Developing a useful interim soil survey report

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ABSTRACT

Since complete soil survey information gathered by the National Cooperative Soil Survey for an area generally is not available for public use before publication of the official soil survey report, an accurate interim report is needed for immediate utilization of the survey. This paper documents the development of an interim report for the Whatcom County Area, WA by the Soil Conservation Service and Western Washington University, a non-Land Grant university. The interim report will have a useful life of about 4 years until the official report is published. The Service provided the technical soil descriptions and interpretations. The University provided computer services for processing, editing, and printing the soil map descriptions, and University cartography students drafted the maps onto mylar at the original scale of 1:24,000. Reduced paper copies of these maps at 1:50,500 were produced for the report. Several government agencies and private companies have requested the report and are using it now.

Additional index words: Cartography, Computer-assisted-writing (CAW), Orthophotography.

DURING the time period between the completion of soil mapping and the publication of a soil survey report prepared by the National Cooperative Soil Survey (NCSS), a complete package of soil survey information, particularly one containing high-quality maps and map unit descriptions, generally is not available to the public. Although the goal of NCSS is to publish soil surveys within 1 year of mapping completion, in the State of Washington the backlog of manuscripts and map compilation from the accelerated soil survey of 1975 to 1980 has resulted in an average delay of about 4 years. The expected publication date for the soil survey report for the Whatcom County area is 1988, about 6 years after mapping completion. Although individual field sheets can be photocopied for owners of small parcels of land, this procedure is impractical for large areas.

A viable alternative for making soil survey information available is to prepare an interim soil survey report for use while the manuscript and maps are processed for official publication. Because NCSS's state and national authorities routinely verify the accuracy of the soil survey at the final correlation conference, which occurs before the text and maps are sent for editing and publishing, the information in the interim report is essentially the same as that in the official report. The NCSS in Whatcom County is composed of the Soil Conservation Service (SCS) (mapping the entire county, soil correlation, and production of the manuscript), the Washington State Department of Natural Resources (DNR) (mapping the forested lands and map compilation August 1978 to July 1980), Western Washington University (providing ADP facilities and expertise for text preparation and the production of the interim report, and providing work space for the soil survey party), and Washington State University (providing quality control and technical review of the manuscript).

This paper describes the development of the "Interim Soil Survey Report, Whatcom County Area, Washington" by the Soil Conservation Service in cooperation with Western Washington University (WWU), a non-Land-Grant university. The unique feature of the report is the innovative production of the maps and map unit descriptions.

The interim report of 648 pages includes student maps, drawn from 1:24,000 field sheets and compiled maps and printed at 1:50,500 to maximize scale on an 8.5 by 11-in sheet of paper (Fig. 1), the identification legend (Fig. 2), map unit descriptions generated from WWU's computer (Fig. 3), interpretable tables produced by the SCS Statistical Laboratory at Ames, IA (Fig. 4), technical descriptions of the soil series produced on the word processor at the SCS state office in Spokane, WA (Fig. 5), and a cover letter describing the advance copy status. The cover letter states that supplementary materials, such as the general soil map and descriptions of the general soil map units, laboratory data on 18 soils in the county, and a map and a listing of the prime agricultural soils for Whatcom County are available at the SCS field office. Since the production of the map unit descriptions and maps are the major obstacle for completing the packet of soil information, this paper will focus on these parts.

The computer-assisted-writing method (CAW) developed by the SCS's technical center in Portland, OR, increases the author's speed and efficiency in preparing map unit descriptions and ensures the consistency of the descriptions (1). CAW provides authors with a choice of coded prewritten statements or the option to write their own. In building the map unit descriptions, the computer sequentially reviews the list of coded descriptors (fillers) for each map unit (such as, "SET008 very deep, well drained/on outwash terraces"), searches for the required statement (SET008) in the statement file ("SET008 This soil is "). and combines them to form the text ("This very deep, well drained soil is on outwash terraces." (Fig. 3).

Fig. 1. Student-drawn soil map. Originally drawn at 1:24 000, published in interim report at 1:50 500.
Lynden sandy loam, 0 to 3 percent slopes. This very deep, well-drained soil is on outwash terraces. This soil formed in loess, volcanic ash, and glacial outwash. The native vegetation is mainly conifers and shrubs. Elevation is 50 to 300 feet. The average annual precipitation is about 45 inches, the average annual air temperature is about 50 degrees F, and the average frost-free period is about 170 days.

Typically, the surface layer is dark brown sandy loam 8 inches thick. The subsoil is dark brown sandy loam 10 inches thick. The upper 12 inches of the substratum is variegated but dominantly very dark grayish brown sand. The lower part to a depth of 60 inches is variegated but dominantly dark grayish brown sand. Depth to sand ranges from 14 to 24 inches.

Typical pedon of Lynden sandy loam, 3 to 8 percent slopes, 6 miles south of Lynden; 900 feet north and 750 feet east of the southwest corner of sec. 16, T. 39 N., R. 3 E. Ap—0 to 8 inches; dark brown (7.5YR 3/2) sandy loam, dark brown (10YR 4/3) dry; weak fine granular structure; soft, very friable, nonsticky, nonplastic, weakly smerey; many very fine roots; many very fine irregular pores; NaF pH 11.0; medium acid; abrupt smooth boundary.

This process is normally part of SCS's editing procedure; however, with its computer facilities and programming expertise, WWU was able to provide this capability on site. Without the WWU effort, the descriptions would have remained in coded form for a considerable time period until reformatted in the Portland technical center.

Using the text-editing capabilities of WWU’s computer to review the completed map unit descriptions, the party leader was able to edit them comprehensively and consistently at the field level prior to the final correlation conference. This procedure improved the quality of the map unit descriptions for the conference and for the interim and official reports. By sending the completed descriptions to the Portland office on magnetic tape, data entry and editing time at that location as well as at the state office in Spokane were greatly reduced, thereby cutting costs overall.

The production of the 192 map unit descriptions at WWU required 30 working days for one person to enter the coded prewritten statements and data from the coded worksheets, and several weeks of programmer time to develop the software (written in Pascal) to run on WWU's time-share system (DEC VAX 11/780).

The 27 maps in the interim report are indexed by township and range. For 13 townships—covering mostly mountainous woodland—DNR and the SCS completed the mapping under a cooperative agreement. By late 1980 DNR had compiled the soil maps from the field sheets onto black-and-white orthophotography at a scale of 1:24 000. In winter quarter 1981, first-term cartography students at WWU transferred the soil lines and symbols from the orthophotos onto mylar at the same scale. Each of the 26 students was assigned one of the 13 townships and the best map of each pair was chosen for the report.

For students beginning their cartographic training, this project provided practice in basic drafting skills with ink on mylar and the use of mechanical lettering methods. Important experience was gained in drafting lines and symbols to standard weight and quality and lettering of appropriate size and placement for legibility.

The SCS completed the soil mapping for the remaining 14 townships in the more level western part of the county in October 1982. Map compilation and the production of orthophotography for this area was not the responsibility of DNR and will not be available until at least 1986. In spring quarter 1983, ten advanced cartography students transferred lines and map symbols from the 1:24 000 field sheets onto mylar base maps traced from 7.5 min USGS quad sheets. The lines and map symbols were transferred directly from the field sheets when the scale was about 1:24 000. When the scale on the field sheets varied significantly from this scale, an optical projector was used to project the image of the field sheet to fit within the bounds of the base map.

For these advanced students, the emphasis was on organizing project resources and personnel, and gaining experience with new materials and new equipment (phototypesetter, process camera, and optical scale changing devices). Lettering was prepared on a phototypesetter and transferred onto clear base photo-mechanical transfer material for placement onto the maps.
The cartography professor and the soil survey party leader reviewed the maps for quality and for accuracy, ensuring that they were well within the standards for the soil survey. Although maps drawn by cartography students using an optical projector are not as precise as those made photogrammetrically by a professional cartographer using a Kelsh plotter, such as in the DNR map compilation, they are adequate and are available sooner.

Not only did the students produce soil survey maps of high cartographic quality, but they gained additional experience in thematic map design and production. Examples include maps of prime agricultural land, soil depth, slope, parent materials, soil temperature, drainage class, and forest productivity. These maps were not included in the interim report, but have been valuable to the party leader, the county planning department, and other users. They are on file in the WWU map library.

The following organizations have requested copies of this report and are using it now: SCS field office; Whatcom County's Planning, Engineering and Health departments; the Whatcom County Conservation District; and several local corporations. It is also on file as a reference in the libraries of Whatcom County, The University of British Columbia, and WWU, and in the Washington State Cooperative Extension Service and the British Columbia Ministry of Environment.

Until the release of this interim report, the principal source of soils information was the 1953 soil survey report (2). Although these organizations have found the 1953 survey useful, they are benefitting from an updated survey which was made with more scientifically advanced techniques and which includes detailed interpretations for soils in urban, agriculture, and forestry uses and for soils in areas previously designated "rough mountainous land." Land users in counties lacking a previous soil survey would especially benefit from the development of such an interim report.

An abbreviated interim report (152 pages) was also organized for Bellingham, the county's largest city. In addition to the principal parts described in the county report, this report also includes a self-guided soils tour, photographs, and soil samples. City planners and the Bellingham Public Schools have responded enthusiastically and the schools plan to incorporate parts of the report, especially the tour, into their curriculum.

These projects demonstrate important government-university interaction and cooperation. They gave students valuable experience in working with non-university personnel, in learning about soil survey, and in meeting the quality and time requirements of an outside agency. These projects also gave soil surveyors the opportunity to work closely with the users of their product.

REFERENCES


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1 The use of trade and company names does not imply endorsement by USDA.