant textural phase of the key series, and then the equivalent phase of any other series in the same family. This permits comparison Of soils falling together at the family, subgroup, and great group levels.

4. Test other phases of the key series, and then the equivalent phases of other series in the same family. (Do not involve slope at this time. That will be handled separately.) Determine whether or not tbe equivalent phases Of series, separated because of importance to use and management, actually fall conformably in the same capability class.

5. If the soil falls into a capability class other than I, refer to soils Memorandum SCS-30 and add the appropriate subclass designation to the basic capability class, upper right corner of the table.

6. Assume that plinthic layers are equivalent to fragipans in their limitation on thickness of soil available for roots.

7. Observe the following rules in the use of Table I:

a. Determine the degree to which each soil property limits capability. Then, when considered in combination, check the need for adjustment in some ratings because of pyramiding or compensating effect.. Has some property been penalized twice? Or does one property compensate for another? Make the following adjustments in ratings on individual properties, but do not adjust back to Class I:

Reduce the penalty on wetness and low available water capacity by one degree (class) if both properties are involved and penalized.

Reduce the penalty for low fines in root zone by one degree (class) ii offset by high organic matter content (a mollic or histic epipedon).

Reduce the penalty on low available water capacity by ma degree of severity ii the soil has free rater within 36 to 48 inches during most of the growing season.

b. After having made all adjustments in the penalty for individual properties, determine the land capability class for the soil by noting the heading for the column showing the moat severe penalty. Single or multiple soil properties may establish this low point in capability. Significant differences between soils in a class because of one property and other soils in the same class because of two or more properties can be distinguished later by land capability units. Enter the capability class decision at the top of tbs table.

c. Recognize the significance Of climatic advantage by a process approximately opposite that of placing soils in tbe "c" subclass and penalizing them for climatic limitations: Raise the capability established under (b) above by one class if the soil occurs south of the 69.6°F average annual air temperature isotherm.

d. Rate coarse textured soils in class VII (and not VI) if:

they have maximum degree of severity for trafficability and workability, available water capacity, and available nutrient capacity;

the choice of plants is limited to trees: and

they cannot be significantly improved for pasture.

e. On back of Table I show the phases tasted and decision on capability classification, along with the T, K, and R factors and other pertinent notes.

<u>Procedure for Using Table 2</u>:

8. "ee Table II to determine capability class of sloping phases as follows:

a. Determine T and K values of the soil from Table I of the interpretative tables for the MLRA.

b. On Table II read opposite the T value for tbe soil the limits of annual allowable soil loss for each capability class, and record tbe values.

c. Use appropriate Tables 2A-2E to determine average annual soil loss for each slope phase. Determine which of Tables 2A-2E to we from R factors shown on pages 6-7 of A&culture Handbook No. 282 <u>Rainfall-Erosion Loss from Cropland East of the Rocky Mountains.</u>

d. In the appropriate K column of Tables 2A-2E selected, bracket the soil loss values recorded from step 2 above. Read from percent gradient columns on left the range in elope that covers the allowable annual soil loss rates from step 2.

e. If the basic capability class is I, record as IIe the slope phase that corresponds to class II allowable soil losses from Table II. If the basic capability class is II, record as IIc, IIs, or IIw the slope phase that covers the allowable soil loss for class I in Table II. Record as IIe the slope phase that covers the allowable soil loss for class II, etc. If the basic class Is III, the IIIe would start at the lower slops range for class II and include the slope range for III, etc.

<u>Tentative plans for Testing Procedure</u>:

1. The committee "ill revise Table 1 and classify selected soils.

2. The committee will send tbe above examples to the states as guides for placement of the key soil in a family. Other soils in the family should be checked and the results reported.

3. Phases used will need to be significant and stand on their own merits.

4. Committee "ill review placements made by states.

5. This procedure will need to be coordinated with other regions. This my influence any schedule that might be proposed at this time.

State Soil Scientists Workshop
December 1965

Notes for discussion - Soil Scientists Workshop 12-16-65 - JRC

Guides for Determining Capability Class - Erosion Hazards

What slope phases of families are significant with respect to capability classification?

How should eroded soils be interpreted?

Let's discuss the second question first. We propose that eroded soils be interpreted using Table 1 only. If the effects of erosion are significant at the capability class level, this will be reflected in Table 1.

In tackling this problem of the significance of soil slope in capability classification we worked under several assumptions. These are:

1. Significant slope phases of arable soils (those under cultivation or likely to be cultivated) are the slope phases that encompass significant ranges in rainfall-erosion hazard.

2. Significant slope phases for capability classification for non-arable soils are primarily those that reflect major differences in limitations in use - for example, 30 or 35 percent slope as break between classes VI and VII based on limitation in use for pasture on steeper slopes.

3. Significant slope breaks are not the same for different kinds of soils. Nor are they the same for the same soils over widely different rainfall zones.

4. Hundreds of observations and years of experience are involved in the background for the slope classes and slope phases now in use in this region. We assumed this experience offered the best basis for establishing which slope classes are significant. Although slope classes used in the region vary widely, there is a certain pattern which seems apparent. A few states seemed to be outside the pattern, and we assumed the majority were correct.

5. In determining the significance of the pattern of slope classes, we assumed the universal soil-loss equation to be the most useful tool.

6. Capability classes I through IV are defined in terms of increasing hazards from rainfall-erosion. Through the years the upper limit of the A slope class has been the upper limit of slope of soils having no significant erosion hazard. The B slope class was used for the moderate hazard, C slope severe, etc. To establish erosion-loss values for these classes, we used the equation. The values are shown in Table 2.

We can test the values shown in Table 2 as follows:

$$A = RKLSCP$$

We assume that the conservation treatment for soils with T value of 5 should hold average soil losses to this value.

10 = RKLS when C = 1 and P = 1 for average loss for Class I			
10	x	(C = 0.5)(P=1)	= 5 tons
35	x	(C = 0.3)(P=0.5)	= 5 tons
75	x	(C=0.13)(P=0.5)	= 5 tons
150	x	(C=0.07)(P=0.5)	= 5 tons
200	x	(C=.025)	= 5 tons

C of 0.5 is about equivalent to continuous corn, fertilized, residues returned - Class 1 treatment.

C of 0.3 and P=0.5 is terraced or stripcropping, contouring with some close spaced crops in rotation - Class II. etc.

Let us examine Table 2. You will note that the limitations of soils that determine T values are accounted for in this table. Footnote 1 gives an explanation of how to use Table 2.

In using Tables 2A-E, read the K = .15 column if the K value for the soil falls in the range K= .10 to .20, use the K =.25 column for the range K = .20-.30, etc.

For example, assume a soil that is Class I using Table 1, with K value in the.20 to.30 range, R = 250, T value of 5. Using Tables 2 and 2A we see this soil is Class I on 0-2% slopes, Class II on 2-5% slopes, Class III on 5-9% slopes, etc.

As another example, consider a soil such as Wilson clay loam of the Blacklands of Texas which rates Class III on Table 1. This soil occurs in an area with R value of 350 (use Table 2C), T value is 3, K value is .43. This soil has a basic rating of IIIs from Table 1. Table 2 shows a significant erosion hazard exists when annual soil loss rate exceeds 12 tons/ac/yr. Using Table 2C we see this occurs if slopes exceed approximately 1/2 of 1 percent. The break between Class IIIe and IVe is at an annual soil loss rate of 60 tons/ac., which will occur at about a 3 percent slope. The break between IVe and VIe is at 120 tons, or at 5% slope. Thus, slope phases of 0 -1/2%, 1/2 - 3%, and 3 - 5 percent seem appropriate for this soil.

TABLE 8: GUIDE FOR CLASSIFYING SOILS INTO BASIC CAPABILITY CLASSES

ROUGH DRAFT - FOR REVIEW ONLY
12-6-65 SKZSC

	None or slight	Moderate	Severe	Very severe	[illegible]			VIII by SE
	[illegible]	20 to 40"	10 to 20"		20" plus	10 to 40" plus; [illegible]		Less than 10"
Workability (or) trafficability	Little or no limitations; traverse easily under normal conditions; SL, L, Si, SiL, SiCL, VFSL, SCL	Permanent or recurring limitations; moderately difficult to traverse or modify; LS, SiC, S, SiS, SC, FS	Permanent or recurrent limitations; difficult to traverse or modify; S, heavy C	Limitations very difficult to traverse or modify; Cl	Normal conditions not more than moderately difficult to modify	Moderate limitations impractical to modify	Severe limitations impractical to modify	Long or very severe limitation impractical to modify
Permeability (to water and air)	Moderately slow to moderately rapid (0.2 to 5.0 in/hr.)	Slow or rapid (0.02 to 0.05 or 5.0 to 10 in/hr.)	Very slow or very rapid (less than 0.05 or more than 10 in/hr.)					
Available water capacity (in effective depth or 5'?)	More than 8"; sufficient to supply needs of common crops during normal annual drought periods	5 to 8" crop yields may be moderately reduced, equivalent to not more than 20% or 1 crop failure in 5 years; choice of crops moderately limited	2 to 5"; crop yields may be severely reduced, equivalent to 50% or 5 crop failures in 10 years; choice of crops severely limited	Less than 2"; crop yields may be very severely reduced, equivalent to more than 50% or 5 crop failures in 10 years; choice of crops very severely limited	More than 5"; only slightly significant in determining kinds of plants and the use and management	2 to 5"; kind and amount of plants that can be grown may be moderately restricted	Less than 2"; the kind and amount of plants that can be grown are severely limited	Not generally significant as class-determining
Available nutrient capacity (in effective depth or 60")	CEC more than 7 m.e.; high base saturation or response to fertilization; favorable alkalinity and reaction; correction not required	CEC 3 to 7 m.e.; moderate base saturation or response to fertilization; moderate problem of balance in nutrients; unfavorable reaction easy to modify	CEC 1 to 3 m.e.; low base saturation or response to fertilization; severe problem of balance in nutrients; unfavorable reaction, difficult to modify	CEC less than 1 m.e.; very low base saturation or response to fertilization; very severe problem of balance in nutrients; unfavorable reaction, very difficult to modify.	CEC more than 3 m.e.; only slightly significant in determining kinds of plants and the use and management	CEC less than 3 m.e., very low base saturation; severe or very severe problem of balance in nutrients; unfavorable reactions impractical to modify; moderate to severe limitations on kind and amounts of plants that can be grown		Not generally significant or class-determining
Wetness (continuing problem of excess water from any cause)	Little or no continuing limitations, restrictions or hazards from excess water; yields or choice of plants not restricted	Moderate limitations, restrictions or hazards from overflow, flooding, ponding or other excess water; partially correctable but existing as a permanent problem; simple to modify and maintain; choice of crops moderately limited	Severe limitations, restrictions or hazards from overflow, flooding, ponding or other excess water; moderately wet after feasible drainage or severe where drainage is not feasible; difficult to modify; choice of crops severely limited	Very severe limitations, restrictions or hazards from overflow, flooding, ponding or other excess water; excessive wetness after feasible drainage or very severe where drainage is not feasible; very difficult to modify; choice of plants very severely limited, or crop damage [illegible]	Very severe limitations, restrictions or hazards from excess water not feasible to remove; choice of plants limited to grasses or trees; slight reduction in yields may be improved	Moderate limitations, restrictions or hazards from excess water plus stream bank erosion problem feasible to modify; choice of plants limited to grass or trees; moderate reduction in yields can be somewhat improved	Severe limitation, restriction or hazard from excess water, not feasible to modify; choice of plants limited to grasses or trees; severe reduction in yields cannot be significantly improved	Wetness precludes commercial production of plants
Stoniness or rockiness	No problem of stones, rocks, or rock outcrops	[illegible] output ratio, or restrict the choice of crops beyond the degree indicated for the class			[illegible] of farm machinery for intertilled crops but pastures can be improved		[illegible] excludes use of farm machinery for pasture improvement; grazing or woods only.	[illegible] commercial production of plants
Soluble salts	Little or no limitations; less than 2 mmhos/cm	Moderate salinity; crops moderately affected and yields of choice reduced; 2-4 mmhos/cm	Severe salinity; crops severely affected and yields of choice reduced; 4-8 mmhos/cm	Very severe salinity; crops very severely affected and yields of choice reduced; 8-15 mmhos/cm	Not class determining	Moderate salinity; choice of plants limited to salt-tolerant species; crop production not [illegible]	Severe salinity; useful vegetation limited to more salt tolerant species	Salinity precludes commercial production of plants
Gullies	No problem of gullies	Do not significantly interfere with use of machinery, change the input-output ratio, or restrict the choice of crops beyond the degree indicated for the class			Limitations not feasible to correct; excludes use of farm machinery for intertilled crops, but pastures can be improved		Limitations not practical to correct; excludes use of farm machinery for pasture improvement; grazing and woods only	Limitations very severe; precludes commercial production of plants
		[illegible]	[illegible]	[illegible]	Not class determining	17+19	Less than 10	Not class

USDA-SCS-FORT WORTH, TEX. [illegible]

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11/30/65

Table 2 - Guide for Determining Capability Class based on Rainfall-Erosion Hazard and Allowable Soil Loss

Capability Class	I	II	III	IV	V	VI	VII	VIII
Annual soil loss rate, tons/ac.1/								
When T value is 5	<20	20-50	50-100	100-200	Erosion hazard not class determining.			
When T value is 4	<16	16-40	40-80	80-160				
When T value is 3	<12	12-30	30-60	60-120				
When T value is 2	<8	8-20	20-40	40-80				
When T value is 1	<4	4-10	10-20	20-40				

1/ Use Tables 2A-2E to determine average annual soil loss rate. Select appropriate table based on R values shown on map pages 6 and 7 of Agriculture Handbook No. 282, Rainfall-Erosion Losses from Cropland East of the Rocky Mountains - May 1965. Values in Tables 2A-2E are derived using soil-loss equation and data given in Handbook 282.

Erosion classes as mapped are not used in determining capability class. Evaluate effects of erosion with respect to changes in soil properties significant in Tables 1 and 2.

Table 2 A - Guide for Determining Capability Class
based on
Rainfall-Erosion Hazard and Allowable Soil Loss

Rainfall Factor R = 250

Gradient %	K-.15	K-.25	K-.35	K-.45
1	6	9	13	17
2	12	18	26	34
3	18	27	39	51
4	23	37	53	68
5	29	47	66	86
6	35	58	81	105
7	44	72	102	131
8	53	87	122	157
9	62	103	145	187
10	73	120	170	218
11	8 4	140	197	
12	97	161	226	
13	109	181		
14	124	205		
15	139	230		
16	154			
17	169			
18	186			
19	204			
20	223			

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Table 2 B - Guide for Determining Capability Class
based on
Rainfall-Erosion Hazard and Allowable Soil Loss

Rainfall Factor R.300

Gradient %	K-.15	K-.25	K-.35	K-.45
1	7	11	16	20
2	14	23	32	41
3	20	34	47	61
4	27	45	63	81
5	34	57	80	103
6	42	70	98	126
7	52	07	122	156
8	63	105	147	189
9	75	125	174	224
10	87	145	204	
11	101	169	236	
12	116	194		
13	131	217		
14	149			
15	167			
16	184			
17	202			
18	223			
19				
20				

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Table 2 C - Guide for Determining Capability Class
based on
Rainfall-Erosion Hazard and Allowable Soil Loss

Rainfall Factor R=350

Gradient %	K-.15	K-.25	K-.35	K-.45
1	8	13	18	24
2	16	26	37	47
3	24	39	55	71
4	32	53	74	95
5	40	67	93	119
6	49	81	114	146
7	61	101	142	182
8	74	123	172	220
9	87	145	203	
10	102	170		
11	118	197		
12	135	226.		
13	152			
14	173			
15	194			
16	215			

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Table 2 D - Guide for Determining Capability Class based on Rainfall-Erosion Hazard and Allowable Soil Loss

Rainfall Factor R=400

Gradient %	K-.15	K-.25	K-.35	K-.45
1	9	15	21	27
2	18	30	42	54
3	27	45	63	81
4	36	60	84	108
5	46	76	106	137
6	56	93	130	167
7	70	116	162	209
8	84	140	196	
9	100	166	232	
10	116	194		
11	135	225		
12	1.55			
13	174			
14	198			
15	222			
16				

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Table 2 E- Guide for Determining Capability Class
based on
Rainfall-Erosion Hazard and Allowable Soil Lose

Rainfall Factor R=500

Gradient %	K-.15	K-.25	K-.35	K-.45
1	11	19	26	34
2	22	38	53	68
3	34	56	79	101
4	45	75	105	135
5	57	95	133	171
6	70	116	163	209
7	87	145	203	
8	105	175		
9	124	207		
10	146			
11	169			
12	194			
13	217			
14				
15				
16				

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Table 3

**Guide for Capability Class
based on
Wind Erosion Hazard - Dryland**

Capability Class	I	II	III	IV	V,VI,VII,VIII
Wind Erodibility Groups when PE zone is 1/					Wind Erosion hazard generally not class determining
PE 64-44	3,4,5,6,7	2	1		
PE 44-36	4,5,6,7	3	2	1	
PE 36-31		4,5,6,7	3	2	1
PE 31-25			3,4,5,6,7	2	1
PE 25-19				3,4,5,6,7	1,2

Table 4

**Guide for Capability Class
based on
Wind Erosion Hazard - Irrigated**

Capability Class	I	II	III	IV	V,VI,VII,VIII
Wind Erodibility Groups when PE zone is 1/					Erosion hazard generally not class determining
PE 64-44	3,4,5,6,7	2	1		
PE 44-31	4,5,6,7	3	2	1	
< 31		3,4,5,6,7	2	1	

1/ Wind Erodibility Groups are listed on Table 1 of Interpretation Tables. Groups used in this table are the same as those used in the Southern Great Plains except fine sands with loamy argillic horizons at depths less than 20" are in group 2, and very fine sandy loams in group 4. PE zones generally are the same as the Wind Erosion Soil Moisture-Wind Velocity Factor Zones shown on Figure 2, page 10, ARS 22-69 A Universal Equation For Measuring Wind Erosion. June 1961

Workshop - Fort Worth
December 13-17, 1965

REPORT OF COMMITTEE A
MLRA's 136, 130

Committee A was concerned with the placement of problem series in MLRA's 136 and WO. A primary task was to make recommendations for separation of mesic and thermic soils. Also, at the meeting of Committee I, Classification of Sandy Soils, the need for dividing Normudults on the basis of thickness was presented. A great group of "Paleudults" was proposed for soils with arenic epipedons, and Committee A was asked to consider the effect of such a separation.

"Paleudults" or "Tenudults"

At the meeting of Committee *I on* sandy soils the proposal was made to modify the suggested "Paleudult" great group by defining soils with thick solums (more than 60"±) as the Normudults, end separating those with thinner solums as another great group. The thinner soils were thought to be on younger surfaces, and it was proposed to indicate this in the new great group name. In a joint meeting of Committees A and B, we agreed to this recommendation with the suggestion that the morphême in the name should indicate thinner rather than younger. .The name "Tenudult" was proposed (from. the Latin tenuis, thin).

The Committee considered the soils in the Piedmont and Blue Ridge mountains, and concluded that nearly all of the soils classified as Normudults in these resource areas would fit the definition of the new group, "Tenudults." Exceptions are only a few on built-up surfaces, such as Braddock.

Soil Temperatures

The Cormnittee considered available temperature data from eleven soils in the intermountain plateau, from watersheds in the Waynesville-Asheville, North Carolina area. Monthly records were available, from 24" depth over a 12 to 14 year period. (Unpublished data - to be published by North Carolina State University)

Recorded mean annual soil temperatures ranged from 51° F at a relatively high elevation (3500 feet approximately) to 62.7° F in a colluvial area at a lower elevation (1800-2000 feet). There was significant variation from year to year, as high as ten degrees. Our conclusion is that MLRA 130 in North and South Carolina is entirely within the mesic zone and that the line between mesic and thermic zones should be drawn on the resource area boundary. In

Georgia it should be drawn somewhat north of the resource area boundary, This line automatically corrects a number of placements which the Committee believes to be in error. It also separates such problem series as Cecil and Hayesville.

First Bottom Soils

A number of changes are suggested in the soils of the first bottom:

1) Congaree and Chewacla series should be classified as Dystrochrepts; they, with Wehadkee, to be considered fine loamy and used for fine loamy first bottom soils throughout the thermic zone of MLRA's 130 and 136, and also in the Coastal Plain.

2) Ochlockonee, Iuka, Mantachie and Bibb series will be in coarse loamy families and will be mapped in MLRA 136 where coarse loamy first bottom soils are found. Mantachie and Bibb mineralogy should be changed to siliceous.

3) We plan no further use of the Bermudian, Rowland and Bowmansville series, and release these names for the use of the Northeastern Region.

4) Color ranges for series of Fluvents and Fluventic soils should be broadened to include the colors allowed in subgroups. Color need not be diagnostic for series of Fluvents. (Note -- this recommendation was not endorsed unanimously by the entire workshop when the Committee reported. Jim Coover of Texas particularly objected.)

5) Mesic counterparts of first bottom soils are needed. We will look to the Northeastern Region for descriptions of these soils.

Slate Belt Soils

Soils derived from fine grained rocks in the Piedmont Plateau present a number of problems in classification, but as 'these soils are now under study by the Office of the Director for Classification and Correlation and by the Soil Survey Laboratory, no recommendations concerning them were made by this Committee. Included are the Georgeville, Herndon, Alamance, Orange, Neson and Tatum series, the silty members of the Colfax and Worsham series, and a number of proposed series for soils with fragipans.

Regional Conflicts

There are numerous conflicts in classification of MLRA 130 and 136 soils between the Southern and Northeastern Regions. The Committee believes that inter-regional problems might be discussed profitably by representatives of the states concerned before the placement into families is issued.

<u>Committee A</u>

Forrest Steele, Chairman
F. T. Ritchie, Jr.
R. D. Wells
C. L. Hunt
E. H. Templin (part-time)

Normudults. Udults without a fragipan in or below the argillic horizon; without nonindurated plinthite that forms a continuous phase or constitutes more than half of the volume of any horizon within the upper 165 cm. (65 inches); with mean summer and mean winter soil temperature at 20 inch depth or at a lithic contact, whichever is shallower, that differ by 9° F. or more; with an argillic horizon that extends to depths greater than 1.5 meters (60 inches) below the soil surface, exclusive of zones of partially weathered rock coated with illuvial clays, and with an epipedon or an argillic horizon that has moist color values of 4 or more or dry values of 5 or more in some part.

Leptudults. Other Udults, exclusive of Fragiudults, Plinthudults, Tropudults, Rhodudults, and Normudults.

The following subgroups and families are recommended for MLRA 133:

Typic Leptudults. Leptudults that--

a. have no mottles with chromas of 2 or less in the upper 50 cm. (20 inches) of the argillic horizon;

b. have textures finer than loamy sand in some part of the argillic horizon, and have an argillic horizon that, in at least its upper 25 cm. (10 inches), has no lamellae;

c. have no interruptions of the argillic horizon by ledges of bedrock within each pedon;

d. have a moist value of 4 or more in all parts of the argillic horizon;

e. lack a lithic contact within 50 cm. (20 inches) of the surface of the mineral soil;

f. have an argillic horizon thicker than 25 cm. (10 inches);

g. lack an epipedon thicker than 50 cm. (20 inches) if coarser textured than loamy fine sand;

h. have one of the following:

(1) a mean annual soil temperature of more than 59 degrees F. (15 degrees C.) and a pH that is less than 5.5 (1:1 dilution in water) throughout the argillic horizon and to at least 50 cm. (20 inches) below its base or to a lithic contact;

(2) a mean annual soil temperature of 59 degrees F. (15 degrees C.) or less and base saturation (by sum of cations) of less than 35 percent at depth of 125 cm. (50 inches) below the top of the argillic horizon, and base colors (a) with hues redder than 7.5 YR in some part of the matrix of the argillic horizon or (b) with chromas of 6 or more throughout the argillic horizon.

j. have an Ap horizon with moist values of 4 or more, or an Al horizon thinner than 15 cm. (6 inches) if its moist value is darker than 4.

Clayey, kaolinitic, thermic.

Coarse loamy, siliceous, thermic.

B-Rumford

Fine loamy, siliceous, thermic (brittle?).

Gilead?

Fine loamy, siliceous, thermic.

Cahaba
Kalmia

Fine silty, mixed, thermic.

Silerton

Aquic Leptudults. Like the Typic except for a.

Clayey, kaolinitic, thermic.

Debruce

Coarse loamy, siliceous, thermic.

Dragston

Fine loamy over fine, mixed, thermic.

Fsirhope

Arenic Leptudults. Like the typic except for g.

Coarse loamy, siliceous, thermic.

Ex-Kenensville

Entic Leptudults. Like the Typic except for f.

Clayey, kaolinitic, thermic.

Ex-Cuthbert

Paraquic Leptudults. Like the Typic except for a, and having low chromas (2 or less) between 10 and 20 inches below the upper boundary of argillic horizon.

Clayey, mixed, thermic.

Ex-Flint

Fine loamy, siliceous, thennic.

B-Charleston

COMMITTEE B - MLRA 133

E. A. Perry, Chairman
Baxter Watts
William Koos
Al Newman
C. M. Ellerbe
Blake Parker
Keith Young, Secretary
D. F. Slusher
R. B. Daniels

Committee B report MLRA 133, Perry, chm., Young, sec.

Series	Distribution	1964 Placement	Committee B Recommendation	Distinguishing Characteristics
Acadia		Aeric Ochraqualfs - fine montmorillonitic, thermic	Change to mixed	La. soil
Alto		N. C.		
Americus		Psamentic Rhodudults - sandy, siliceous, themic, thick	OK	
Amite		Typic Rhodudults - fine loamy siliceous (mixed?) thermic	Typic Rhodudult- fine loamy, ~~mixed~~, thermic siliceous	
Anacoco		N. C.		Florida responsibility
Altavista		Paraquic Normudult fine loamy, siliceous, thermic	Committee 136 should handle	
Angie		Aquic Normudult - clayey, mixed, thermic	OK	

Series	Distribution	1964 Placement	Committee Recommendation	Distinguishing Characteristics
Augusta		Aquic Normudult - fine loamy, mixed, thermic	136 should handle placement	
Arredondo		Typic Quarzipsamment - siliceous-phosphatic, acid, thermic, coated	O.K. - if question are Fla-	
Barclay		N. C.	?	
Barth		N. C.	Suggest inactive	
Beauregard		Aquic Normudult - fine silty, siliceous, thermic	Plinthic Normudult	
Bayboro		Typic Umbraquults - clayey kaolinitic, thermic	ok	
Bibb		Cumulic Normaquept - coarse loamy, ~~mixed~~, acid, thermic	Fluvaquentic Normaquept coarse loamy, siliceous acid thermic	

Series	Distribution	1964 Placement	Committee Recommendation	Distinguishing Characteristics
Bertie		**Aqualfic Normudults** - fine loamy, mixed, thermic	?	
Blakely		Dropped - **TSC** Ad. **FW-15**, **5-9-65 c/w** Greenville	OK	
Bienville		**N. C.**	Study with relationship of [illegible] - Ls responsibility	
Bladen		**Typic Ochraquult** - clayey, **mixed, thermic**	Series being circulated for Comment	
Blanton		**Aquic Quarzipsamment** - siliceous, acid, thermic, coated	Assignment Committee responsibility	
Boswell		Typic Normudult - clayey, mixed, thermic	OK (may be paraquic)	
Bwie		Typic **Normudult** - fine loamy, siliceous, thermic	OK - Texas thinks may be plinthic	

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Series	Distribution	1964 Placement	Committee Recommendation	Distinguishing Characteristics
Bradley		Typic Normudult - clayey, kaolinitic, thermic	Typic Tenudult clayey, kaolinitic thermic	
Bruno		Cumulic (Umeric?) Normipsamment - siliceous, thermic	Psamment committee responsibility	
Bub		Lithic Haplorthent - clayey, kaolinitfc, acid, thermic	[illegible] (Texas)	
Byars		Typic Umbraquult clayey, mixed, thermic	OK	
Caddo		Typic Ochraquult - fine silty, mixed, thermic (Fragiaquult?)	Typic Ochraquult fine silty, siliceous, thermic	
Cahaba		Typic Normudult - fine loamy, mixed, thermic	Typic Tenudult, fine loamy, siliceous, thermic	
Carnegie		Plinthic Normudult - fine loamy, siliceous; thermic	OK	

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Series	Distribution	Placement	Committee Recommendation	Distinguishing Characteristics
Caroline		Typic Normudult - clayey, kaolinitic, thermic	ok	
Chastain		Cumulic Normaquept - fine mixed, acid, thermic	Fluventic Normaquept fine mixed, acid thermic	
Chattahoochee		Typic Normudult - fine loamy, siliceous, thermic	ok but [illegible]	
Chesterfield		Typic Normudult - clayey, kaolinitic, thermic	Typic Hapludult, maybe fine loamy	
Coxville		Typic Ochraquult - clayey, mixed, thermic	[illegible] ?	
Cuthbert		Entic Normudult - clayey, kaolinitic, thermic, thin	Typic Hapludult [illegible]	
Craven		Paraquic Normudult - clayey, kaolinitic, thermic	ok	

Series	Distribution	1964 Placement	Committee Recommendation	Distinguishing Characteristics
~~Dobruce~~ Debruce		Aquic Normudult - clayey, mixed, thermic	aquic Tenudults clayey ~~OK~~ thermic Kaolinitic	
Dragston		Aquic Normudult - coarse loamy, siliceous, thermic	aquic Tenudults, coarse loamy - siliceous thermic.	
Dierks		Typic Normudult - loamy ***skeletal, siliceous,*** thermic	Ark consider Combine with Saffell	
Dunbar		Aquic Normudult - clayey, mixed, thermic	aquic Normudult, clayey kaolinitic thermic	Low silt <30%
Duplin		Paraquic Normudult - fine loamy, mixed, thermic	clayey, kaolinitic thermic	
Esto (R)		Typic Normudult - clayey, kaolinitic, thermic	OK	
Elkton		Typic Ochraquult - clayey, mixed, thermic	?	

Series	Distribution	1964 Placement	Committee Recommendation	Distinguishing Characteristics
Eulonia		Paraquic Normudult - fine loamy over fine, mixed, thermic	see committee narrative.	high silt
Eustis		Entic Normudult - Sandy, siliceous, thermic, thick	Psammentic Normudult - sandy, siliceous, thermic	
Faceville		Typic Normudult - Clayey, kaolinitic, thermic	OK	
Fallsington		Typic Ochraquult - coarse loamy, siliceous, thermic	~~[illegible]~~ OK	
Flint		Paraquic Normudult - clayey, mixed, thermic	Paraquic Normudult clayey, mixed, thermic	
Gainesville		Ultic Quarzipsamment - siliceous phosphatic, acid, thermic, coated	Psamment committee	
Galestown		Ultic Quarzipsamment - siliceous, acid, mesic, coated		

Series	Distribution	1964 Placement	Committee Recommendation	Distinguishing Characteristics
Gilead		Typic Normudult - fine loamy, siliceous, thermic (brittle?)	Typic Tenudult, fine loamy siliceous thermic (See narrative)	
Goldsboro		Paraquic Normudult - fine loamy, siliceous, thermic	OK	
Gore		Aqualfic Normudult - clayey, expanding, thermic	see committee narrative	
Grady		Typic Ochraquult - clayey, kaolinitic, thermic	OK	
Greenville		Typic Rhcdudult - clayey, kaolinitic, thermic	OK	
Guin		Typic Dystrochrept - sandy-skeletal, siliceous, thermic	OK	
Hannahatchee		Cumulic Haplorthent - coarse loamy, siliceous, acid, thermic	Typic Udifluvents OK	

Series	Distribution	1964 Placement	Committee Recommendation	Distinguishing Characteristics
Henderson		Typic Normudult - clayey, kaolinitic, thermic, thin	Typic Tenudult clayey, kaolinitic, thermic	
Hoffman		Entic Normudult - clayey, kaolinitic, thermic, thin	Entic Tenudult clayey kaolinitic thermic	
Hortman		Aqualfic Normudult - clayey, expanding, thermic	see committee narrative ↓	
Iola		Typic Normudult - loamy skeletal, siliceous, thermic		
Hyattsville			7	
Hyde		Typic Umbraquult	fine silty, mixed thermic	
Irvington		Ochreptic Plinthic Fragiudult - fine loamy, siliceous, thermic	OK	

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Series	Distribution	1964 Placement	Committee Recommendation	Distinguishing Characteristics
Immokalee		Arenic Normaquods - sandy, siliceous, thermic, coated	OK	
Iuka		Aquic Cumulic Haplorthent - coarse loamy, siliceous, acid, thermic	~~Aquic Udifluvent~~ see fluvial committee	
Invershiel		N. C.		
Izagora		Paraquic Normudult - fine loamy over fine, mixed, thermic	see committee narrative	
Johnston		Typic Humaquept - coarse loamy, siliceous, acid, thermic	see fluvents	
Kalmia		Typic Normudult - fine loamy, siliceous, thermic	Typic Tenudult, fine loamy siliceous thermic.	low silt
Kanapaha		Aquic Quarzipsamment - siliceous-phosphatic, acid, thermic, coated	see psamment committee	

Series	Distribution	1964 Placement	Committee Recommendation	Distinguishing Characteristics
Kirvin		Typic Normudults - clayey, mixed, thermic	Defer responsibility	
Kenansville		Arenic Normudult - coarse loamy, siliceous, thermic	Arenic Normudults coarse loamy siliceous thermic ?	
Keyport		Paraquic Normudult - clayey, kaolinitic, thermic	OK	[illegible]
Klej		Aquic Quarzipsamment - siliceous, acid, thermic, coated	Add placement [illegible]	
Kisatchie		N. C.	Typic ~~Normudult~~ [illegible] clayey [illegible]	Low chroma inherited from parent rock.
Lakeland		Typic Quarzipsamment - siliceous, acid, thermic, coated	Ultic Quarzipsamment - siliceous, acid, thermic	4 - 10% fines - silt and clay in control.
Lakewood		Spodic Quarzipsamment - siliceous, acid; thermic, coated	OK	

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Series	Distribution	1964 Placement	Committee Recommendation	Distinguishing Characteristics
Lauderdale		Lithic Dystrochrept loamy skeletal, siliceous, thermic	OK	
Leaf		Typic Ochraquult - clayey, mixed; thermic	OK	over 30% silt
Lenoir		Aquic Normudult - clayey, mixed, thermic	- kaolinitic	
Leon		Aeric Normaqucd - sandy, siliceous, thermic, non-cemented	OK	7th soil
Luverne		Typic Normudult - clayey, kaolinit ic, thermic	OK	
Lynchburg		Aquic Normudult - fine loamy, siliceous, thermic	OK	<20% silt
Macon		Typic Normudult - fine loamy, siliceous, thermic (mixed?)	- ϵK	

	but	1964 Placement	Committee Recommendation	Distinguishing Characteristics
Magnolia		Typic Normudult - clayey, kaolinitic, thermic	ok	
Mantachie		Aeric Cumulic Normaquept - coarse loamy, mixed, acid, thermic	Fluventic committee	
Marlboro		Typic Normudult - clayey, kaolinitic, thermic	ok	
Mashulaville		Typic Fragiaquults - fine loamy, mixed, thermic	ok	>20% silt
Matapeake		Alfic Normudult - fine silty, mixed, mesic	both probably mesic	
Mattapex		Alfic Normudult - fine loamy, mixed, thermic		
Mayhew		Aquultic Mazaquert - montmorillonitic, thermic slowly permeable	Probably Typic Ochraqualt	

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Series	Distributicn	1964 Placement	Ccuamittee Recommendation	Distinguishing Characteristics
Molena		Ultic Quarzipsamment, siliceous, acid, thermic, coated	[illegible] committee	
McKamie		Alfic Normudult - clayey, expanding, thermic	Typic Normudalf fine, mixed, ther...	
Morse clay		Typic Grumustert - montmorillonitic, thermic	see Vertic committee	
Mus kog ee		Typic Normudalf - fine silty over fine, montmorillonitic, thermic	Typic Normudalf, fine silty over fine, mixed, ther...	
Myat t		Typic Ochraquult - fine loamy, mixed, thermic	OK	high silt
Nacogdoches		Typic Rhodudult - clayey, mixed, thermic, thick	OK ... not thick family	
Norfolk		Typic Normudult - fine loamy, siliceous, thermic	OK	low silt < 20%

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Series	Distribution	1964 Placement	Committee Recommendation	Distinguishing Characteristics
Nevada		N. C.	?	Ark. may drop
Nixonton		Aquic Dystrochrept - coarse silty, mixed, thermic	?	
Ochlockonee		Cumulic Haplorthent - coarse loamy, siliceous, acid, thermic	see fluventic cumulic	
Okenee		Typic Umbraquult - fine loamy, siliceous, thermic	OK	
Ona		Aeric Normaquod - sandy siliceous, thermic, non-cemented	see Fla.	
Onslow		Ultic Normorthods - sandy over fine loamy, siliceous, thermic	↓	
Ora		Typic Fragiudult - fine loamy, mixed, thermic	siliceous could be plinthic	

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Series	Distribution	1964 Placement	Committee Recommendation	st gui ar ter
Orangeburg		Typic Normudult - fine loamy, siliceous, thermic	OK	Low silt < 20%
Othello		Typic Ochraquult - fine loamy, siliceous, thermic	OK	
Paden		Ochreptic Fragiudult - fine silty, mixed, thermic	Same	
Paraloma		Ochreptic Fragiudult - loamy skeletal, siliceous, thermic	?	Ark soil
Percilla		Typic Ochraquult - clayey, kaolinitic, thermic	?	Texas soil mapped in landscapes with Greenville
Pasquotank		Typic Normaquept - coarse silty, mixed, acid, thermic	?	
Phea		Aqueptic Fragiudult - fine loamy, mixed thermic	fine silty	

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		1964	Committee	Distinguishing
Pickwick		Typic Normudult - fine silty, mixed, thermic	OK	
		Typic Haplaquoll - fine mixed, thermic	OK	
Plummer (R)		Grossarenic Ochraquult - loamy, siliceous, thermic	OK	
Pocomoke		N. C.	?	
Portsmouth		Typic Umbraquult - fine loamy, siliceous, thermic	OK	
Prentiss (R		Typic Fragiudult - coarse loamy, siliceous, thermic	OK	
Prescott		N. C.	?	

Series	Distribution	1964 Placement	Committee Recommendation	Distinguishing Characteristics
Rains		Typic Ochraquult - fine loamy, siliceous, thermic	OK	< 20% silt
Red Bay		Typic Rhodudult - fine loamy, siliceous, thermic	OK	low silt
Roanoke		Typic Ochraquult - clayey, mixed, thermic	see 136 committee	
Robertsdale		Aquept ic Plinthic Fragiudult - fine loamy, siliceous, thermic	see plinthic committee	
Rumford		Typic Normudult - coarse loamy, siliceous, thermic	Typic [illegible] ok	> 30% silt
Ruston		Typic Normudult - fine loamy, *mixed,* thermic	Typic Normudult, fine loamy, siliceous thermic	
Rutlege		Typic Humaquept - sandy, siliceous, acid, thermic	OK	

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Series	Distribution	1964 Placement	Committee Recommendation	Distinguishing Characteristics
Saffell		Typic Normudult - loamy skeletal, siliceous, thermic	OK	
Sassafras		Alfic Normudult - fine loamy, siliceous, mesic		
Savannah		Typic Fragiudult - fine loamy, mixed, thermic	siliceous	high silt > 20%
Sawyer		Typic Normudult - clayey, mixed, thermic (Paraquic?)	Typic normudult fine loamy over clayey, siliceous thermic	need revised series description Okla
Scranton		Aquipsammentic Haplumbrept - sandy, siliceous, thermic		
Shubuta		Typic Normudult - clayey, mixed, thermic	Typic normudult clayey mixed, thermic	
Silerton		Typic Normudult - fine silty, mixed, thermic	ok	

Series	Distribution	1964 Placement	Committee Recommendation	Distinguishing Characteristics
St. Johns		Typic Normaquod - sandy, siliceous, thermic	OK	
St. Lucie		Typic Quarzipsamment - siliceous, acid, thermic, coated	see psamments committee	
Stough		Aquic Fragiudult - coarse loamy, siliceous, thermic	OK	
Summerfield		Typic Ochraquult - clayey, mixed, thermic	aquic Normudult fine loamy over clayey mixed thermic	
Sunsweet		Plinthic Normudult - clayey, Kaolinitic, thermic	OK	
Susquehanna		Aquultic Mazaquert - montmorillonitic, thermic, slowly permeable	aquic Normudult clayey, montmorillonitic thermic	
Thomasville		I. C.	OK	

Series	Distribution	1964 Placement	Committee Recommendation	Distinguishing Characteristics
Tifton		linthic Normudult - fine loamy, siliceous, thermic	OK	
Tilden		ypic Fragiudult - fine loamy, mixed, thermic	siliceous	
Vaucluse		ypic Normudult - fine loamy, siliceous, thermic (brittle?)	Typic Ferrudult, (see narrative)	
Urbo		eric Cumulic Normaquept - fine, mixed, acid, thermic	see Fluventic [illegible]	
Wahee		uic Normudult - clayey, mixed thermic	OK	
Waugh		aact ive - TSC Ad. FW-10, 5-3-65, c/w Altavista	OK	
Weeksville		ypic Humaquept - coarse silty, mixed, acid, thermic	OK	

Series	Distribution	1964 Placement	Committee Recommendation	Distinguishing Characteristics
Wilcox		Aquultic Mazaquert - montmorillonitic, thermic	Aquic Normudult, clayey see Vertisol committee	
Woodstown		Paraquic Normudult - fine loamy, siliceous, thermic	Paraquic Tenudult — OK	
Wrightsville		Typic Albaqualf - fine montmorillonitic, thermic		
Weston		Typic Ochraquult - coarse loamy, siliceous, thermic	OK	

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Series	Distribution	1964 Placement	ommittee ecommendation	Distinguishing Character ist ics
Alaga		Ultic Quarzipsamment - siliceous, acid, thermic	OK as in yellow sheet	10 - 25% fines - silt and clay in control.
Alapaha		Arenic Plinthic Ochraquult - loamy siliceous, thermic	"	
Albany		Aquic Arenic Normudults- fine loamy, siliceous, thermic	OK	
Ardilla		Aquic Plinthic Normudult - fine loamy, siliceous, thermic		
Cowarts		Plinthic Normudults - fine loamy, siliceous, thermic		
Dothan		Plinthic Normudults - fine loamy, siliceous, thermic		
Ducker		"Cumulic" Haplorthent - fine loamy, siliceous, acid, thermic	✓	

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Series	Distribution	1964 Placement	Committee Recommendation	Distinguishing Characteristics
Fuquay		Arenic Plinthic Normudults - loamy, siliceous, thermic	OK as in yellow sheet	
Grangeburg		Paraquic Plinthic Normudult - fine loamy, siliceous, thermic		
Kershal		Ultic Quarzipsamment - siliceous, acid, thermic		< 1% fines - silt and clay in control.
Kinsey		"Cumulic" Haplorthent - coarse loamy, siliceous, acid, thermic		
Leefield		Arenic Plinthaquic Normudult - loamy, siliceous, thermic		
Lucy		Arenic Normudult - loamy, siliceous, thermic	OK	
McLaurin		Typic Normudult - coarse loamy, siliceous, thermic		

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Series	Distribution	1964 Placement	ommittee Recommendation	Distinguishing Characteristics
Ocilla		Arenic Aquic Normudult - fine loamy, siliceous, thermic	loamy, siliceous, thermic	
Osier		Typic Aquipsamments - siliceous, acid, thermic	OK	
Pansey		Plinthic Ochraquults - fine loamy, siliceous, thermic		
Pelham		Arenic Ochraquult - fine loamy, siliceous, thermic		
Quitman		Aquic Fragiudult - fine loamy, mixed, thermic		
Stilson		Arenic Paraquic Plinthic Normudult - loamy, siliceous, thermic		
Troup		Grossarenic Normudult - loamy, siliceous, thermic		

Series	Distribution	1964 Placement	Committee Recommendation	Distinguishing Characteristics
Wicksburg		Arenic Normudult - clayey, kaolinitic, thermic	OK	
Wagram		Arenic Normudults loamy, siliceous thermic	→ OK	

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COMMITTEE C

Committee C was charged with the placement of problem soils in Resource Areas: Ozark Highlands, Central Basin, Highland Rim, and Great Valley. The recommendations of this committee are given on the attached chart.

Joe A. Elder, Chairman
H. C. Dean
Leland Burgess
Joe Nichols
E. C. Sease
A. H. Hidlebaugh
M. E. Shaffer

Committee C Report
by Joe Elder

Series	Distribution	1964 Placement	Committee C Recommendation	Distinguishing Characteristics
Alcoa	GV	Typic Rhodudults, fine loamy oxidic, thermic	Same	
Allen	GV	Typic Normudults, clayey> Kaolinitic, thermic	Typic Normudults, fine loamy, siliceous, [redacted] thermic	Argillic horizon red&r than 7.5 YR in major part and ranges from 30-40 % in clay content. Nolichucky is thermic equivalent.
Apison	GV	Typic Normudults, fine silty, siliceous, thermic	Typic ~~Normudults~~ Leptudults, fine loamy, siliceous, thermic	Argillic horizon 7.5 YR and yellower, and ranges from 25to 35% in clay content. Paralithic contact at 3 to 4 feet. This series conflicts with Holston, one should be dropped.
Armour	CB	Humic Normudults, fine silty, mixed-phosphatic, thermic	Mollic ~~Normudults~~ Normudalfs, fine silty, mixed, thermic	Phosphatic
Armuchee	GV	Entic Normudults, clayey, mixed, mesic, thin	Entic ~~Normudults~~ Leptudults, clayey, mixed, thermic thin.	Thin argillic horizon. 2 to 8 inches, underlain by soft acid shale. Thermic equivalaent of Litz.
Ashwood	CB	Typic Hapludolls, fine, illitic, thermic	Typic Argiudolls, fine Mont. thermic	Phosphatic
Baxter	HR,OH	Typic Normudults, clayey, Kaolinitic, thermic	[redacted] Alfic Normudult, Clayey, Kaolinitic, mesic	Argillic horizon redder then 7.5 YR in major part and ranges from 35 to 45 percent. Clay content in control section. Less clay and

Series	Distribution	1964 Placement	Committee Recommendation	Distinguishing Characteristics
Baxter (Con't)				thicker Bt than Christian.
Beason	GV,CB,HR,OH	Aquic Normudults, clayey, mixed, thermic	Same	Low chroma mottles in upper part of argillic. More poorly drained than capsbav.
Bodine	HR,OH	Typic Normudults, loamy, skeletal, siliceous, thermic	Typic ~~Basic~~ Normudults, loamy skeletal, siliceous, thermic	Thin Argillic In hues of 7.5 YR and yellower. 45 to 65% chert content. Needs further study to determine thickness range of argillic.
Brandon	HR,OH	Typic Normudults, fine silty, mixed, thermic	Typic Normudults, ~~fine loamy,~~ siliceous, thermic (fine silty over loamy skeletal).	About 2 feet of loess over a loamy skeletal or a very gravelly layer. Upper part of argillic is fine silty, lover part is fine loamy.
Braxton	CB	Humic Normudults, clayey, mixed-phosphatic, mesic	Typic Normudults, clayey, mixed, thermic	Phosphatic
Bruno	GV,HR, OH, CB	Cumulic Normipsamments, siliceous thermic	(Fluventic?) Typic ~~Typic~~ Udipsamments, siliceous, non-acid, thermic	lore than 10% fines.
Capshaw	GV,CB, HR,OH	Paraguic Normudults, clayey, mixed,thermic	Typic Normudults, fine, ~~Aqualfic Normudults,~~ ~~clayey~~ mixed, thermic	as mottles with chromas of 2 or less between 10 and 20 inches belov upperboundary of argillic. Argillic In hues of 7.5 YR and yellower. PH above 5.5 in lover part of argillic.

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Series	Distribution	1964 Placement	Committee Recommendation	Distinguishing Characteristics
Caylor	GV	Typic Normudults, fine silty, mixed, thermic	Humic Normudults, fine loamy, silicous,mesic	Argillic in hues redder than 7.5 YR. mesic equivalent of Etowah. Base saturation less than 35% - about 15.
Christian	GV,HR, CB,OH	Typic Normudults, clayey, Kaolinitic, thermic	~~Same~~ Typic Leptudults, clayey, Kaolinitic, thermic	Argillic in hues redder than 7.5 Yr. in major part and ranges from 45 to 65% in clay content. Base saturation below 35% - about 20 percent. Very few coarse fragments.
Claiborne	GV	Typic Normudults, fine silty, mixed thermic	Alfic ~~Typic~~ Normudults, fine loamy, ~~siliceous~~ mixed, mesic	Argillic horizon in hues of 5 YR and redder in major part. Base saturation about 15 percent; low sand content; moderate amount of chert gravel; clay content of argillic 25 to 37%.
Clarksville	GV,OH	Typic Normudults, loamy skeletal, siliceous, thermic	Alfic ~~Typic~~ Normudults, ~~fine loamy, siliceous, thermic~~ loamy skeletal, Siliceous, mesic	
Colbert	GV,CB	Alfic Normudults, clayey, expanding, mesic, thin	Vertic Normudalfs, fine ~~Alfic Normudults, clayey,~~ Mont., thermic	Argillic in hues of 7.5 YR and yellower; about 60% clay content; PH above 5.5 in sub-horizon above limestone bedrock.

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U. S. DEPARTMENT OF AGRICULTURE, SOIL CONSERVATION SERVICE, FORT WORTH, TEXAS
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Series	Distribution	1964 Placement	Committee Recommendation	Distinguishing Characteristics
Conasauga	GV	Alfic Normudults, clayey, expanding, mesic, thin	Vertic Normudults, fine, ~~Alfic Normudults, clayey~~ mixed, thermic	Argillic in hues of 7.5 YR and yellower; about 50 to 65% clay; PH above j.5 in lower part of argillic above partly decomposed shale rock.
Crider	HR,OH	Alfic Normudults, fine silty, siliceous, thermic	~~Same~~ Alfic Normudults, fine silty, mixed, mesic	Upper 15 inches or more of argillic in hues yellower than 5 YR, value 4, Chroma 4. Lover part of argillic in hues redder than 7.5 YR. Base saturation about 35%.
Culleoka	CB	Alfic Normudults, fine silty, mixed, mesic	Alfic Normudults, fine loamy, mixed mesic-thermic	Phosphatic. Argillic 20 to 30 inches thick; hues of 7.5 YR and yellower.
Cumberland	GV,HR, CB,OH	Typic Rhodudults, clayey, Kaolinitic, themic	~~Same~~ Typic Rhodudults, clayey, Kaolinitic, mesic	No completely satisfactory way has been found to separate this series from Decatur. Perhaps Cumberland should be dropped.
Dandridge	GV	Ruptic Alfic Lithlc Eutrochrepts, clayey skeletal, mixed-calcareous, mesic	Same	Thin intermittent B horizon. Does not seem to conflict with other known series.
Decatur	GV,HR, CB,OH	Typic Rhodudults, clayey Kaolinitic, thermic	Same	Argillic in hues redder than 5 YR and values less than 4. Clay content of argillic 40 to 50%. Base-saturation generally less than 20 percent.

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U. S. DEPARTMENT OF AGRICULTURE, SOIL CONSERVATION SERVICE, FORT WORTH, TEXAS
USDA SCS FORT WORTH

Series	Distribution	1964 Placement	Committee Recommendation	Distinguishing Characteristics
Dekoven	GV, CB, HR, OH	Typic Haplaquolls, fine silty, mired mesic	Typic Haplaquolls, fine silty, mixed, thermic	Mollic epipedon 10 to 20 inches thick
Dellrose	CB	Humic Normudults, fine silty mixed, thermic	Humic Normudults, fine loamy, mixed, thermic	Thick, weak argillic horizon in hues of 7.5 YR and yellower in major part; low sand, high chert content; 20 to 35% base saturation; 25 to 35 percent clay content; phosphatic.
Dewey	GV, HR, CB, OH	Typic Normudults, clayey, Kaolinitic, thermic	Same	Chick argillic in hues of 5 XR and redder in major part. Clay content increases to more than 40% within 10 inches of the upper boundary of the argillic horizon.
Dickson	HR, OH	Ochreptic Fragiudults, fine silty, mixed thermic	Ochreptic Fragiudults, fine silty, siliceous, thermic	Bisequel profile. Few or no clay films above fragipan. Base saturation below 20%.
Donerail	CB	Humic paraquic Normudults, clayey mixed-phosphatic, mesic	Humic paraquic Normudults, clayey, mixed, thermic-mesic	Phosphatic; value of plow layer darker than 4; low chroma mottles between 10 and 20 inches from top of argillic; argillic in hues of 7.5 YR and yellower.
Dowellton	CB, HR, GV, OH	Typic Ochraqualfs, clayey, Mont. thermic	~~Same~~ Vertic Ochraqualfs, fine, Mont., thermic	Mineralogy needs further study.

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Series	Distribution	1964 Placement	Committee Recommendation	Distinguishing Characteristics
Dunmore	GV	Typic Normudults, clayey, Kaolinitic mesic	~~Same.~~ Typic Lepludults, clayey, Kaolinitic, mesic	Thick Argillic in hues of 5 YR andredder in major part; clay content 50 to 75%; bass saturation below 35% • about 10 to 15.
Dunning	W	Typic Haplaquolls (vertic?), fine, mixed, mesic (Mont.)	Same	Mesic equivalent of Roellen.
Egam	GV, CB, HR, OH	Cumulic Hapludolls, fine silty, mixed thermic	Aquic ~~Cumulic~~ Fluventic Hapludolls, fine, mixed, thermic	Mollic epipedon has chroma of less than 2, in lower part; low chroma mottles within 6 Inches of lower boundary of ❑ ollic; clay content of control section averages about 42 percent.
Elk	W	Alfic Normudults, fine silty, mixed, mesic	Alfic Humic Normudults, fine loamy, mixed, mesic	Argillic horizon in hues of 7.5 YR and yellower; clay content of control section 25 to 35 percent; Minimum sand content for fine
Emory	GV, OH	Cumulic Dystrochrepts, fine silty siliceous, thermic	Umbric Dystrochrepts, fine loamy, mixed, thermic (Cumulic?)	Thick Cambic horizon in hues of 7.5 YR and redder; base saturation less than 35% • about 10-x); darker colored epipedon than Greendale.

Series	Distribution	1964 Placement	Committee Recommendation	Distinguishing Characteristics
Enders	OH	Typic Normudults, clayey, kaolinitic, thermic	~~Same~~ Typic Leptudults, clayey, mixed, thermic	Conflicts with Sequoia if Enders Is thermic. Argillic horizon in hues redder than 7.5 YR in major part: Argillicis 12-25 inches thick; underlain by soft shale.
Ennis	GV, HR, OH	**Cumulic Haplorthents,** fine silty, siliceous. acid, **thermic**	Fluventic Dystrochrept ~~Typic Udalents,~~ **fine loamy, siliceous, acid thermic**	
Etowah	**GV, HR, OH, CB**	Humic Normudults, **fine silty, mixed thermic**	**Humic Normudults,** fine loamy, siliceous **thermic**	Thick argillic -horizon in hues of 5 YR and redder in major part; base saturation less than 35%- about 10-15.
Farragut	W	Humic Normudults, clayey **mixed**, thermic	**Humic Normudults,** clayey, **kaolinitic, thermic**	Thick argillic horizon in hues of 5 YR and redder in major part; underlain mostly by soft shale; base saturation less than 35 - about 10 to 15.
Frederick	W	**Typic Normudults, clayey,** kaolinitic, mesic	~~Same~~ Typic Normudults (Alfic?), clayey, mixed mesic	Used in Virginia; conflicts with Dunmore if both are typic.
Fullerton	**GV, OH**	**Typic Normudults,** clayey, kaolinitic, thermic	Same	Thick Argillic horizon in hues redder than 7.5 YR in major part. Base saturation about 10 percent: high chert content; serious conflict with Baxter. Separation of the two series on base saturation is not completely satisfactory

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Series	Distribution	1964 Placement	Committee Recommendation	Distinguishing Characteristics
Godwin	CB	Cumulic Hapludolls, fine silty, mixed thermic	Cumulic Haplaquolls, fine, mixed, thermic	Phosphatic; upper half of mollic has chromas of 2 and 3, lower half has chromas of less than 2; upper 10-15 inches of profile is recent overwash on a black poorly drained soil.
Greendale	GV, HR, OH	Cumulic Dystrochrepts, fine silty, siliceous, thermic	~~Alembic~~ Fluventic Dystrochrepts, fine loamy, siliceous, ~~thermic~~ Mesic	Thick cambic horizon in hues of 7.5 YR and yellower; 20 to 30% clay content; base saturation below 35 - about 10-15%.
Guin	HR, OH	Typic Dystrochrepts, sandy skeletal, siliceous, thermic	~~Same~~ Typic Dystrochrepts, loamy skeletal, siliceous, thermic	
Guthrie	HR, OH, GV	Typic Fragiaquults, fine silty, mixed, thermic	Typic Fragiaquults, fine silty, siliceous, thermic	Base saturation below 35%, ranges down to about 10%.
Hamblen	GV, OH, HR	Aquic Cumlic Haplorthents, fine silty, mixed, non-acid thermic	Aquic ~~alembic~~ Fluventic Dystrochrepts, fine loamy, siliceous, non-acid, thermic	Mottles with chromas of 2 or less within 20 inches of surface; PH ranges from 5.5 to 6.5.
Hampshire	CB	Typic Normudolfs, fine illitic, thermic	Typic ~~Normudults~~ Leptudults, clayey, mixed, thermic	Argillic horizon 15 to 30 inches thick in hues of 7.5 YR and yellower: 40-55% clay content; base saturation below 35, between 15 and 34; phosphatic.

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Series	Distribution	1964 Placement	Committee Recommendation	Distinguishing Characteristics
Hayter	W	Alfic Normudults, fine loamy, siliceous, mesic	Humic ~~Normudults~~ Leptudults, fine loamy, siliceous, mesic	Thick, weak argillic horizon in hues of 7.5 YR and yellower; base saturation 20 to 35%. AP horizon darker than value 4.
Holston	W	N.C.	Typic Normudults, fine loamy, siliceous, ~~mesic~~ ~~thermic~~ thermic	Argillic horizon 20 to 45 inches thick in hues of 7.5 YR and yellower; very low base saturation-5 to 15 percent. Conflicts with Apison; perhaps one should be dropped.
Humphreys	HR, GV, OH	Alfic Normudults, fine silty, siliceous thermic	Fluvantic Humic ~~Normudults~~ Leptudults, fine loamy, siliceous thermic	Thick, weak argillic horizon in hues of 7.5 YR and yellower; AP darker than value 4; base saturation 20 to 35 percent.
Huntington	W	Entic Hapludolls, fine silty, mixed mesic	MC.	
Inman	CB	Typic Normudolfs, fine illitic, thermic	Entic Normudolfs, fine, mixed, thermic	Phosphatic; argillic 6 to 10 inches thick; underlain by siltstones and limestone; PH above 5.5. Conflicts with Eden series.

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Series	Distributio	1964 Placement	Committee Recommendation	Distinguishing Characteristics
Jefferson	W	Typic Normudolfs, fine loamy, mixed, mesic	Typic Normudults, fine loamy, siliceous, ~~thermic~~ mesic	Thick argillic horizon in hues of 7.5YR and yellower; lov base saturation, less than 20 percent; more than 25% sand content in control section.
Landisburg	W	ochreptic Fragiudults, fin silty, siliceous, mesic	N.C.	
Lanton	GV, HR, CB, OH	Typic Haplaquolls, fine silty, mixed thermic	~~Cumulic~~ Fluventic Haplaquolls, fine silty, mixed, thermic (cumulic?)	Mollic epipedon 24 to 30 in. thick.
Lawrence	W	Aqueptic Fragiudults, fine silty mixed, mesic	N.C.	
Lax	HR, OH	Typic Fragiudults, fine silty, mixed, thermic	Typic Fragiudults, fine silty over loamy skeletal, siliceous, thermic (ochreptic?)	Needs study, may be ochreptic.
Leadvale	W	Ochreptic Fragiudults, fine silty, mixed, thensic	Ochreptic Fragiudults, fine silty, siliceous thermic	Fragipan underlain by leache or calcareous shale.

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Series	Distribution	1964 Placement	Committee Recommendation	Distinguishing Characteristics
Lee	HR, OH	Cumulic Normaquepts fine silty, mixed, acid, thermic	Fluventic ~~Alentic~~ Normaquepts, fine ~~loamy~~ silty, siliceous, acid, thermic	H 4.5 to 5.5
Lehew	GV	Typic Dystmchrepts, coarse loamy, siliceous, thermic	~~Same~~ Typic Dystrochrepts, Coarse loamy, siliceous, mesic (thermic?)	bout 15 to 25 inches to sandstone and shale bedrock; very strongly acid; appears to conflict with Rector series.
Lindside	W	Aquic cumulic Haplorthents, fine silty, mixed, non-acid, mesic	N.C.	
Litz	W	Entic Normudults, fine silty, siliceous, mesic	Entic ~~Normudults~~ Leptudults, fine silty ~~clayey~~, mixed, mesic, thin	Thin (2 to 8 inches) argillic horizon in hues of 7.5 YR or redder; strongly acid; low base saturation; soft, leached shale under argillic.
Lobelville	GV, HR, OH	Aquic cumulic Haplorthents, fine silty, mixed, acid, thermic	Aquic ~~Alentic~~ Fluventic Dystrochrepts, fine loamy, siliceous, acid, thermi	H leas than 5.5; mottles in chroma of 2 or less within 20 in. of surface.
Maury	CB	Humic Normudults, clayey, mixed-phosphatic, mesic	Humic Normudults, clayey, mixed, thermic-mesic	hosphatic; thick argillic in hues redder than 7.5 YR; base saturation 2-C to 35%; clay content of control about 40%.

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Series	Distribution	1964 Placement	Committee Recommendation	Distinguishing Characteristics
Melvin	GV, HR, OH, CB	Cumulic Normaquepts, fine silty, mixed, non-acid, thermic	Fluventic ~~Aleubic~~ Normaquepts, fine silty, mixed, non-acid, thermic	PH 5.5 to 6.5. Conflicts with Uhoon. Maybe Mhoon ~~is mixed Mineralogy and Melvin siliceous~~. has higher percentage of sand.
Mimosa	CB	Mollic Normudolfs, fine, illitic, thermic	Typic Normudolfs, fine, mixed, thermic	Phosphatic; clay content of argillic 50 to 70 percent; color In hues 7.5 YR and yellower. Reeds study to determine color of epipedon and base saturation in lower part of argillic.
Minvale	GV, HR, OH	Typic Normudults, fine silty, mixed, thermic	Typic Normudults, fine loamy siliceous themic	Thick argillic in hues of 5 YR and redder in major part; low base saturation, commonly 10 to 15 percent; low sand content, moderate to high chert content.
Monogahela	GV	Ochreptic Iregiudults, fine loamy, siliceous, mesic	N.C.	
Montevallo	GV	Lithic Dystrochrepts, loamy skeletal, siliceous, mesic	Lithic Dystrochrepts, loamy skeletal, siliceous, thermic	Less than 20 inches to ~~soft~~ hard shale; very strongly acid and low base saturation; yellower than 5 YR.
Mountview	HR, OH	Typic Normudults, fine silty mixed, themic	Typic Normudults, fine silty, siliceous, thermic	Thick argillic in hues of 7.5 YR and yellover; low base saturation - 10-15%.

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Series	Distribution	1964 Placement	Committee Recommendation	Distinguishing Characteristics
Needmore	GV	Typic Normudults, clayey mixed, thermic	Alfic Normudults, clayey, mixed, mesic	Argillic horizon 15 to 30 ins. thick in hues 7.5 YR and yellower; underlain by calcareous shale. PH above 5.5 at 50 ins. below top of argillic.
Neubert	GV	Cumulic Dystrochrepts, fine loamy, mixed, thermic	Typic Udifluvents ~~Umbric [illegible]~~, fine loamy, siliceous, thermic	No diagnotic horizon except' plow layer; hues of 7.5 YR and redder; PH 5.0-5.5.
Newark	GV, HR OH, CB	Aeric cumulic Normaquepts, fine silty, mixed, Non-acid, thermic	Aeric Fluventic ~~Alentic~~ Normaquepts, fine silty, mixed, non-acid, thermic	PH 5.5 - 6.5. May conflict with Commerce.
Nixa	GV, HR, OH	Ochreptic Fragiudults, fine silty, siliceous, thermic	Ochreptic Fragiudults, ~~fine loamy, siliceous, thermic~~ loamy skeletal, siliceous, mesic	Bisequel profile; chert fragments or gravel qualfies the series for fine loamy.
Nolichucky	GV, HR, OH	Typic Fragiudults, fine loamy, mixed, mesic	Typic Normudults ~~Fragiudults~~, fine loamy, siliceous, mesic ~~thermic~~	Thick argillic in hues redder than 7.5 YR in major part; low base saturation. 5-15%; high sand content.
Ochlockonee	HR, ?	Cumulic Haplorthents, coarse loamy, siliceous, acid, thermic	Fluventic Dystrochrepts, Coars ~~Typic udients, fine~~ loamy, siliceous, thermic	High sand content; PH 4.5-5.5; questionable whether Cambic is present.

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Series	Distribution	1964 Placement	Committee Recommendation	Distinguishing Characteristics
Pembroke	HR, OH, CB	Humic Normudults, fine silty, mired, thermic	Same	Thick argillic in hues redder than 7.5 YR; base saturation 20 to 35 percent; AP horizon darker than value 4.
Pickwick	HR, OH, CB	Typic Normudults, fine silty, mixed, thermic	Same	Thick argillic in hues redder than 7.5 YR in major part; base saturation 20-35; AP horizon in values of 4 or more
Roellen	HR, CB, OH, GV	Typic Haplaquolls, fine, mixed, thermic	Same	Mollic 10 to 20 Inches thick.
Saffell	HR	Typic Normudults, loamy skeletal, siliceous, thermic	Same	- -
Sango	HR, OH	Aqueptic Fragadults, fine silty, mixed thermic	Aqueptic ~~Fragadults,~~ Fragiudults coarse silty, siliceous thermic	Bisequel profile; [redacted]
Sequatchle	GV, HR, OH	Alfic Normudults, fine loamy, siliceous, mesic	Mollic Normudults ~~Humic Normudults,~~ coarse loamy, siliceous, thermic	Thick, weak argillic in hues of 7.5 YR and yellower;
Sequoia	GV	Typic Normudults, clayey, mixed thermic, thin	Entic Leptudults ~~Typic Normudults,~~ clayey, mixed, therm	Argillic 12 to 30 inches thick underlain by soft shale; hues are 5 YR and redder in major part; less than 20% base saturation.

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Series	Distribution	1964 Placement	Committee Recommendation	Distinguishing Characteristics
Staser	GV, HR, OH	Entic Hapludolls, fine silty, mixed, thermic	~~Cumulic~~ Fluventic Hapludolls, fine loamy, mixed thermic (Cumulic Fluventic)	Mollic more than 20 inches thick; PH 5.5 - 6.5.
State	GV	Alfic Normudults, fine loamy siliceous, mesic	N.C.	
Taft	GV, HR, OH, CB	Aqueptic Fragiudults, fin silty, mixed, thermic	Aqueptic Fragiudults, fine silty, siliceou thermic	Bisequel profile; base saturation about 10%.
Talbott	GV, CB	Typic Normudults, clayey, mixed, thermic	Typic Normudalfs, fine, mixed, thermic	Argillic about 20 to 40 inches thick; hues of 5 YR and redder in major part; reaction above 5.5 at 50 inches below top of Et.
Tellico	GV	Typic Rhodudults, clayey, oxidic, thermic	Same	- -
Waynesboro	GV, HR, OH, CB	Typic Normudults, Clayey, kaolinitic, thermic	Same	Thick argillic hues of 5 YR and redder in major part; base saturation 5 to 15 Percent.
Whitwell	GV, HR, OH	Paraquic Nonuudults, fine Loamy, siliceous, thermi	Same	Base saturation less than 35%; mainly 20 to 35%.

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COMMITTEE D - Subgroups of Haplustalfs needed in Texas

Haplustalfs

Typic Haplustalfs. Haplustalfs that--

Statements b, c, d, e, and h from 1964 supplement, plus

i. are usually moist, but are dry in some part of the upper 1.5 meters (60 Inches) for more than 135 days (cumulative) in most years.

j. have argillic horizons with less than 35 percent clay in the upper half and lack clear or abrupt textural changes between the A and B horizons.

Calciustollic Haplustalfs. Haplustalfs like the Typic except for d and h.

Amarillo

Mollic Haplustalfs. Haplustalfs like the Typic except for d.

Cobb

Mollic Petrocalcic Haplustalfs. Haplustalfs like the Typic except for d and h with petrocalcic.

Arvana

Petrocalcic Haplustalfs. Haplustalfs like the Typic except for h with petrocalcic.

Delmita

Lithic Udic Haplustalfs. Haplustalfs like the Typic except for e and i.

Exray

Udollic Haplustalfs. Haplustalfs like the Typic except for d and i.

May or
Bastrop

Aquic Haplustalfs. Haplustalfs like the Typic except for c and i.

Vashti

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Udultic Haplustalfs. Haplustalfs like the Typic except for b and i.

Bonti

Udollic Nimic Haplustalfs. Haplustalfs like the Typic except for d, i, and j.

Bexar or
Lindy

Mollic Nimic Haplustalfs. Haplustalfs like tile Typic except for d and j.

Orelia

Udic Haplustalfs. Haplustalfs like the Typic except for i.

Moisture Breaks - Guides

1. Usually moist in some part of the upper 60 inches of the soil but are dry in some part for less than 90 days (cumulative) in most years.

   8. This is east of P. E. 64 ± 4.

   b. All Udic great groups are east of P. E. 64 ± 4.

      (1) Udolls

      (2) Udalfs

      (3) Udifluvents

      (4) Uderts

      (5) Udipsamments

      (6) Also Ultisols, Dystrochrepts, and Eutrochrepts.

   c. This boundary also approximates the boundary between the Land Resource Regions of M, Central Feed Grains and Livestock Region, N. East and Central General Farming and Forest Region; and P, South Atlantic and Gulf Slope Cash Crop, Forest, and Livestock Region, which are east of P. E. 64 ± 4; and the H, Central Great Plains Winter Wheat and Range Region; and J, Southwestern Prairies, Cotton and Forage Region, which are west of P. E. 64 ± 4.

2. All Udic subgroups of Ustic great groups are east of P. E. 44 ± 4, excepting Fluvents and Fluvic or Fluventic soils, which are east of P. E. 33 ± 4. Usually moist in some pert of the upper 60 inches of the soil but are dry in some part for 90 to 135 days (cumulative) in most years.

   a. Udic subgroups of Ustolls, Ustalfs, Uscerts, Ustipsamments, and also Ustrochrepts. P. E. 44 ± 4 - 64 ± 4.

   b. Udic subgroups of Ustifluvents and Fluventic Udic or Fluvic Udic subgroups. P. E. 33 ± 4 - 64 ± 4.

   c. Typic subgroups of Ustic great groups are east of P. E. 24 ± 4.

3. Typic subgroups of Ustic great groups.

   Usually moist in some part of the upper 60 inches of the soil but are dry in some port for 135 to 180 days (cumulative) in most years.

4. Torri. Usually dry.

5. Recommend that definitions of moisture statements for Udolls and Xeralfs be made consistent with Udalfs and Xerods, respectively. Udolls are defined as 60 consecutive days and Xeralfs as 90 days (cumulative).

6. R&commend that another name be selected to replace Pale that connotes thick rather than old. Pach was suggested.

H. T. Otsuki, Chairman
W. Fuchs
J. Culver
W. B. McKinzie

COMMITTEE E.

Gordon McKee, Chairman
H. C. Dean, Texas
R. C. Carter
D. F. Slusher
E. H. Templin
J. Nichols
Luis Rivera

We recommend that the following Vertic subgroups be recognized for use in the Southern States:

Rendollic Vertic Eutrochrepts	(Sumter)
Fluventic Vertic Normaquepts	(Alligator)
Aeric Fluventic Vertic Normaquepts	(Houlka)
Aquic Fluventic Vertic Eutrochrepts	(Roebuck)
tbtolllo Vertic Camborthids	(Mangum)
Haplic Vertic Calciustolls	(Knippa)
Petrocalcic Vertic Calciustolls	(Valera)
Cumulic Vertic Haplaquolls	(Trinity)
Aquic Vertic Hapludolls	(Miller)
Vertic Ochraqualfs	(Mayhew)
Udic Vertic Haplustolls	(Denton)
Cumulic Vertic Haplustolls	(Miller)
Vertic Udic Ustrochrepts	(Ellis)

The definition of each proposed subgroup is based on the statement, "Like the Typic except for ...." The following statement is added to each Typic subgroup:

( ) Lack in all horizons below the surface down to a lithic or paralithic contact or to a calcic horizon that must be deeper than 20 inches or to one meter whichever is shallower, more than 35 percent clay and more than 30 milliequivalents exchange capacity per 100 gms. of soil and one or more of the following characteristics:

1. Having at some season, if not irrigated, cracks 1 to 25 cm. wide that reach to a depth of 20," or

2. A coefficient of maximum potential extensibility of .08 or more (coefficient of swelling may be used when values become available).

In addition the Udic subgroup is proposed for Ustolls and Ustalfs where the Typic is defined as .... "are dry in some horizon below 25 cm. (10 inches) for more than 90 consecutive days during most years."

Torrerts (only one group is recognized).

Typic Torrerts. Torrerts that --

Dalby

a. have moist chromas of 1.5 or more throughout the upper 30 cm. (12 inches);

b. have surface color value that is more than 3.5 when moist, or the horizon that is darker than this is less than 30 cm. (12") thick;

c. have less than 15 percent Na saturation in all horizons throughout the pedon to a depth of 75 cm. (30 inches).

Aquic Torrerts. Torrerts like the Typic except a.

Natric Torrerts. Torrerts like the Typic except e.

[illegible]

Ustic Torrerts. Torrerts like the Typic except b.

Verhalen

Uderts.

Pelluderts.

Typic Pelluderts. Pelluderts that --

Hollywood

a. have to a depth of more than 75 cm. (30 inches) in more than 50 percent of the pedon moist values of 3.5 or less (5 when dry);

b. have a matrix with chromas less than 1.5 throughout the upper 75 cm. (30 inches);

c. have loose porous surface mulch and lack fragments of a platy or massive crust;

d. have less than 15 percent saturation with sodium in all horizons to 75 cm. (30 inches);

e. have pH values (1:1 in water) of 5.5 or more throughout the upper 30 cm. (12 inches).

Chromic [illegible] Pelluderts. Pelluderts like the Typic except for b.

Houston (of Alabama & Mississippi)

Natraquollic Pelluderts. Pelluderts like the Typic except for d.

Mazaqualfic Pelluderts. Pelluderts like the Typic except for a, c, and e, and have base saturation above 35 percent in some part of the control section.

Beaumont
Eutaw

Entic Pelluderts. Pelluderts like the Typic except for a.

[illegible]

Chromuderts.

Typic Chromuderts. Chromuderts that --

a. have to a depth of more than 75 cm. (30 inches) in more than 50 percent of pedon moist values of 3.5 or less (5 when dry);

b. lack distinct to prominent mottles within 40 cm. (20 inches) of the soil surface;

c. have a loose porous surface mulch and lack fragments of a platy or massive crust;

d. have pH values (1:1 in water) of 5.5 or more throughout the upper 30 cm. (12 inches).

Entic Chromuderts. Chromuderts like the Typic except for a.

Mazaquilfic Chromuderts. Chromuderts like the Typic except for a, b, c, and d and have base saturation greater than 35 percent in some part of the control section.

Oktibbeha

Usterts.

Pellusterts.

Typic Pellusterts. Pellusterts that --

a. have color values of 3.5 or less when moist and 5 or less when dry to a depth of 30 cm. (12 inches);

b. have chromas of less than 1.5 throughout the upper 75 cm. (30 inches) in more than 50 percent of the pedon;

c. have a loose, porous surface mulch consisting of discrete, very hard aggregates dominantly less than 5 mm. in diameter; lack a platy or massive surface crust containing uncoated silt or sand grains and persisting after drying; and lack fragments of a platy or massive crust in an Ap horizon;

d. have less than 15 percent saturation with sodium in all horizons to 75 cm. (30 inches);

e. have cracks that remain open less than a total of 150 days per year.

Chromic

Torric Pellusterts. Pellusterts like Typic except for b.

Houston of Texas

Chromic

Aeric Entic Pellusterts. Pellusterts like the Typic except for a and b.

Terrie

Entic Torric Pellusterts. Pellusterts like the Typic except for a and e.

Lipan

Mazic Pellusterts. Pellusterts like the Typic except for c.

Burleson

Natric Torric Pellusterts. Pellusterts like the Typic except for b and d.

Victoria

Natrentic Torric Pellusterts. Pellusterts like the Typic except for a, b, and d.

Montell

Torric Pellusterts. Pellusterts like the Typic except for d.

Roscoe

Mazic Natric Torric Pellusterts. Pellusterts like the Typic except for c, b, and d.

Banquete

Chromusterts.

Typic Chromusterts. Chromusterts that --

Tobosa

a. have color values of 3.5 or less when moist and 5 or less when dry to a depth of 30 cm. (12 inches);

b. have less than 15 percent saturation with sodium in all horizons to 75 cm. (30 inches);

c. have a loose, porous surface mulch consisting of discrete, very hard aggregates dominantly less than 5 mm. in diameter; lack a platy or massive surface crust containing uncoated silt or sand grains that persists after drying; and lack fragments of a platy or massive crust in an Ap horizon;

d. have cracks that remain open more than a total of 150 days per year.

Entic Chromusterts. Chromusterts like the Typic except for a.

<u>Natrustic</u> <u>Chromusterts</u>. Chromusterts like the Typic except for a and b.

Viboras

<u>Udic</u> <u>Chromusterts</u>. Chromusterts like the Typic except for d and cracks remain open from 90 to 150 days.

<u>Mazic</u> <u>Natrustalfic</u> <u>Chromusterts</u>. Chromusterts like the Typic except for b and c.

Fe´(of Puerto Rico)

<u>Xererts</u>.

<u>Pelloxererts</u>.

<u>Typic</u> <u>Pelloxererts</u>. Pelloxererts that --

a. have color values of 3.5 or less when moist and 5 or less when dry to a depth of 30 cm. (12 inches);

b. have chromas of 1.5 or less throughout the upper 75 cm. (30 inches) in more than 50 percent of the pedon;

c. have a loose, porous surface mulch consisting of discrete, very hard aggregates dominantly less than 5 mm. in diameter; lack a platy or massive surface crust containing uncoated silt or sand grains and persisting after drying; and lack fragments of a platy or massive crust in an Ap horizon;

d. have less than 15 percent saturation with sodium in all horizons to 75 cm. (30 inches).

Chromic
<u>Aeric</u> <u>Pelloxererts</u>. Pelloxererts like the Typic except for b.

<u>Entic</u> <u>Pelloxererts</u>. Pelloxererts like the Typic except for a.

<u>Chromoxererts</u>.

<u>Typic</u> <u>Chromoxererts</u>. Chromoxererts that --

a. have color values of 3.5 or less when moist and 5 or less when dry to a depth of 30 cm. (12 inches);

b. have less than 15 percent saturation with sodium in all horizons to 75 cm. (30 inches);

c. have a loose, porous surface mulch consisting of discrete, very hard aggregates dominantly less than 5 mm. in diameter; lack a platy or massive surface crust containing uncoated silt or sand grains that persists after drying; and lack fragments of a platy or massive crust in an Ap horizon.

COMMITTEE F - Ultiosls and Inceptisols

General Rules --

1. Divisions on depth to bedrock. The Lithic subgroups plus proposed separation of Normudults and Tenudults on thickness of solum will make the separations on depth to bedrock which we desire.

2. The report on classification of certain soils from sandstone and shale sets up limits for soils on depth to rock which straddles certain provisions of classification in the system. The Committee recommends this report be revised to bring it in line with the classification system.

4. The Fluvic soils were not considered'as Committee III in making the placement recommendations, and all members of Committee F are on Committee III.

O.R. Carter, Chairman
C. B. Breinig
William H. Bender

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Series	Committee Recommendation	SS Classification 10-1-64	Other Classifications (if different from SS)
Allen (Tenn)	Typic Normudult, fine loamy siliceous, mesic	Typic Normudult, clayey, Kaolinitic, thermic	Tenn: fine loamy, siliceous mesic NE: fine loamy, mixed, thermic
Apison (Tenn)	Typic Tenudult, fine silty siliceous, thermic	Typic Normudult, fine silty, siliceous, thermic	NE: fine silty, mixed, thermic
Bethias (Ark)	reassign to Committee III	Cumulic Normaquepts, fine silty, mixed, acid, mesic	MW: fine loamy, mixed, acid, thermic NE: fine loamy, mixed, acid, mesic
Blago (Ohio)	not used if Samba approved	NC	MW. Typic Argiaquults, fine, mixed, mesic NE. Typic Umbraquults, clayey, mixed mesic
Cane (Ala)	close competitor with Ora series	Typic Fragiudults, fine loamy, mixed thermic	
Casa (Ark)	reassign to Committee III	Cumulic Haplothents, fine loamy, siliceous, acid, thermic	
Cleora (Okla)	reassign to Committee III	NC	Ultic Hapludoll, coarse loamy siliceous, thermic ? (Proposed Okla. reactivation)
Conway (Ark)	aquic Normudult, fine silty, mixed, thermic	aquic Normudults, fine silty, mixed, thermic	
Crossville (Tenn)	umbric Dystrochrept, fine loamy, siliceous, mesic	Typic Dystrochrepts, fine loamy, siliceous, mesic	Tenn: Umbric Dystrochrepts NE: Alfic Normudults, coarse loamy, siliceous, mesic
* Dalespring (Ark)	as proposed, if approved		Proposed: Typic Fragiaquults, fine silty, mixed, thermic
Enders (Ark)	Typic Tenudult, clayey, mixed, thermic	Typic Normudults, clayey, kaolinitic, thermic	NE: clayey, mixed, thermic

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Series	Recommendation	SS Classification	Other classifications
* Fayetteville (Ark)	under study as proposed if series approved	?	
Hanceville (Ala)	Typic Rhodudults, fine loamy, mixed, thermic	Typic Rhodudults, fine loamy, mixed, thermic	
Hartsells (Ala)	Typic Tennudult, fine loamy mixed, thermic	Typic Normudults, fine loamy, mixed, thermic	
Hector (Ark)	Lithic Dystrochrepts, loamy, siliceous, thermic	NC	Ark: Lithic Dystrochrepts, loamy siliceous, thermic
Holston (Tenn)	Typic Tennudults, fine loamy, siliceous, thermic.	NC	Tenn: Typic Normudults, fine loamy, siliceous thermic NE: Typic Normudults, fine silty, mixed, thermic
Johnsburg (Ind)	NC or use NE classification	Aqueptic Fragiudults, fine silty, mixed, mesic	NE: Typic ~~Fragiudults~~ Fragiaqualts, fine silty, mixed, mesic
Jefferson (Ky)	Typic Tennudult, coarse loamy, siliceous, mesic	Typic Normudults, fine loamy, mixed, mesic	Tenn: fine loamy, siliceous, mesic NE: Thermic
Leadvale (Tenn)	Typic Fragiudults fine silty, siliceous, thermic	Ochreptic Fragiudults, fine silty mixed thermic	Tenn: Typic Fragiudults, fine silty, siliceous, thermic
Linker (Ark)	Typic Tennudults, fine loamy mixed, thermic	Typic Normudults, fine loamy, mixed, thermic	
~~[illegible]~~ Locust (Ala)	Ochreptic Fragiudults, fine loamy, siliceous, thermic	Ochreptic Fragiudults, fine loamy siliceous, thermic	
Monongahela (W Va)	Ochreptic Fragiudults, fine loamy, siliceous, thermic	Ochreptic Fragiudults, fine loamy, siliceous, thermic	NE Typic Fragiudults, fine silty, mixed, mesic
Montevallo (Ala)	Typic Dystrochrepts, loamy skeletal, siliceous, thermic	Typic Dystrochrepts, loamy skeletal, siliceous, thermic	NW: Mixed NE: Lithic Dystrochrepts, loamy skeletal, mixed, thermic

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Series	Recommendation	SS Classification	Other Classification
*Mountainburg (Ark)	As proposed, if series approved		Proposed: Lithic ~~Dystrochrepts~~ Hapludults loamy, siliceous, thermic
*Bliss (Ark)	As proposed, if series approved		Proposed: Typic Normudults, fine loamy, mixed, thermic
Philo (Ky)	reassign to Committee III	Aquic Cumulic Haplorthods, fine loamy, siliceous, acid, mesic	MW: mixed, acid, thermic NE: Coarse loamy, mixed, acid, mesic
Pope (Ark)	reassign to Committee III	Cumulic Haplorthods, fine loamy, siliceous, acid, thermic	MW: Coarse loamy, siliceous, acid, thermic NE: Coarse loamy, siliceous, acid, mesic
Purdy (Ohio)	Typic Fragiaqualfs, fine silty, mixed, mesic	NC	MW: Typic Fragiaqualfs, fine silty, mixed, mesic NE: same
Ramsey (N. Caro.)	Lithic Dystrochrepts, loamy, siliceous, mesic	Lithic Dystrochrepts, loamy skeletal, siliceous, mesic	
Rarden (Ky)	Typic Fenudults, clayey, mixed, mesic	Typic Normudults, clayey, mixed, thermic	NE: mesic
*Razorback (Ark)	As proposed, if series approved		Proposed: Mollic Normudalfs, fine loamy, mixed, ~~thermic~~ mesic
*Samba (Ark)	As proposed, if series approved		Proposed: Typic Umbraqualfs, fine mixed, thermic
Sequatchie (Tenn)	Humic Fenudults Coarse loamy, siliceous, thermic	Alfic Normudults, fine loamy, siliceous, thermic	Tenn: Alfic Humic Normudults Coarse loamy, siliceous, thermic
Stendal (Ind.)	reassign to Committee III	Aeric Cumulic Normaquepts, fine loamy, siliceous, acid, mesic	
Tyler (Ohio)	Not Classified	NC	MW Aqueptic Fragiudults, fine silty, mixed, mesic

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Series	Recommendation	SS Classification	Other Classification
Waynesboro (Tenn)	Typic Normudults clayey, kaolinitic, thermic	Typic Normudults, ~~fine silty, mixed~~ [redacted] (clayey, kaolinitic) Thermic	~~NE Alfic Normudults~~
Wilbston (Ohio)	Typic Tenudults fine silty, mixed, mesic,	Typic Normudults, fine silty, mixed, mesic	NE: Alfic Normudults
Whitwell (Tenn)	Paraquic Tenudults, fine loamy siliceous, thermic	Paraquic Normudults, fine loamy, siliceous, thermic	NE: Aquic Normudults, fine loamy, mixed, mesic
Sequoia	~~Typic~~ Entic Tenudults, clayey, mixed, thermic		
Shelocta	Typic Normudult, fine loamy, siliceous, mesic		
Cleburne	Typic Tenudults, fine loamy, siliceous mesic		
Muskingum	Typic Dystrochrept, fine loamy, siliceous, thermic		
Berks	Typic Dystrochrepts, loamy skeletal, siliceous, mesic		
Dekalb	Typic Dystrochrepts, coarse loamy, siliceous, mesic		
Litz	Entic Tenudult, fine silty, siliceous, mesic		