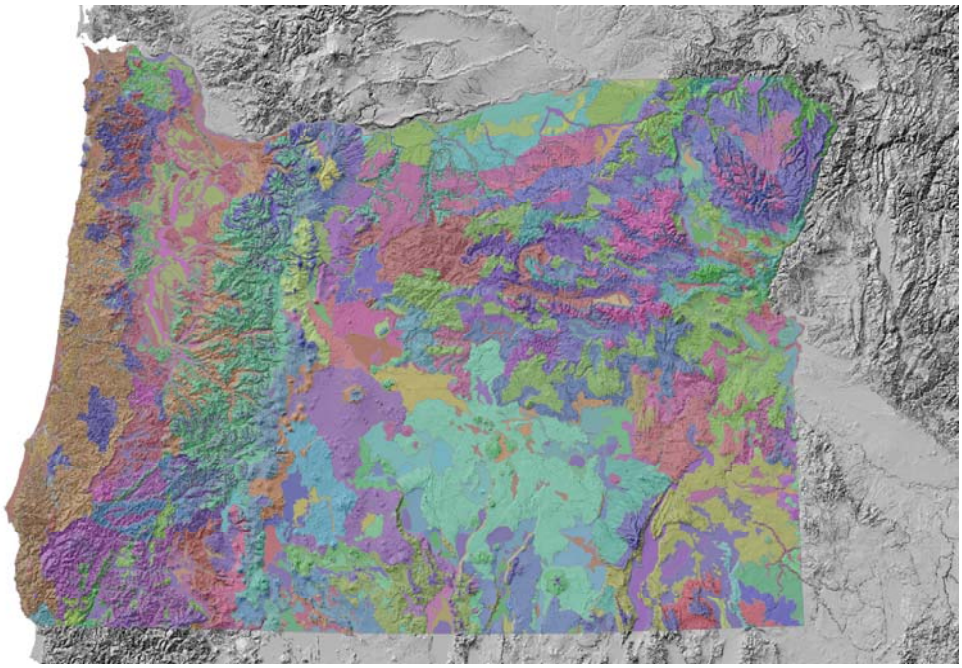
PROPOSED

OREGON SOILS FRAMEWORK LAYER (OSFL)

A COMPONENT OF THE OREGON GEOSCIENCE FRAMEWORK THEME



Draft for Comment

February 2009

Prepared by
Oregon Soils Committee

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1.0 INTRODUCTION

The Oregon Geographic Information Council (OGIC) is overseeing preparation of geospatial data standards for the state. The development of these standards will ease the sharing of data and assist cooperative data development efforts. OGIC assigned a Framework Implementation Team (FIT) to guide the development of standards for 14 statewide data themes. Separate (Oregon Framework) Work Groups are developing standards for each theme. Geoscience is one Oregon Framework theme and a Geologic Committee is guiding development of a Geologic Layer and a Soils Committee is coordinating a Soils Layer. This document concerns the Soils Layer.

This document is a standard for compiling soil map data statewide for Oregon. It is based on the National Cooperative Soil Survey (NCSS) standards and the Soil Geographic Data Standards of the Federal Geographic Data Committee (SGDS-FGDC). These standards provide the structure for organizing, storing, and using a range of soils map data. The NCSS and SGDS-FGDC data standards, as well as supporting methodologies, are designed for optimal use at 1:12,000 to 1:30,000 or smaller scales (FGDC, 1997) (Fig. 1). Much of the

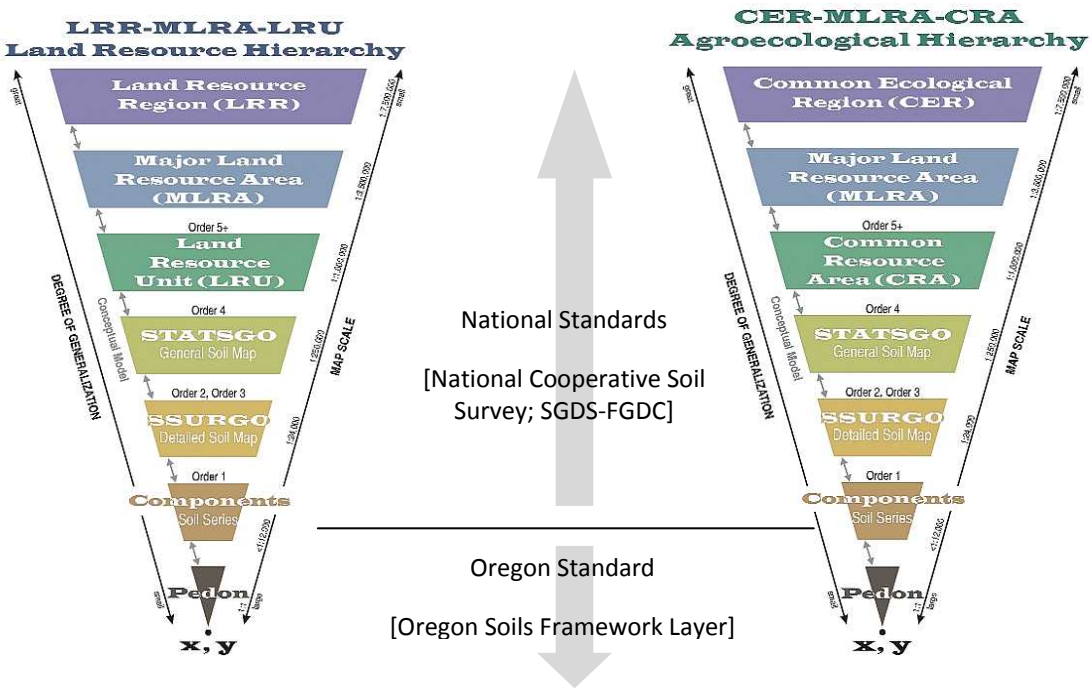

Figure 1. National hierarchies for land resources and agroecology are conceptualized as inverted pyramids, from most general at the top to most site- specific at the bottom. For Land Resources (R), from top to bottom: Land Resource Region (LRR), Major Land Resource Area (MLRA), Land Resource Unit (LRU), STATSGO (General Soil Map), SSURGO (Detailed Soil Map), Components (Soil Series), Pedon, and Point. For Agroecology (L), from top to bottom: Common Ecological Region (CER), Major Land Resource Area (MLRA), Common Resource Area (CRA), STATSGO (General Soil Map), SSURGO (Detailed Soil Map), Components (Soil Series), Pedon, and Point. From USDA-NRS (http://soils.usda.gov/survey/geography/hierarchy/) (acccessed 2/11/09)

State and private concerns in regard to soils geospatial data are at scales greater than 1:12,000 (e.g. 1:5,000). This document seeks to address high intensity and site-specific investigations of soils in Oregon. This document outlines a content standard emphasizing geologic features, concepts, and relationships pertaining to information presented on soil maps. The standard addresses the graphic data elements held in a geographic information system (GIS) and the non-graphic descriptive information linked to the graphic elements, which could be organized in a relational database such as PEDON (NRCS).

1.1 MISSION AND GOALS OF STANDARD

The mission of this standard is to provide a consistent and maintainable structure for soil map data being compiled statewide for Oregon. The name of this statewide compilation dataset is the Oregon Soils Framework Layer (OSFL). Its overall aim is to assist both producers and users of soil map data in Oregon. The following goals influenced development of this standard:

- To provide guidance and structure to spatial data collected and distributed at scales too detailed for national concerns.
- To provide guidance for integration of site-specific and local soil information with the existing, smaller scale, i.e., Order 2 to 5 soil map standards of the NCSS and SGDS-FGDC.

1.2 RELATIONSHIP TO EXISTING STANDARDS

The OSFL is directly related to the existing Soil Geographic Data Standards (SGDS) of the FGDC. The overall objective of the SGDS is to standardize the names, definitions, ranges of values, and other characteristics of soil survey map attribute data developed by the National Cooperative Soil Survey (NCSS) (FGDC, 1997). The NCSS is the body composed of the various federal, state, and local units of government who work cooperatively to develop the soil survey of all lands in the United States. The SGDS is a set of data standards for the inventory, mapping, and reporting on the soil resources of the United States. It includes a description of the proposed data elements to be used when reporting and transferring data used to describe soil map units and their components. These map units are associated with soil maps developed by the National Cooperative Soil Survey. The SGDC does not detail data elements used to describe soils at a specific point/site on the landscape, the field methods used to collect the data, or the various classification systems used to classify soils. The OSFL deals with point/site data. Documents containing the field methods and various classification systems are listed as references at the end of this standard. The Oregon Geologic Data Model (http://www.oregon.gov/DAS/FISPD/GEO/Standards/Standards.shtml) served as an important reference in designing the OSFL.

1.3 DESCRIPTION OF THE STANDARD

This standard lays out the essential content and data structure necessary to describe, produce, and use the OSFL. These essential elements are a distillation of the important features normally included as the content of soil maps and deemed necessary for the statewide layer.

The standard addresses three organizational components:

1 Geospatial elements (or geometry)

2 Description of soils and soil map units

3 Metadata for documentation

This standard has been written recognizing that: soils maps are complex and interpretive; the classifications of soils and soil-landscape concepts interpretations have and will continue to evolve over time. This standard focuses more on issues of scales and site-specific character, rather than setting a new precedent for soils maps. Acknowledging these, the standard strives to be highly adaptive and refrains from re-interpreting the data and interpretations the author developed in the original soils map. However, an important part of the OSFL is the assignment of Merge Unit Labels that organize the disparate original mapped soils units into several coherent statewide classifications. This is a departure from the national system of NCSS wherein soils are correlated by officials of the NRCS to central concepts of each recognized soil series. This distinction is necessary to produce a statewide soils layer because so much of the state remains unmapped or uncorrelated by NCSS standards.

1.4 APPLICABILITY AND INTENDED USE OF THE STANDARD

The intent of this standard is to foster the orderly development, sharing, and maintenance of the OSFL. This standard proposes a consistent format, structure, and documentation for the OSFL. It is a minimum standard intended to be usable by all levels of government, as well as academia and the private sector. As work on national soils data standards evolves for local and site-specific information (soils maps), this standard will evolve and strive to be compatible with such efforts.

1.5 STANDARD DEVELOPMENT PROCEDURES

The Oregon Geoscience Framework Group – Soils Committee, was formed in 2007 and has since met infrequently. The draft model will be made available for wider review/comment on the Oregon Geospatial Enterprise Office (GEO) website: http://www.gis.state.or.us/coord/FrameLayers/soilsFrame.html. This site is hosted by the Oregon Department of Administrative Services.

1.6 MAINTENANCE OF THE STANDARD

The Soils Committee acknowledges that this standard will need periodic maintenance during preparation of the OSFL. Updates to this standard will be presented, when appropriate, to the Soils Committee for comment, revision, and final endorsement. Oregon State University− Soils Science Unit (OSU− SSU) is implementing the standard in a one-year project to complete the OSFL, and will be the data steward for the OSFL.

2.0 BODY OF THE STANDARD

2.1 SCOPE AND CONTENT OF THE STANDARD

The scope of this standard encompasses the public domain vector, raster and associated tabular soils data compiled for the OSFL. The range of applicable reference map scales is from 1:100 to 1:12,000, specifically, and down to 1:500,000. This wide range of scales reflects the variable resolution of soils mapping in the state. This range of scales makes documentation of the original reference map scale an important element of this standard. The standard anticipates the addition of continually improved data resolution by providing for the incorporation of new, higher resolution mapping as it becomes available. This standard adopts national standards that are applicable up to 1:12,000 scale; this standard expands those definitions up to 1:100 scale so that site-specific soils map data may be aggregated in the state. The unique identification of each reference map's line, point, and polygon feature is within the scope of this standard and allows users to go to the reference, if needed. This standard does not include a standardized science language for describing, classifying and interpreting soils, including their description and classification. The standard soils language is encoded at the national level by NCSS.

The list of geospatial and attribute elements included in this standard will likely be modified and added to in the future. When appropriate, these modifications/additions will be submitted to the Soils Committee for acceptance and the revised data content publicized to all interested users of the standard.

2.2 NEED FOR THE STANDARD

Soils maps are very diverse in the type(s) of information that they contain and the soils-related issues that they address. They are produced by State or Federal agencies, private industry consultants, and academic researchers according to well-described, standard professional guidelines for content and form (see appendix). The features displayed on soils maps are interpretive and specific to each soils survey.

2.3 PARTICIPATION IN STANDARDS DEVELOPMENT

The Soils Committee is comprised of federal, state, and academic representatives. Participation in the Committee is open to all entities that are concerned with the production, use and exchange of statewide digital geologic information. Present member affiliations include:

- Oregon Department of Administrative Services
- Oregon Department of Agriculture
- Oregon Department of Environmental Quality
- Oregon Department of Geology & Mineral Industries
- Oregon Department of Revenue

- Oregon Department of Transportation
- Oregon Watershed Enhancement Board
- U.S. Bureau of Land Management
- U.S. Forest Service
- U.S. Geological Survey
- U.S. Government
- U.S. Natural Resources Conservation Service
- Oregon State University, Department of Crop and Soil Science, Soil Science Unit

This Is being tested and implemented in a pilot OSFL project during 2008-2009. The project integrates original reference maps in a layer covering the entire state of Oregon. Information regarding the pilot project is available from OSU– Soil Science Unit (http://cropandsoil.oregonstate.edu).

2.4 INTEGRATION WITH OTHER STANDARDS

The layout of this standard conforms to the OGIC layout template developed for the Oregon Framework Themes. Further, it is directly developed from the OGFL, with which it is partnered under the Oregon Geosciences Framework Theme. The documentation component of this standard, as specified in various tables listed in Appendix, relates to the OGIC-approved metadata standard. In 2008, the Soils Committee recommended the SGDS-FDGC for adoption and full integration with this standard.

2.5 TECHNICAL AND OPERATIONAL CONTEXT

2.5.1 DATA ENVIRONMENT

The data environment for the OSFL is a vector model of polygons, lines, and points linked to relational database content. Digital soils data elements are assembled in a variety of proprietary formats (both CAD and GIS). However the state exchange medium is the ESRI shapefile, a public domain data structure relating polygons, lines, points and feature attribution (including shape geometry). To take full advantage of the OSFL, the user must properly link the shapefile(s) to the descriptive content in the relational database. The data environment of this relational database will be both comma-delimited ASCII and the MS Access 2000 formats.

2.5.2 REFERENCE SYSTEMS

Soils map information is commonly assembled and overlayed on a U.S. Geological Survey Digital Orthoquad quadrangle (DOQQ). DOQQs are typically provided in the Universal Transverse Mercator coordinate referencing system. However, for the OSFL, all soils information will be stored and exchanged in the custom Oregon Lambert Projection. This is the adopted standard projection among Oregon state agencies. Specific parameters of this projection can be found at http://www.gis.state.or.us/data/format.html

2.5.4 INTEGRATION OF THEMES

Soils are mapped on the basis of climate, hydrology, biology (esp. vegetation), elevation, slope, landform, geology and other environmental factors. The integrative nature of soils mapping means that features (point, line, polygon) of the OSFL will locally to regionally show strong correspondence to Framework Layers carrying spatial information (e.g. vegetation map unit boundary) of these environmental factors.

2.5.5 ENCODING

Soils data incorporated into the OSFL will be encoded according to the SGDS-FGDC, adopted by the Soils Committee. Data dictionaries describing the specific format for the OSFL those currently published by the NCSS.

2.5.6 RESOLUTION

The resolution of the OSFL will vary according to the original reference soils map(s) or individual contributor's working map scale. The range of scales is 1:100 to 1:500,000. The OSFL has been designed to allow the best available soils data to nest together in a single statewide dataset, regardless of original map scale. This process is managed through assignment of Merge Unit Labels to map unit labels in both the spatial data (polygons) and in the descriptive data (database) in the Compilation Merge Unit table.

2.5.7 ACCURACY

This standard supports varying levels of positional accuracy, as implied by the range of original reference map scales. The accuracy of interpreted soils information varies with the scale of its base map. Soil map unit interpretations from the original written explanatory reference materials are carried directly into the relational database without reinterpretation, thereby promoting attribute accuracy.

2.5.8 EDGE MATCHING

The concept of seamless geometry is not compatible with integration and maintenance of data from widely varying original map scales. As this standard guides incorporation of the best available data for the OSFL, the concept of 'logical seamlessness' is applied. Individual reference map polygon and line features are not edgematched, however, a 'logical seamlessness' is achieved through assignment of the Merge Unit Labels in the Compilation Merge Unit table. Improvement in edgematching is anticipated as the OSFL continually incorporates newer, higher-resolution mapping.

2.5.9 FEATURE IDENTIFICATION CODE

The feature identification code is the concatenation of two separate fields: a unique Reference_ID_Code for the reference geologic map plus the individual polygon/line/point

unique ID. The Reference_ID_Code is a text field that identifies the reference author by the first four letters of the last name, followed by the first and middle initials, followed by the year of work or the unpublished status, followed by the plate information (if any).

For example: BrowDE1980aPlate3 = Brown, David E., published 1980, "a" indicates that the OSFL contains more than the map by this author for this year, and where multiple maps from the same publication are used, the particular map cited. OSU-SSU will maintain the list of Reference_ID_Codes. All information about the soils features is tracked by the Reference_ID_Code, this is the field linking all spatial features with the relational database table content.

2.5.10 ATTRIBUTES

2.5.10.1 POLYGONS

Polygons are geospatial objects that represent the boundaries of soils map units that have been mapped by a soil scientist and digitally encoded. Each polygon is uniquely identified according to the Feature Identification Code described in Section 2.5.9.

2.5.10.2 LINES

Lines are geospatial objects that represent the azimuths and locations of linear soils features mapped by a soil scientist and digitally encoded. Lines are uniquely identified according to the Feature Identification Code described in Section 2.5.9.

2.5.10.3 POINTS

Points are geospatial objects that identify the location on the ground of soils- related feature sites. Points are uniquely identified according to the Feature Identification Code described in Section 2.5.9.

2.5.11 TRANSACTIONAL UPDATING

An exact process to handle transactional updating of soils data is being explored. The data steward for the OSFL is OSU-SSU. The OGDM design strives to make possible the timely incorporation of new data as it becomes available.

2.5.12 RECORDS MANAGEMENT

Versions of the OSFL, as it is developed, will be tracked using a relational database management system hosted by OSU-SSU. At a minimum, the OSFL versions will satisfy the archiving mandates applying to Oregon State agencies.

2.5.13 METADATA

This standard follows the Oregon Core Metadata Standard for geospatial data. Metadata detailing the characteristics, content, and quality of geologic map information must be provided. Metadata reports should make every effort to meet the more rigorous standards set forth in the federal Metadata Content Standard. The metadata will provide sufficient information to allow the potential user to determine if the dataset will meet their intended purpose, as well as to assist the user in accessing and interpreting the data.

3.0 DATA CHARACTERISTICS

The data characteristics detailed below are subject to revision, based on continuing refinement of the OGDM. The data characteristics described in this section represent the minimum set of graphical and non-graphical attributes required to meet this standard.

3.1 MINIMUM GRAPHIC DATA ELEMENTS

See Oregon Geology Framework Layer standard.

3.2 MINIMUM ATTRIBUTE OR NON-GRAPHIC DATA ELEMENTS

See Oregon Geology Framework Layer standard.

3.3 OPTIONAL GRAPHIC DATA ELEMENTS

None specified at this time

3.4 OPTIONAL ATTRIBUTE OR NON-GRAPHIC DATA ELEMENTS

None specified at this time

4.0 REFERENCES

Federal Geographic Data Committee (FGDC), 1997. Soil Geographic Data Standard. http://www.fgdc.gov/standards/projects/FGDC-standards-projects/soils/soil997.PDF (accessed 11/21/08).