# Simplified Guide to Soil Taxonomy

J. Cameron Loerch[1], Michel D. Ransom[2], John M. Galbraith[3], David C. Weindorf[4], H. Curtis, Monger Jr.[5], Joseph V. Chiaretti[1], Craig A. Ditzler[1], Kenneth F. Scheffe[1]

[1]USDA NRCS National Soil Survey Center, Lincoln, NE, [2] Kansas State University, Manhattan, KS, [3] Virginia Tech, Blacksburg, VA, [4] Texas Tech University, Lubbock, TX, [5] New Mexico State University, Las Cruces, NM

Soil Taxonomy: A Basic System of Soil Classification for Making and Interpreting Soil Surveys, and its companion document, *Keys to Soil Taxonomy,* are used by professional soil scientists and serve as the standard for soil classification in the United States. They are necessarily very technical and thus difficult to learn and use by students and other natural resource scientists. Soil Taxonomy is challenging to teach and challenging to understand if the user does not have extensive knowledge and experience in soil science across a broad variety landscapes and settings from artic to desert and coastal plain to mountain and in specific sciences including mineralogy, physics, chemistry, and biology. Further complicating the ease to learn and use is the predominantly text-based criteria key format and organization.
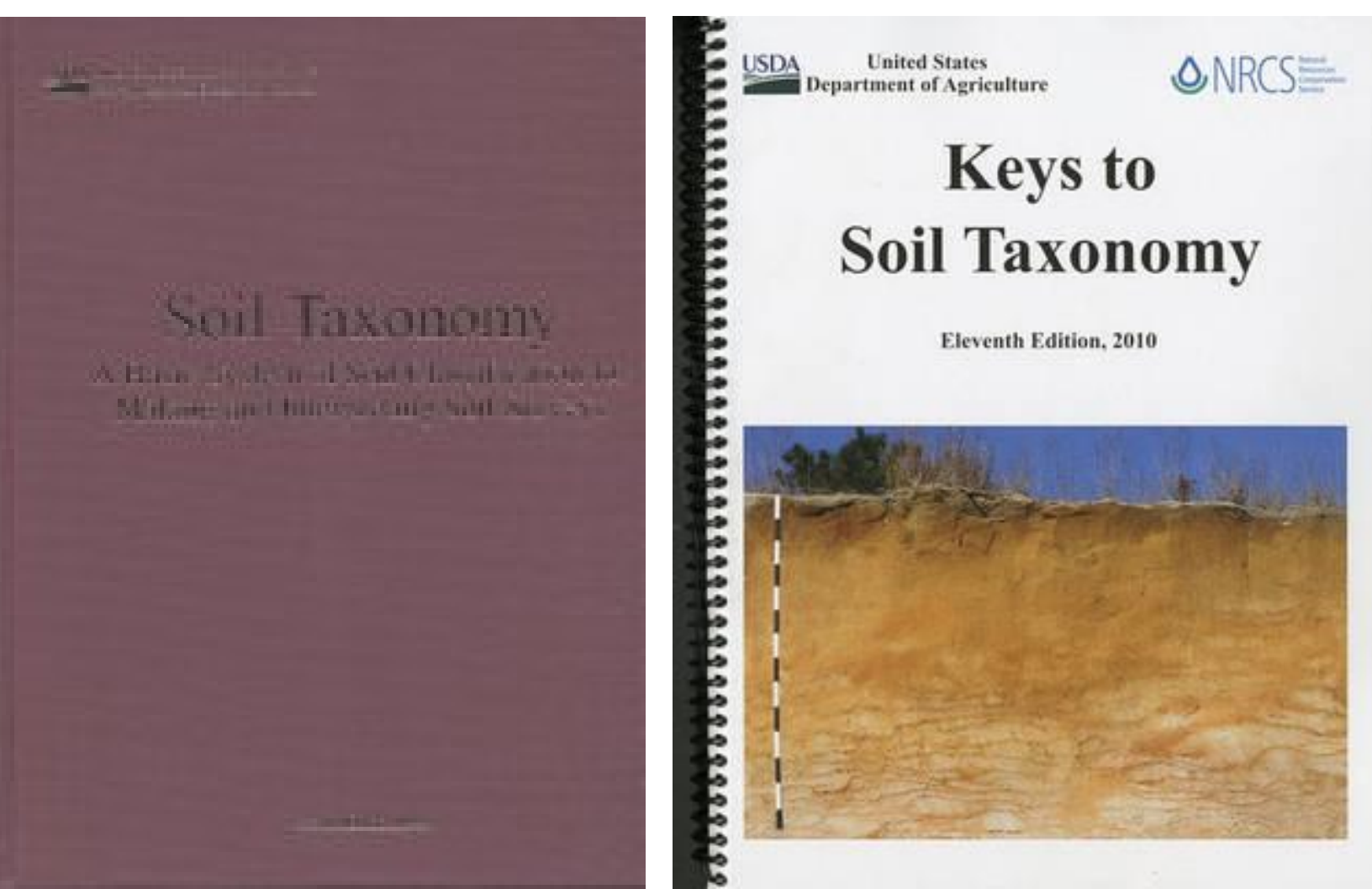
To address these issues, an ad hoc NCSS (National Cooperative Soil Survey) working group was formed in May 2011 with the charge to gather input and comments on problems and solutions in teaching and using Soil Taxonomy, and to develop a user guide that provides a more systematic and user-friendly approach to soil classification. The Work Group conducted its business via monthly teleconferences to draw upon the knowledge and experiences of soil scientists working within the NCSS. Participation has been informal with participation varying by subject area and the interest and experience of the participants. As the various topical areas are addressed, the Work Group recruits the input of scientists with specific knowledge and experience for input.

Members who have provided input to date include:

Janis Boettinger, Utah State University
Craig Ditzler, NRCS-NSCC (retired)
Kim Kerschen, Kansas State Univ. (MS student)
Paul McDaniel, University of Idaho
Curtis Monger, New Mexico State University
Phillip Owens, Purdue University
Kenneth Scheffe, NRCS-NSSC
Mark Stolt, University of Rhode Island
Joe Chiaretti, NRCS-NSSC,
John Galbraith, Virginia Tech
Cam Loerch, NRCS-NSSC (Co-chair)
Shawn McVey, NRCS-NSSC
Toby O'Geen, University of California-Davis
Mickey Ransom, Kansas St. Univ. (Co-chair)
Joey Shaw, Auburn University
David Weindorf, Texas Tech University

An initial draft of selected sections the Guide was presented for review at the 2013 National Cooperative Soil Survey Conference in Annapolis, MD in June to gather input from students, scientists from NCSS cooperators in attendance which has been integrated into the draft which is now out in the field for testing.
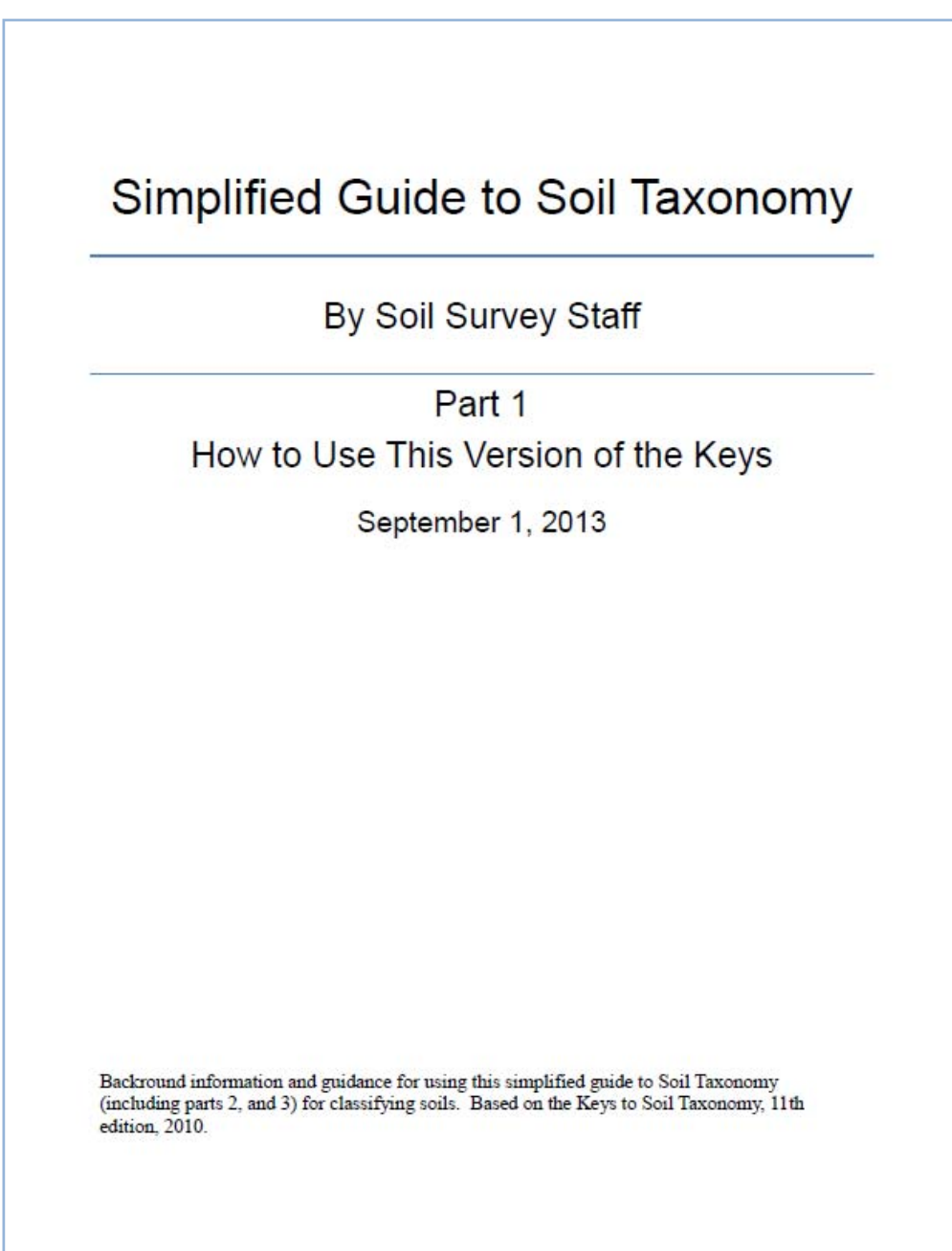
The Working Group has made a number of decisions regarding the objectives and content of the document including name "*Simplified Guide to Soil Taxonomy*". The primary goal of the Guide is to simplify learning and using Soil Taxonomy. It targets the classification of soils to the Great Group level in Soil Taxonomy. Targeted users include field soil scientists, university students, scientists in other disciplines, and soil science practitioners in the private sector.

Several assumptions were made in development of the Guide to assure its utility

- First, the guide should be practical and used while in the field, and presented in printed or electronic format.
- To be useful as a teaching aid, the target audience will have taken at least one soil science course, or a related course with extensive soil science content.
- The Work Group recognized a simplified guide could not be 100% correct in all circumstances, but targeted the level of precision to be correct, at the Great Group level, 90% of the time.
- If the need is to be 100% correct, the Keys to Soil Taxonomy should be used.
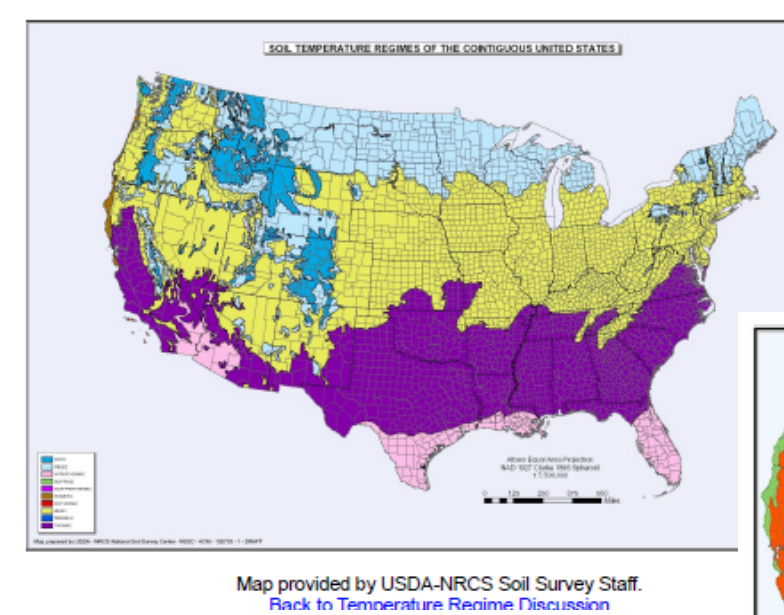
To assess the accuracy and ease of use, the guide is being tested at participating universities in teaching their soils classes and preparation for the collegiate soil judging contests.

The guide includes three main Parts based upon the Keys to Soil Taxonomy, 11th Edition.

Part 1 titled *How to Use this Version of the Keys* provides background information and guidance for using the simplified guide to Soil Taxonomy for classifying soils.

It introduces the concepts of diagnostic horizons and features, soil Orders, Suborders, and Great Groups.

It references source documents of information used in the description of soil profiles aiding in the recognition of diagnostic horizons and features, and consideration of soil location for determination of moisture and temperature regimes.
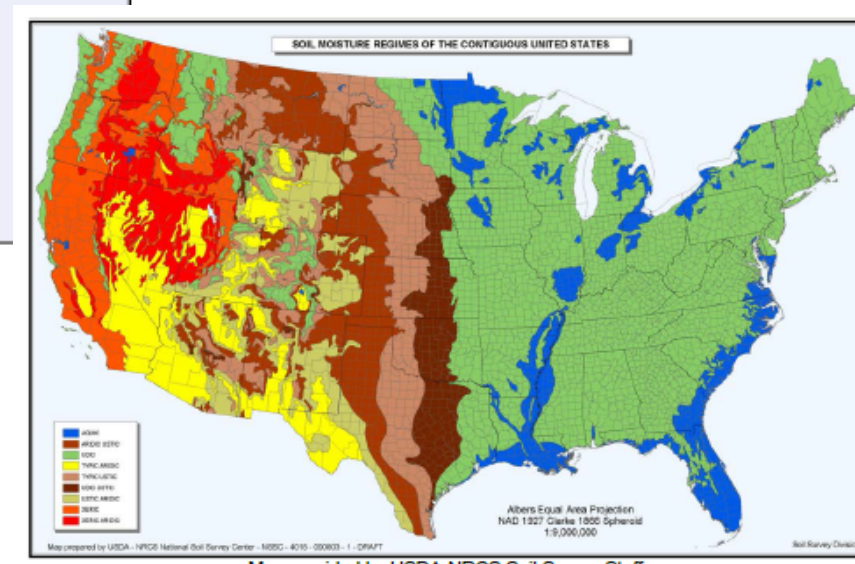
It provides operational guidance needed to classify soils including the rounding of numbers, definitions, importance of color, horizon nomenclature, depth classes, and soil climate.

Part 2 details the *Diagnostic Horizons and Features* recognized in Soil Taxonomy. It is extensively augmented with photographs, illustrations, and maps, including the background and description of the concepts behind the diagnostic characteristics.

The diagnostic criteria are listed alphabetically and described in concise for ease of use.

It includes two subparts. The first addresses epipedons and the second addresses subsurface horizons and diagnostic features.

The guide makes extensive use of hyperlinks to other sections of the guide and other technical documents where concepts are further defined, described, and illustrated.

The Guide could be used on smartphones, as well as 3G tablets and computers to access additional information from the internet resources.

Part 3 is *Keys to Orders, Suborder, and Great Groups*, providing the simplified key to classify a soil to the Great Group.
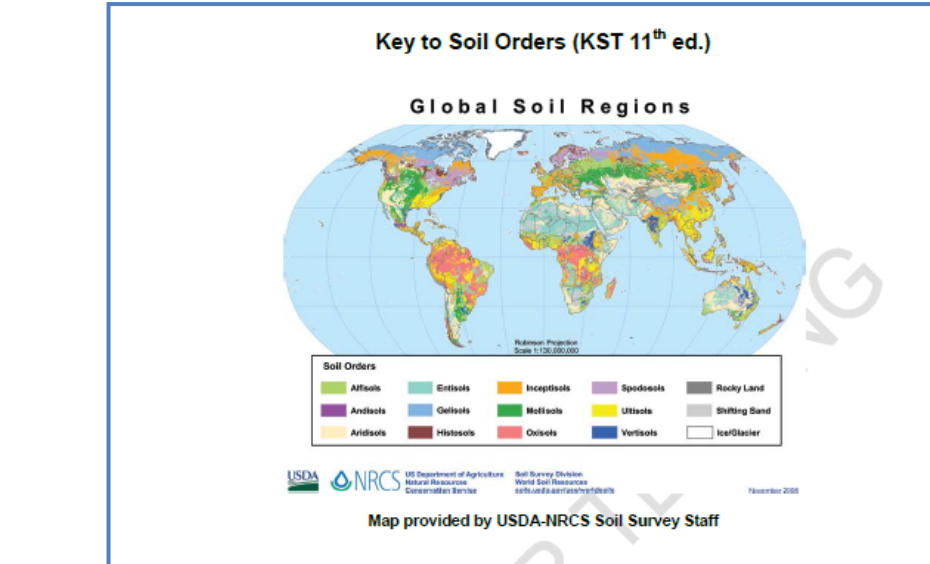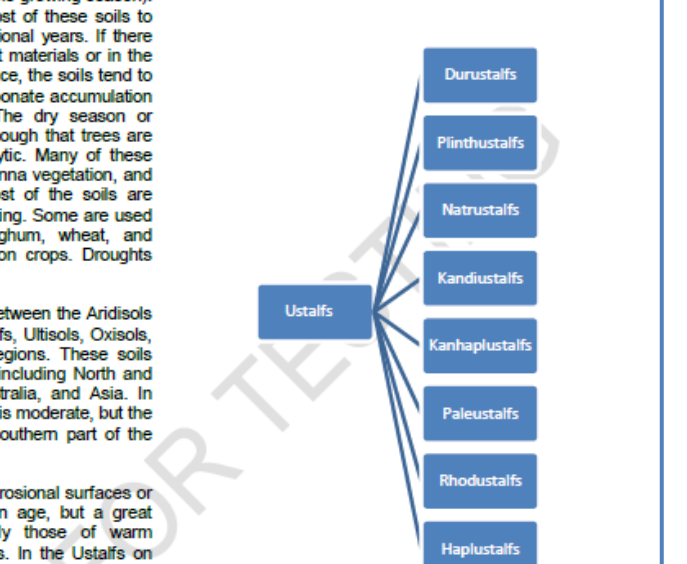
The soil Order is discussed in terms of its general characteristics, environment of occurrence and soil forming processes as well as the locations the Order has been observed.

Maps show the worldwide distribution of the soil Order and the US distribution of soils to the Suborder level.

The guide is organized in the order in which soils 'key out' by diagnostic characteristics, and it provides hyperlinks to the selected next lower level of the classification system, as well as a return feature to the previous level.

Principle divisions are of course the 12 Soil Orders, and each subsection includes soil profile photographs of selected taxa and flow diagrams of the Orders through Suborder and Great Group.

The Great Groups include narrative descriptions of the characteristics of the soils in the class thus greatly aiding the understanding of how the criteria distinguishes each Great Group class from its competitors.

The ad hoc Working Group is exploring the development additional guides and references to aid the understanding and classification of soils. These include guides or charts facilitating classification to the family level, simplifying the determination of control section, particle size class, and depth class.

If you have interest in testing the *Simplified Guide to Soil Taxonomy* or participate with the Working Group , please contact the NCSS ad hoc committee co-chairs Dr. Michael (Mickey) Ransom, Kansas State University, (mdransom@ksu.edu) or Cam Loerch, NSSC, National Leader for Soil Survey Standards (cameron.loerch@lin.usda.gov).

NRCS Natural Resources Conservation Service